m4|26

AIR PHOTO SERVICES
21 GUNHILD WAY
CAMBRIDGE
CB1 8QZ
PHONE/FAX 01223 572063

HOLDINGHAM RISING MAIN, SLEAFORD, AREA CENTRED TF075473, LINCOLNSHIRE:

AERIAL PHOTOGRAPHIC ASSESSMENT

REPORT No: 2004/35

DECEMBER 2004

Commissioned by:
Archaeological Project Services
The Old School
Cameron Street
Heckington
Sleaford
Lincs NG34 9RW

AIR PHOTO SERVICES, CAMBRIDGE: ROG PALMER MA MIFA
Archaeological consultant for aerial photographic interpretation and accurate mapping

No event INTERVENTION REPORT: LI10021

PRN 63570 63676 65273
60458 62677

HOLDINGHAM RISING MAIN, SLEAFORD,
AREA CENTRED TF075473,
LINCOLNSHIRE:
AERIAL PHOTOGRAPHIC ASSESSMENT

SUMMARY

This assessment of aerial photographs examined a corridor 500m each side of a pipeline between TF067471 and TF082473 in order to identify and accurately map archaeological, recent and natural features.

The main pre-medieval features are parts of a ditch-defined field system(s) that appears to be laid perpendicular to the Roman road and may be of that date. Within or adjacent to the fields are sites that may be settlement enclosures. Two of those may be affected by the Development.

Medieval landuse is evident by the remains of ridge and furrow cultivation.

Three recent pipelines have been identified.

Original photo interpretation and mapping for the 500m corridor was at 1:10000 level with extracts enhanced to 1:2500 level for fields adjacent to the Development.

HOLDINGHAM RISING MAIN, SLEAFORD,

AREA CENTRED TF075473,

LINCOLNSHIRE:

AERIAL PHOTOGRAPHIC ASSESSMENT

Rog Palmer MA MIFA

INTRODUCTION

This assessment of aerial photographs was commissioned to examine a corridor 500m each side of a pipeline between TF067471 and TF082473 in order to identify and accurately map archaeological, recent and natural features and thus provide a guide for field evaluation. That corridor was to be examined at 1:10000 level with extracts enhanced to 1:2500 level if they were likely to be affected by the Development.

ARCHAEOLOGICAL AND NATURAL FEATURES FROM AERIAL PHOTOGRAPHS

In suitable cultivated soils, sub-surface features – including archaeological ditches, banks, pits, walls or foundations – may be recorded from the air in different ways in different seasons. In spring and summer these may show through their effect on crops growing above them. Such indications tend to be at their most visible in ripe cereal crops, in June or July in this part of Britain, although their appearance cannot accurately be predicted and their absence cannot be taken to imply evidence of archaeological absence. In winter months, when the soil is bare or crop cover is thin (when viewed from above), features may show by virtue of their different soils. Upstanding remains, which may survive in unploughed grassland, are also best recorded in winter months when vegetation is sparse and the low angle of the sun helps pick out slight differences of height and slope.

Grass sometimes shows sub-surface features through the withering of the plants above them. This may occur towards the end of very dry summers and usually indicates the presence of buried walls or foundations. Such dry summers occurred in Britain in 1949, 1959, 1975, 1976, 1984, 1989 and 1990 (Bewley 1994, 25) and more recently in 1995 and 1996. This does not imply that every grass field will reveal its buried remains on these dates as local variations in weather and field management will affect parching. However, it does provide a list of years in which photographs taken from, say, mid July to the end of August may prove informative.

Natural faults and deposits can cause similar differences in crop growth and may also appear as colour differences in bare winter soils. On the limestone areas in this locality we may expect indications of fissures that are typical of that bedrock and which may be mistaken for archaeological ditches. Soil-filled fissures can affect the growth of crops and become visible at the same times as archaeological features.

PHOTO INTERPRETATION AND MAPPING

Photographs examined

The most immediately informative aerial photographs of archaeological subjects tend to be those resulting from observer-directed flights. This activity is usually undertaken by an experienced archaeological observer who will fly at seasons and times of day when optimum results are expected. Oblique photographs, taken using a hand-held camera, are the usual products of such investigation. Although oblique photographs are able to provide a very detailed view, they are biased in providing a record that is mainly of features noticed by the observer, understood, and thought to be of archaeological relevance. To be able to map accurately from these photographs it is necessary that they have been taken from a sufficient height to include surrounding control information.

Vertical photographs cover the whole of Britain and can provide scenes on a series of dates between (usually) 1946-7 and the present. Unfortunately these vertical surveys were not necessarily flown at times of year that are best to record the archaeological features sought for this Assessment and may have been taken at inappropriate dates to record crop and soil responses that may be seen above sub-surface features. Vertical photographs are taken by a camera fixed inside an aircraft and adjusted to take a series of overlapping views that can be examined stereoscopically. They are often of relatively small scale and their interpretation requires higher perceptive powers and a more cautious approach than that necessary for examination of obliques. Use of these small-scale images can also lead to errors of location and size when they are rectified or re-scaled to match a larger map scale.

Cover searches were obtained from the Cambridge University Collection of Aerial Photographs (CUCAP) and the National Monuments Record: Air Photographs (NMRAP), Swindon. Archaeological Project Services listed photographs at Lincolnshire SMR as part of their Desktop Report and identified none that were not duplicated at CUCAP or NMRC. Photographs included those resulting from observer-directed flights and routine vertical surveys.

Photographs consulted are listed in the Appendix to this report.

Base maps

Digital data at survey scale of 1:2500 and a printed copy of the 1:10000 OS map were provided by the client.

Study area

Photographs were examined in detail for the area shown in Figure 1, defined approximately by corners TF060465 and TF090480.

Photo interpretation and mapping

All photographs were examined by eye and under slight (2x) magnification, viewing them as stereoscopic pairs when possible. Interpretations were made in two ways. Where copies of prints were available for scanning the digital copies were transformed to match either base map using the specialist program AirPhoto (Scollar 2002). All scanned photographs were enhanced using the default setting in AirPhoto before being examined on screen. Transformed files were set as background layers in AutoCAD Map, where features were overdrawn, making reference to the original prints, using standard conventions. Other photographs were interpreted on overlays to individual prints following procedures described by Palmer and Cox (1993). These overlays were then scanned and transformed to match the relevant-scale base map using AirPhoto. Resulting files were imported into AutoCAD Map where features were overdrawn using standard conventions.

Two maps have been produced for this Assessment:

1:10000. This large area provides context within a 500m corridor as required. Medieval cultivation is shown only at this scale and has been sketched schematically.

1:2500. Features within modern fields that may be affected by, or are more relevant to, the pipeline have been interpreted and mapped at this scale and then exported to the 1:10000 map.

Both maps have been provided to the client in digital form and are printed as illustrations in this report (1:2500 is reduced to fit the page).

Accuracy

AirPhoto computes values for mismatches of control points on the photograph and map. Within the area mapped at 1:2500 features in all modern fields except one were transformed with mean mismatches of less than ±1.50m. The exception was in the field centred TF074474 north of the A17 which combines information from two amateur photographs which were taken from too low a height to include sufficient modern control information. Errors in location are likely to be in the region of ±3-4m.

Mapping originally undertaken at 1:10000 does not have the inherent accuracy to be used to locate features on the ground with precision.

COMMENTARY

Soils

The Soil Survey of England and Wales (SSEW 1983) shows the Study Area is bisected by a north-south deposit of Jurassic sand and clay (soil association 841a: Curdridge). West of this is Jurassic limestone and clay (soil association 512a: ASWARBY) while on the east is Glaciofluvial sand and gravel (soil association 512c: RUSKINGTON). Differences in the effect of these soils on

crop growth above sub-surface variations are discussed by Ann Carter (1998, 98-100) and her Figures 1 and 4 show a considerable amount of archaeological information has been recorded on the RUSKINGTON and ASWARBY associations with little on the Curdridge association. Within the Study Area the Soil Survey map shows that most of the land south of the pipeline is of Curdridge association while west and north and the north-east areas are on more responsive soils. Carter's conclusions are based on incomplete archaeological evidence (see below) and land within the actual Development zone appears to be very responsive.

Archaeological features (Figures 1 and 2)

Parts of Lincolnshire have been mapped previously as part of English Heritage's National Mapping Programme and the northern part of the Study Area appears in a map published by Winton (1998, fig 11). That mapping is elementary and a considerable amount of information is missing despite it being recorded on photographs taken many years before NMP commenced.

Figures in this report update the NMP mapping and show a planned landscape in which ditch-defined field systems appear to have been laid with axes perpendicular to and west of the Roman road. The road was visible on aerial photographs as a pair of side ditches showing, in places, hints of internal metalling visible as poor growth in crop. Quarry ditches as shown by Winton (*op cit*) were also visible but have not been mapped for this Assessment. Extending the alignment of the Roman road suggests that it will be cut by the present Development.

The mapped field systems in the Study Area show close parallels to the 'brickwork fields' identified and named by Riley following his survey of North Nottingham and South Yorkshire (Riley 1980). Limited field evaluation before that publication suggested a Romano-British date for the fields and this has been confirmed by archaeological excavations at later dates, although it has been argued that the origin of the field systems (in Yorkshire) may be pre-Roman (Chadwick 1997). As in the northern examples, the Sleaford area fields include a scatter of features that are likely to be settlement sites. Two of these, one south of the A17 at TF071472 and one immediately north of the road at TF074474, may be affected by the Development. Others are more distant.

All ditched archaeological features shown in Figure 1 may be of this later prehistoric to Romano British date as no obvious earlier forms such as ring ditches have been identified. There is also little superimposition of features which suggests that there was little major change, or different usage, to the planned system of ditched land divisions.

In medieval times the land was cultivated as is indicated by the ridge and furrow, all of which is now levelled by modern ploughing. The mapped ridge and furrow may include one field that was steam ploughed in post-medieval times (centred TF080468). Furrows there were straight and showed closer spacing than elsewhere in the Study Area.

Figure 2 shows the area that was interpreted and mapped at 1:2500 level and will show greater detail with higher positional accuracy than the 1:10000 Study Area mapping. Medieval cultivation and recent features have been omitted from that map.

A number of features, usually straight ditches, have been mapped as being of 'uncertain age'. Their character on photographs was different to the obviously archaeological ditches and they may remain from more recent field divisions although some (as for example in area TF083478) are on identical axes to definite archaeological features.

Non-archaeological features

Crops in many fields in the Study Area indicated a sub-surface network of fine fissures as is common on Limestone bedrock. These are ubiquitous and have not been mapped as in this part of Lincolnshire there is little chance of misidentifying them as of archaeological origin.

Two less certain identifications as 'possible natural' have been made in the area centred TF071472 where information on the photographs was not sufficiently unambiguous to assign the features to either 'archaeology' or 'natural'.

Three pipelines have been sketch-mapped at 1:10000. All were first visible in 1968, as also was the Sewage Works at TF083473. One of the pipelines follows almost exactly a ditch of a field system (area TF075470). The ditch was visible on photographs taken in 1951 and thus appears to be a genuine archaeological feature.

One area of hand-dug quarrying was identified towards the north of the Study Area (TF080478) where it cuts through the Roman road. In the same area are a number of recent field boundaries, one of which appears as a triple ditch (TF079476).

Land use

Except for a small number of farm-side fields, all land in the Study Area, and all of that cut by the Development, was in arable use on the latest date of photography. Some fields, mainly those along the Old River Slea and others near Sleaford Wood, were used as pasture in the 1940s and 50s but all had been converted to arable by 1968.

The A17 was constructed by 1974 and in that year recently laid field drains were visible in a number of fields south of the road.

The fairly long arable use of the land and frequent over-flying by specialist archaeological observers suggest that the mapped evidence provides a reasonably complete picture of past ditch-defined features in those areas where soils are conducive to differential crop growth.

REFERENCES

Bewley, R. H., 1994. *Prehistoric Settlements.* Batsford/English Heritage, London.

Carter, A., 1998. The contribution of aerial survey: understanding the results. In R.H. Bewley (ed) *Lincolnshire's Archaeology from the Air. Occasional Papers in Lincolnshire History and Archaeology* **11**, 96-104.

Chadwick, A., 1997. Towards a Social Archaeology of Later Prehistoric and Romano-British Field Systems in South Yorkshire, West Yorkshire and Nottinghamshire. *Assemblage* 2, http://www.shef.ac.uk/assem/2/2chad.html#back [accessed 01 April 2005]

OS, 2004. http://www.ordnancesurvey.gov.uk/productpages/landline/positional-background.htm

Palmer, R. and Cox, C., 1993. *Uses of aerial photography in archaeological evaluations. IFA Technical Paper* 12.

Riley, D.N., 1980. *Early Landscape from the Air.* Collis, Sheffield.

Scollar, I., 2002. Making things look vertical, in Bewley, R.H. and Rączkowski, W., (ed). *Aerial archaeology: developing future practice.* NATO Science Series, Vol **337**, 166-172.

SSEW, 1983. *Soils of England and Wales: sheet 4: Eastern England (1:250,000).* Soil Survey of England and Wales, Harpenden.

Winton, H., 1998. The cropmark evidence for prehistoric and Roman settlement in west Lincolnshire. In R.H. Bewley (ed). *Lincolnshire's Archaeology from the Air. Occasional Papers in Lincolnshire History and Archaeology* **11**, 47-68.

APPENDIX

Aerial photographs examined

Source: Cambridge University Collection of Aerial Photographs

Oblique photographs

PHOTO_ID	PHOTO_SUBJ	NGRE	NGRN	DATE
AAA55	Crop marks, 1.75 miles NE of Sleaford	508600	347800	13 Jul 1959
ABK20-21	Cropmarks, 0.75 mile N of Sleaford	506700	347100	22 Jun 1960
ABK34-37	Cropmarks, 1.5 miles NE of Sleaford	508400	347700	22 Jun 1960
ABK38-39	Panorama near Holdingham, looking NNE	507900	347800	22 Jun 1960
BTW56-57	Cropmarks, 0.5 mile NNW of Holdingham	505500	347800	5 Jul 1975
CJV12	Cropmarks, 1.5 miles ENE of Holdingham	508100	348000	21 Jul 1979
CJV13	Cropmarks, 1.25 miles ENE of Holdingham	507900	347800	21 Jul 1979
CJV15	Cropmarks, 1.75 miles NE of Sleaford	508700	347800	21 Jul 1979

Vertical photographs

PHOTO_ID	DATE	PHOTO_SUBJ	COVER TRACE	PHOTO SCALE	NGRE	NGRN
RC8DE002	21 Jul 1979	Crop marks, Ruskington and Leasingham	79_075	4000	508046	347564
RC8LN108	15 Jul 1989	Crop marks North East of Sleaford	89_085	5000	508681	347815
RC8LN109	15 Jul 1989	Crop marks North East of Sleaford	89_085	5000	508258	347608

Source: National Monuments Record: Air Photographs

Specialist collection

TF0647/1	18 July 1979
TF0647/2	5 July 1995
TF0747/1/46-47	5 August 1976
TF0747/2-4	18 July 1979
TF0747/5	22 July 1979
TF0747/6-7	18 July 1979
TF0747/8-9	12 July 1980
TF0747/10-11	19 July 1992
TF0747/12-13	5 August 1995
TF0747/14-16	15 July 1998
TF0748/1	18 July 1979
TF0846/4/354-355	24 July 1986
TF0846/6	15 August 1981
TF0847/1	5 August 1976

TF0847/2/38-39	5 August 1976
TF0847/3/40-41	5 August 1976
TF0847/4/42-43	5 August 1976
TF0847/5/44-45	5 August 1976
TF0847/6	15 August 1981
TF0847/7/356-357	24 July 1986
TF0847/8-10	15 August 1981
TF0847/11-14	15 July 1996
TF0847/15	14 July 1996
TF0847/16-17	5 August 1995
TF0847/18-19	15 July 1998
TF0947/6-7	15 August 1981

Vertical collection

RAF/CPE/UK/2073:3021-3026	17 May 1947	1:10500
RAF/CPE/UK/2073: 3070-3075	17 May 1947	1:10500
RAF/541/568: 3106-3110	7 June 1050	1:10000
RAF/541/568: 3162	7 June 1050	1:10000
RAF/541/568: 4050-4051	7 June 1050	1:10000
RAF/58/655: 3091-3094	25 April 1951	1:4980
RAF/58/655: 3123-3127	25 April 1951	1:4980
RAF/58/655: 4091-4094	25 April 1951	1:4980
OS/68041: 14-16	12 April 1968	1:7500
OS/68041: 76-78	12 April 1968	1:7500
OS/68041: 89-91	12 April 1968	1:7500
OS/74012: 3-6	5 April 1974	1:7800
OS/74012: 13-16	5 April 1974	1:7800
OS/74072: 25-27	26 May 1974	1:7500
OS/74072: 32-33	26 May 1974	1:7500
OS/74072: 40-44	26 May 1974	1:7500
OS/74177: 49-54	21 July 1974	1:7500
OS/74177: 61-63	21 July 1974	1:7500
OS/76137: 242	5 July 1976	1:7300

Most informative photographs

ABK20
CJV 13
RC8-DE 2
RC8-LN109
TF0747/1/46
TF0747/5
TF0747/11
TF0747/14
TF0747/16
TF0847/4
TF0847/5/44
TF0847/7/356
RAF/CPE/UK/2073:3021-3026
RAF/541/568: 3106-3110
RAF/58/655: 3094
OS/68041: 15
OS/74177: 50-51
OS/76137: 242

TERMS AND CONDITIONS

Air Photo Services have produced this assessment for their clients, Archaeological Project Services, subject to the following conditions:

Air Photo Services will be answerable only for those transcriptions, plans, documentary records and written reports that it submits to the clients, and not for the accuracy of any edited or re-drawn versions of that material that may subsequently be produced by the clients or any other of their agents.

That transcriptions, documentation, and textual reports presented within this assessment report shall be explicitly identified as the work of Air Photo Services.

Air Photo Services has consulted only those aerial photographs specified. It cannot guarantee that further aerial photographs of archaeological significance do not exist in collections that were not examined.

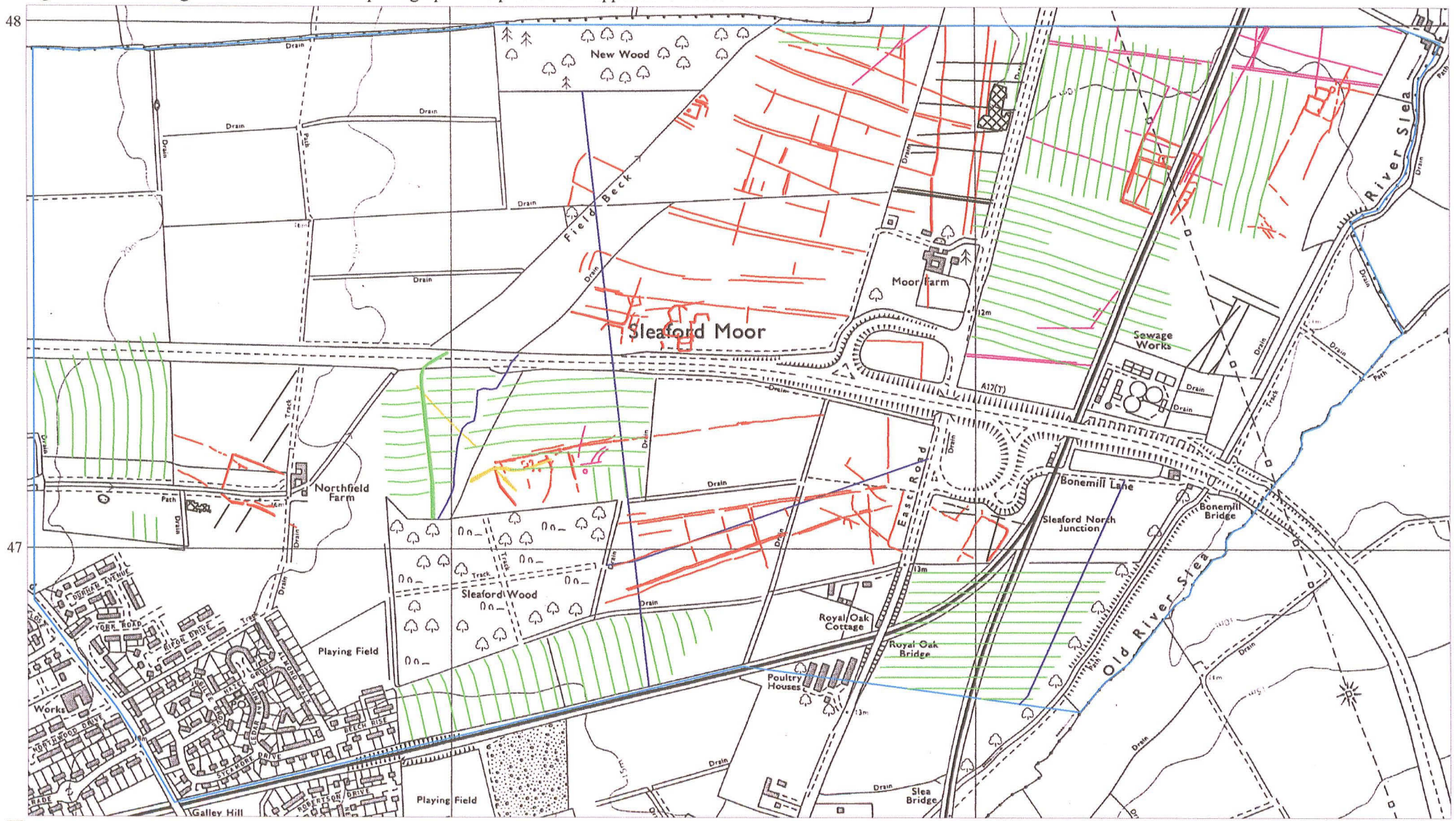
Due to the nature of aerial photographic evidence, Air Photo Services cannot guarantee that there may not be further archaeological features found during ground survey which are not visible on aerial photographs or that apparently 'blank' areas will not contain masked archaeological evidence.

We suggest that if a period of 6 months or more elapses between compilation of this report and field evaluation new searches are made in appropriate photo libraries. Examination of any newly acquired photographs is recommended.

That the original working documents (being interpretation overlays, control information, and digital data files) will remain the property of Air Photo Services and be securely retained by it for a period of three years from the completion date of this assessment after which only the digital files may be retained.

It is requested that a copy of this report be lodged with the relevant Sites and Monuments Record within six months of the completion of the archaeological evaluation.

Holdingham Rising Main, Sleaford, Lincolnshire:
Figure 1. Archaeological context from aerial photographs interpreted and mapped at 1:10000.



Area examined
Archaeological ditch
Ditch of uncertain age
Possible natural hollow
Medieval cultivation (schematic)
Recent boundary or field drain
Recent hand-dug quarry
Modern pipeline

Original photo interpretation and mapping at 1:10000
based on photographs at CUCAP and NMRC.
Air Photo Services Cambridge
December 2004
Drawing: 0435-10000.dwg

Holdingham Rising Main, Sleaford, Lincolnshire:
Figure 2. Archaeological features interpreted and mapped at 1:2500.

Area examined at 1:2500
Archaeological ditch
Possible archaeological ditch
Possible natural feature

For ridge and furrow see 1:10000 map.

Original photo interpretation and mapping at 1:2500
based on aerial photographs at CUCAP and NMRC.
Air Photo Services Cambridge
December 2004
Drawing: 0435Hold.dwg