Aerial Reconnaissance and Prehistoric and Romano-British Archaeology in Northern Lincolnshire - A Sample Survey

Dilwyn Jones

1. BACKGROUND AND OBJECTIVES OF THE SURVEY

The recording of archaeological sites by aerial photography has a long history in Lincolnshire, but it is only in very recent years that its potential contribution to prehistoric and Romano-British studies in the northern part of the county has begun to be realised. Most significant in this respect were the results of a modest flying programme, initiated by P. Everson on behalf of the former North Lincolnshire Archaeological Unit, which first hinted at the richness and diversity of settlement in this part of the county.

In April 1985, in advance of its proposed survey of cropmarks in historic Lincolnshire, the Royal Commission on the Historical Monuments of England (RCHME), in collaboration with Nottingham University, sponsored a sample survey to investigate the archaeological implications of the evidence recorded from the northern part of the county. A trial transect of some 335km² was examined with three primary objectives:

(i) to assess the extent, deficiencies, and quality of the existing air photographic record in order to draw up guidelines for further aerial reconnaissance;

(ii) to evaluate the ability of the soils in northern Lincolnshire to develop cropmarks, identifying the more sensitive areas and those lacking in response;

(iii) to examine, specifically, the cropmark evidence of prehistoric and Romano-British settlement.

2. METHODOLOGY OF SURVEY

2.1 Air Photographic and Archival Sources

Information on archaeological cropmark sites was derived from oblique aerial photographs. The three principal sources for the transect were the collections of the Cambridge Committee for Aerial Photography (CUCAP), the Air Photographic Unit of the RCHME and the significant collection built up independently by P. Everson under the auspices of the North Lincolnshire Archaeological Unit (NLAU) between 1976 and 1981. These were supplemented by the results of a limited amount of flying carried out intermittently by a number of locally based fliers during the 1960s and 1970s. The earliest oblique air photograph (exact date not known, c.1930) came from the O.G.S. Crawford Collection, the latest from sullies flown in August 1985 by the archaeological staff of the British Gas Corporation along the route of the Skitter-Hatton pipeline which ran across the transect from Stainton-le-Vale (TF 174 950) towards Ludford (TF 171 900) on the chalk Wolds.

Apart from photographs, the principal sources for archaeological information relating to archaeological sites and findspots recorded from the transect were the sites and monuments record compiled comprehensively for the area by P. Everson and the staff of NLAU, (including material from the records of the Lincoln City and County Museum) and the National Archaeological Record, Southampton. Additional information on sites discovered along the route of the Skitter-Hatton gas pipeline was provided from the sites and monuments record compiled by the archaeological staff of the British Gas Corporation under the direction of Mr. P. Catherall, and on sites in the Claxby-Walesby area from the fieldwalking records of Mrs. J. M. Lewis of Claxby.

2.2 Fieldwalking Evidence

Fieldwalking was an essential component of the project in view of the paucity of information available on the archaeology of rural settlement of this part of the county. The strategy adopted was dictated by the overall project design, by the constraints of time (the project was of a limited two-year duration), by the resources available (one person) and the extent of the study area. In contrast to the strategy employed in two systematic fieldwalking surveys in progress on the Wolds at the time of writing (by Dr. P. Phillips on behalf of Sheffield University, and P. Chowne on behalf of the Trust for Lincolnshire Archaeology) the RCHME project was ‘site specific’ and designed to examine a representative proportion of the undated cropmark sites encountered across the topographical spectrum of the transect.

Field visits enabled the cropmark evidence to be viewed in the context of its landscape setting, and thereby assisted interpretation. It was hoped that the archaeological material collected from the ploughsoil might give an indication of the time-span of activity on a site, or even of its function. Notwithstanding the problems of interpreting unstratified ploughsoil material, a field-walking strategy of a low level of intensity was judged the most appropriate at this exploratory stage of archaeological investigation. Its results would form the basis of a more intensive approach in the future.

Twenty eight days were spent in the field, in which a total of forty three cropmark sites were examined. Prior to the survey, only nine of the archaeological sites recorded from the air could have been inferred from findspot evidence; fieldwalking yielded archaeological material of varying amounts from a further sixteen sites (37.2% of the total examined). The material collected from fieldwalking will be deposited with the City and County Museum, Lincoln.

3. THE TRANSECT

3.1 Location

The area examined (Fig. 1) comprised a corridor 5km wide (corresponding to the depth of one 1:10,000 scale Ordnance Survey map) extending eastwards in a continuous band across the districts of West and East Lindsey from the River Trent to the coast (O.S. 1:10,000 scale map sequence numbers SK795E to TF495E), a distance of almost 70km At its western extremity the transect bisected the town of Gainsborough, but otherwise it avoided major centres of population, running to the north of both the market towns of Market Rasen in the Clay Vale and Louth in the Marshland. The orientation and precise location of the transect was dictated by geological and pedological considerations. In particular there was a need to sample the various geological and soil formations of northern Lincolnshire,
including the extensive aeolian sand deposits found in the Trentside lowlands, and along the foot of the Wolds escarpment in the Mid Clay Vale (Fig. 2 a & b).

3.2 Geology and relief

The underlying solid geology of northern Lincolnshire comprises a series of alternating strata of softer and harder rocks, dipping gently eastwards. The oldest (the Keuper Marl, and Rhaetic Beds of the Triassic) are on the west, with the youngest (the Chalk of the Upper Cretaceous) on the east (Kent et al., 1980; Swinnerton and Kent, 1981). This has produced a landscape of varied relief (Fig. 2b) in which ‘upland’ areas of more resistant rocks separate lowland vales of more easily eroded clays. As a result, the northern part of the county is divided topographically into five bands which run in a roughly north-south direction.

On the west side, the county is bounded by the Trent Valley, a flat-floored flood plain with levees, up to 15km wide, incised at the northern end by minor valleys formed by tributaries of the rivers Eau and Till. North and east of Gainsborough the Keuper Marl and Lias formations are largely overlain by Quaternary deposits. Aeolian sand occupies areas along the fringes of the carr-lands bordering the Trent, and a more extensive cover of Wolstonian till occurs on the higher ground (above the 15m contour) extending eastwards to the escarpment of the Lincoln Cliff or Edge. This ridge of high ground dominates the landscape of the western half of the county. It rises to more than 120m O.D. east of Grantham but attains a little more than half this height (a maximum of 73m O.D.) north of the Lincoln Gap. The west face is steep, with the dip slope falling gradually eastwards towards the Mid Clay Vale. The bevelled summit is formed of Lincolnshire Limestone with Upper and Middle Lias Clays and Marlstone beneath. The limestone thins eastwards, and the dip slope, comprising clays and limestones of the Great Oolite Series (the Upper Estuarine, Great Oolite limestone, and Blisworth Clay) with limestones of the Cornbrash, is dissected by a series of minor streams (e.g. the Atterby Beck and the Seggemoor Beck) flowing north-eastwards into the Anholme. The ridge and dip slope are largely drift-free except for minor pockets of gravel in valley bottoms, with a more significant band located in the Snitterby-Glentham area.

Between the limestone ridge and the chalk Wolds is the Upper Jurassic clay lowland of the Mid Clay Vale, some 12km wide, and drained by the River Ancholme. The hard sandy Kellaway Beds on the western edge of the Vale are frequently exposed in places north of Caenby, with the deep formations of Oxford and Kimmeridge Clays in the centre of the Vale. Much of the solid geology is masked by broad spreads of Jurassic clay till, with alluvium and outwash sand and gravel on the west, and extensive aeolian cover sand along the foot of the steep Wolds escarpment.

The Wolds form a belt of upland some 70km long and up to 15km wide, rising to over 160m in the vicinity of Walsby and dissected by valleys running south-westwards into the Mid Clay Vale and north-eastwards into the Marshland. The bevelled summit is Middle and Upper Chalk which overlie the sandstones, clays and ironstone formations of the Lower Cretaceous. These, and the underlying Spilsby Sandstone are exposed in the west facing escarpment and in the bottoms of the deeper river valleys. Drift is mostly absent on the chalk except for an isolated spread of till north-west of Louth. The eastern edge of the Wolds is marked by the degraded interglacial sea cliff.

To the east lies the Marshland, a lowland area of little relief, which extends along the coastline in a broad band up to 15km wide. Along the fringe of the Wolds is the gently undulating Middle Marsh, crossed by streams running off the chalk, giving way eastwards to the flat Outmarsh. The Middle Marsh is of Devensian till with pockets of sand and gravel which covers the underlying chalk platform to a considerable depth (up to 27m). The Outmarsh is made up of extensive accumulations of marsh and freshwater silts, with ancient sand dunes and post-medieval reclamation along the coast.

3.3 Current Land Use

Lincolnshire is pre-eminently a county of arable farming. In 1985 over 87% of the total of 5158 km² of agricultural land in the county was under arable crops, fallow, or short-term grassland, with less than 12% permanent grassland or rough grazing. The emphasis is on cereal production, principally autumn-sown wheat (cultivated on 38% of the total area of agricultural holdings) and spring-sown barley (18%). Sugar beet (6.7%) is used as an effective break crop for cereals on sandy soils, and increasingly, on a wider range of soils, oilseed rape (6.5%) has been introduced into the crop rotation. Potatoes, early and maincrop, remain an important root crop (3.7%), and are found mainly on the Fenland peats and silts and the medium land of the northern half of the county. With the introduction of a more intensive form of agriculture during the last two decades the amount of land left fallow has been reduced to less than 0.5%. This pattern of agriculture is echoed in the transect, the statistics for which are tabulated opposite.

Farms, in which wheat and barley are grown together with sugar beet and potatoes, are the most numerous in the transect (43% of 299 holdings), followed by purely cereal farms (25.1%), specialised dairy farms (8.4%), livestock (8.0%), pigs and poultry (6.7%), mixed (3.3%), horticulture
Fig. 2a  Location of transect in relation to geology.

Fig. 2b  Profile diagram west-east across transect.

Table 1: Agricultural land use in 1985*

<table>
<thead>
<tr>
<th>Total Area of Holdings (hectares)</th>
<th>Total tillage</th>
<th>Bare fallow</th>
<th>Grassland: Permanent (1981 or later)</th>
<th>Young Rough Grazing</th>
<th>Woodland</th>
<th>All other land</th>
</tr>
</thead>
<tbody>
<tr>
<td>59302</td>
<td>81.3</td>
<td>0.2</td>
<td>10.9</td>
<td>4.5</td>
<td>0.9</td>
<td>0.9</td>
</tr>
</tbody>
</table>

*All categories are given as a percentage of the total area of agricultural holdings. The data relating to land use were derived from the June 1985 Parish Summaries compiled by the Ministry of Agriculture, Fisheries and Food. The returns were examined for a total of 60 parishes (total area 593km²) which fell wholly or partly within the artificial boundaries of the transect. The statistics for the parish of Thonock were not available for examination.

4. ANALYSIS OF THE AERIAL RECONNAISSANCE OF THE TRANSECT

Histograms in Figs. 3a, 3b, record the annual number of flights and the rate of discovery of sites in the transect. Prior to 1975 the amount of aerial reconnaissance was negligible; the period was characterised by an extremely low level of activity (14 sorties over sixteen years) producing very meagre results (19 new discoveries). In the years that followed more reconnaissance was conducted and with far better results.

Between 1975 and 1981 the rate of aerial reconnaissance underwent a significant increase due to the combined efforts of CUCAP (during 1975, 1976), RCHME (1976-78, 1980) and P. Eversfield, locally (1976-8, 1980). The number
of flights flown during this period (total of 39; average 6.5 flights per annum) represented a substantial increase on the previous sixteen years' activity (total of 14 flights; average 0.88 per annum), but far more dramatic was the impact on the cropmark record.

During these six years, a total of 100 new cropmark sites were discovered, representing 80% of the total recorded from the corridor. The rate reached a peak of forty three sites (34.4% of total) under the exceptionally favourable conditions prevailing in 1976 when all three agencies were active; thereafter there has been an overall reduction in the level of reconnaissance.

The greater effectiveness of the reconnaissance after 1976 was undoubtedly the programme of locally based flying undertaken by P. Everson. In terms of intensive long-term aerial reconnaissance this programme, totalling twenty nine days over a five year period, remains relatively modest; in comparison, areas of the Bunter Sandstone of northern Nottinghamshire and South Yorkshire were examined by D. N. Riley at varying levels of intensity on eighty one sorties during a comparable period, 1974-79 (Riley, 1980, 6, fig. 2). Despite this, the results of the reconnaissance by Everson should not be underestimated for they had a profound effect upon the cropmark record of Northern Lincolnshire. This can be demonstrated from the figures compiled in Table 2 which reveal that Everson accounted for 47 new discoveries (37.6% of total sample) exceeding both the RCHME with 23 (18.4%) and CUCAP with 39.5 (31.6%); the latter having been active since 1959. An even more vivid indication of the advantages of reconnaissance from a local base, which combines cost effectiveness with a more intense awareness of the archaeology of the area being studied, is obtained from a comparison of the geographical distribution of cropmarks recorded by the various sources (Fig. 4). Everson's discoveries are fairly evenly spread throughout the transect, indicating an attempt at systematic, blanket air cover, whereas the patterns of recording for both CUCAP and RCHME are by contrast more localised, suggesting a more selective approach and a less intensive level of reconnaissance. The main sphere of RCHME activity was along the chalk Wolds, with forays into the Trent Valley; CUCAP, on the other hand, ranged more widely, recording sites along the Trent, and Anholme valleys, and the Wolds.

A final point of some significance revealed by analysis (Table 2.6) is that the majority (62.4%) of sites in the transect have been photographed solely over a period of one year. This has implications with regard to the interpretation of cropmark features, since it is only by recording sites under different conditions over a number of years that a confident assessment of the evidence can be made; the transect will therefore continue to benefit from reconnaissance for considerable time to come.

5. CROPMARK DISTRIBUTION
5.1 Analysis of Cropmark Distribution in Relation to Relief and Geology
Cropmarks revealing archaeological sites have been recorded from 125 locations in the transect. Their distribution in relation to relief (Fig. 5) and geology (Fig. 6), is examined on the basis of the five topographical zones into which the northern part of the county divides naturally, proceeding from west to east.

The Trent Valley
This broad lowland tract (making up approximately 21% of the total area of the transect) has produced remarkably few cropmark sites to date. The thin scatter (10 sites; comprising 8.0% of the total sample) is confined largely to the western half of the zone, on the cover sand deposits found along the margins of the River Trent. Cropmarks have not been recorded on the substantial areas of till or the drift-free Lias, or from the lesser bands of Keuper Marl or Rhaetic Beds further west. Two isolated cropmarks are recorded from the extreme eastern end of the zone on a low marlstone ridge north of Blyborough village, and on a localized pocket of river gravel at the confluence of two minor streams near Red House Farm, approximately 1.5km to the west. Islands of gravel are found elsewhere, in the vicinity of Pilham and Corringham but no cropmarks have been observed to date.

Lincoln Edge
In sharp contrast to the Trent valley, the high ground forming the Lincoln Edge and the gentle dip slope to the east (making up approximately 12% of total area) have proved more responsive (26 cropmark sites; representing 20.8% of sample). Cropmarks occur with equal frequency across the landscape - on the drift-free areas of Lincolnshire limestone of the ridge summit and on the Great Oolitic limestone and glacial sand and gravel deposits of the dip slope. A notable feature of the distribution is the preponderance of enclosure or settlement cropmarks found on the dip slope below the 30m contour, in a landscape intersected by a series of minor valleys formed by streams which flow north-eastwards into the Anholme valley. A number of sites of some complexity are found on the lowlands of the Atterby, Spital, and Seggimoor becks, with a conspicuous group in the Glentham Cliff farm area (Fig. 17). On the higher ground above 30m O.D., cropmarks of linear features predominate and enclosures are noticeably absent.

The Mid Clay Vale
A different picture is encountered on the flat lowland of the Mid Clay Vale (approximately 18% of total area). Here distribution of cropmarks is restricted primarily to two discrete areas, the undulating windblown cover sand landscape of Otby Moor to the east (15 cropmark sites, 12% of total), and the sand and gravel deposits (6
Fig. 4 The distribution of cropmark sites recorded by individual sources.
cropmarks, 4.8%) and the drift-free areas of the Kellaways Beds (2 cropmarks, 1.6%) fringing the Anholme to the west. Two cropmarks are recorded from the extensive areas of Anholme alluvium but none from the heavier claylands of the central vale. Of the cropmark sites on the Anholme margins the nucleated settlement complexes on Cross Lane on the west side of the river (Fig. 19) and the riverine settlement on the opposite side, north of Bishopbridge, are particularly worthy of note (Fig. 8, TF 034915). At the eastern end of the vale cropmarks are concentrated along the Otby Beck (Fig. 20) and the Moor Road to the south, in an area of apparently intense industrial activity during the Roman period. Isolated cropmarks also occur on the windblown deposits further west on Usselby Moor and to the south of Osgodby Moor.

The Wolds

In comparison to other zones cropmarks are found in proliferation on the ‘uplands’ of the Wolds (approximately 22% of total area) which account for just over one half of the total recorded in the transect (63, representing 50.4% of total). The distribution pattern is not uniform across this landscape but reveals an imbalance in favour of the drift-free areas of chalk and the earstone and Tealby limestone formations.

Cropmarks have been recorded mainly on the summits of plateaus and interfluve ridges, and to a lesser extent on valley slopes. Few have been discovered from the bottoms of river valleys where the presence of both vestigial earthworks of medieval and later settlement and cultivation (e.g. in the parishes of Stainton le Vale, and Kirmond le Mire) and alluvium may be an inhibiting factor.

The Marshland

To the east of the Wolds on the belt of coastal lowland making up the Marshland (approximately 27% of total area) cropmarks have been recorded from only one location, near Fotherby (centred on TF 312911) on one of the pockets of glacial sand and gravel eastward of the chalk escarpment. Elsewhere the Marshlands so far have proved unproductive of cropmarks.

Table 2. The discovery and photography of cropmark sites by source.

1. Total number of sites photographed:

<table>
<thead>
<tr>
<th>Agency</th>
<th>No. of sites</th>
<th>(As % of total)</th>
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<tbody>
<tr>
<td>RCHME1</td>
<td>17</td>
<td>(13.6)</td>
</tr>
<tr>
<td>CUCAP2</td>
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<td>(13.6)</td>
</tr>
<tr>
<td>PE3</td>
<td>43</td>
<td>(34.4)</td>
</tr>
<tr>
<td>OTHERS</td>
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<td>(4.0)</td>
</tr>
<tr>
<td>RCHME/CUCAP</td>
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<td>(3.2)</td>
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<td>RCHME/PE</td>
<td>07</td>
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<td>(3.2)</td>
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<td>(0.8)</td>
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<tr>
<td>RCHME/OTHERS/PE</td>
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<td>(0.8)</td>
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<tr>
<td>RCHME/CUCAP/OTHERS</td>
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2. Sites recorded by:

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<td>8</td>
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<tr>
<td>% of total sites</td>
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<td>28.0</td>
<td>6.4</td>
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3. Sites discovered by:

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<th>Agency</th>
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<tr>
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<tr>
<td>CUCAP</td>
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<td>31.6</td>
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<tr>
<td>PE</td>
<td>47(43+8)</td>
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<tr>
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4. Sites photographed by:

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<th>Agency</th>
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<tr>
<td>RCHME</td>
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<td>5.5</td>
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<td>Total recorded by source</td>
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6. Frequency of recording (no. of years):

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<th>Four+</th>
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<tr>
<td>Number of sites</td>
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<td>30</td>
<td>9</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>% of total sites</td>
<td>62.4</td>
<td>24.0</td>
<td>7.2</td>
<td>4.0</td>
<td>2.4</td>
</tr>
</tbody>
</table>

1 Royal Commission on the Historical Monuments of England, Air Photography Unit.
2 Cambridge University Committee for Aerial Photography.
3 Paul Eversen Collection deposited with RCHME Air Photographs Library.
4 Sites discovered jointly by independent sources.
Fig. 5 The distribution of cropmarks in relation to relief.
Fig. 6 The distribution of cropmarks in relation to geology.
5.2 Analysis of Croppmark Distribution in Relation to Soil Type

5.2.1 Responsive Soils

Fig. 7 depicts the distribution of croppmarks in relation to the principal soil types (Hodge et al., 1984) found in the transect (based on information derived from the 1:250,000 scale regional soil map, Soil Survey of England and Wales: Sheet 4, Eastern Region, 1983; related subsoil groups and soils which have not yet yielded croppmarks have been amalgamated, as indicated).

By far the most responsive of the series are the shallow, well-drained, calcareous soils of the brown rendzinas sub-group (soil survey class 343) found on the Jurassic limestone ridge and chalk Wolds which produce 42.8% of the croppmark sample. Of these, the soil of the Andover series (soil association 343h) found on the slopes and crests of the higher ground on the Wolds has proved most sensitive, accounting for just over one third of the sample. Moreover, it consistently produces croppmarks of good clarity under normal conditions, and under extremes can even produce good parch marks in pasture. This is exemplified by the Binbrook Walk House complex (Fig. 8, TF 249298), photographed uniquely during the drought conditions of 1976 in a field of pasture which has lain under grass for at least three decades.

A second important group with a similar distribution, on the summit of the Wolds and the Jurassic dip slope, is formed by the brown calcareous earths (soil class 511, and 512) which have produced 25.5 sites (20.4% of total) and the typical paleo-argillic brown earths (soil class 581d), found along the eastern side of the Wolds which have yielded a sparse scatter of 9 (7.2% of total). Of these soils, the shallow gleyic brown calcareous earths of the Jurassic dip slope (class 512a) has proved least satisfactory from the point of view of croppmark interpretation due to the exposure in places of patterned ground against which archaeological markings are not distinguished with ease. This has proved to be the case, also, of the deep, permeable sandy soil (class 821b) and Ernst sand deposits on Otby Moor in the Clay Vale, and Blyton Common in the Trent Valley, the only other soil type to display croppmarks with any regularity within the transect (21 sites, representing 16.8% of the total). Of the remaining croppmark sites seven occur on the more permeable soils developed on the marine alluvium and river gravel deposits of the Anholme valley (typical humic-alluvial gley soils, and typical cambic gley soils, soil associations 851c and 831c, respectively), while the remainder are found on seven soil associations, but not in any significant number.

5.2.2 Unresponsive Soils

Sixteen of the soils represented in the transect have failed to produce croppmarks. The distribution of these falls primarily within the heavy clay lands of the Trent Valley, the Anholme Valley, and the Marshland. Though croppmarks are absent here, abundant evidence exists in the form of surface finds to indicate that archaeological sites are present.

The reasons for the lack of croppmarks are not clear. One possible explanation could be that the remains of ridge and furrow cultivation, which characterised the clay lands until recent times, are continuing to mask the underlying archaeology. A comparison of the distribution of findspot sites in relation to the extent of ridge and furrow in the transect, however, demonstrates quite clearly that this is not the case. In the Mid Clay Vale, in particular, numerous sites are found to lie within the areas of former ridge and furrow, proving that the overlying ridges have been sufficiently degraded by ploughing to expose the archaeological horizons beneath (See Fig. 13 for illustration of croppmarks underlying ridge and furrow in the Trent Valley).

The absence of croppmarks may be explained, therefore, by geology and the heavy textured and poorly drained character of the soils which have formed, mainly class 711 and 712. Where croppmarks do occur in the heavy claylands, they are to be found usually on areas of lighter, more permeable soils formed over deposits of fluvial or alluvial origin. The fact must not be overlooked however that under certain conditions heavier soils, formed on a clay parent material or subsoil, possess the ability to develop croppmarks, though evidently not with the frequency of the lighter, more permeable soils of the clay-free areas. This phenomenon may be observed at work on the Wolds where croppmarks are found in far greater density on the brown rendzinas (soil class 343h) and typical brown calcareous earths (soil class 511c) of the drift-free areas, than on the typical paleo-argillic brown earths (class 581d), which are formed on a clay enriched subsoil of shallow plateau drift material of glacial origin, overlying extremely calcareous till.

The extensive area of alluvium in the transect has proved very unproductive from the point of view of croppmark development. The alluvial deposits of the clay lands are largely marine in origin, derived in the case of the Trent and Anholme valleys from the Humber. Along the Trent natural deposition has been augmented by artificial warping in the latter part of the eighteenth century and the first half of the nineteenth century, which has resulted in the accumulation of river-borne silts on what was formerly marginal land, e.g. on Blyton Common (Everson, 1979). Marine alluvium is found most extensively in the area of coastal marshlands to the east of the Wolds in a landscape of diverse character which has undergone dramatic change since historic times (Robinson, 1970).

The potentially inhibitive nature of river alluvium (which only occurs as narrow lenses in the transect) is demonstrated vividly at Kirmond le Mire on the Wolds (Fig. 8, TF 185935) where a rectilinear enclosure, recorded with clarity on Tealby Limestone, disappears on entering the alluvium. In contrast, two major cropmark complexes are recorded on the marine alluvium of the Anholme valley, at Cross Lane Bridge (Fig. 8, TF 017919) and Bishopbridge (Fig. 8, TF 034915) on the opposite side of the river, though not with any high degree of resolution. The reasons for this disparity in potential croppmark visibility are not fully understood, but are probably linked to the composition and depth of the alluvium present, and the nature of the soils formed. At Kirmond le Mire the soil is a member of the slowly permeable, typical stagnogley sub-group (soil class 711f) formed on a clay enriched subsoil (Lower Cretaceous clays and sandstones); it is found more widely on the Lias Clay where croppmarks are generally absent. The Anholme Valley complexes, on the other hand, are found on a typical humic-alluvial gley soil (soil class 851c) developed normally within, or over more responsive permeable material.

To what extent the process of deposition of alluvium and land reclamation prohibit the development of croppmarks on the prehistoric and Romano-British landscapes of the Marshland is uncertain and requires investigation. In the northern Outmarsh, between Tetney Lock and Grinithorp, saltern mounds of an industry which flourished from the Middle Ages to the early Seventeenth century are recorded in the form of croppmarks, soilmarks, and extant earthworks, demonstrating that conditions (soil class 812c, calcareous alluvial gley soils) favourable to the
Fig. 7 The distribution of cropmarks in relation to soil types.
development of cropmarks do occur, at least in the case of archaeological sites of more recent date lying in upper marshland horizons (Beresford and St. Joseph, 1979, 262-5).

Within the transect the presence of several archaeological sites of pre-medieval date is indicated by finds, both from the areas of till of the Middle Marsh and the alluvium of the Outmarsh. Romano-British coarseware sherdso are recorded (in unknown circumstances) from Alvingham, TF 366916 (LCCM records) on the edge of the chalky till, and from the ploughsoil, on the alluvium, on the margins of Alvingham Fen, approximately 1.9km to the north-north-east at TF 371939 (EMAB, 12, 1978, 22). Further into the Outmarsh Romano-British material probably associated with salt production is recorded from the fields on either side of the road at Acre Bridge, TF 3919467, and TF 39249462 (NAR, antiquity no. TF39 SE7) and at Manor Farm, Sculthorpe, near South Somercotes, TF 403919 (LHA 4, 1969, 106), c.3km to the south-east, where it was discovered during the excavation of a reservoir. In the case of the former, the Romano-British horizon lay within plough depth, while in the latter it was encountered at a depth of 3.6m below contemporary ground level. The considerable difference in the levels at which these archaeological horizons occurred indicates the possible extreme variations which may be found in the stratigraphy of the marshlands as a result of the lack of uniformity in the relief of the surface of the till. In these circumstances, it may reasonably be assumed that the critical factor upon which the formation of cropmarks on sites in the submerged landscapes will depend will be the depth of marine deposits which have accumulated over the archaeological horizons.

6. MORPHOLOGICAL CLASSIFICATION OF THE CROPMARK EVIDENCE

An informative way of presenting and analysing air photographic evidence is by morphological classification. The scheme produced here is provisional, intended as a preliminary analysis for the purpose of identifying rough groupings. It is subjective but as the discussion shows (section 7) it remains valid for the transect. A more rigorous system of morphological analysis is currently being developed within the Air Photography Unit of RIMME and will, in due course, be adopted in the proposed survey of cropmark evidence for the remainder of Lincolnshire.

In the scheme presented below cropmarks are divided into two primary categories, *simple* forms, and *complex* forms, which are further subdivided according to their shape. Examples of each type are illustrated in Fig. 8.

1. Simple forms

These are cropmark sites having a rudimentary outline appearance which may display minor internal elements or external attachments but of no great extent. Similarly the group includes examples which show evidence of slight overlapping or superimposition of features, but in no way comparable to the degree found in the examples of complex form. Cropmarks of simple form can be divided into three groups depending on their shape - *curvilinear*, *rectilinear*, and *linear* - each of which is subdivided as shown below. In the majority of cases the cropmark features comprise a single ditch, with a minority defined by two ditches, and exceptionally, in the case of linear features, a multiplicity of ditches.

a) *Curvilinear* ditched enclosures subdivide into three types, (i) *circles*, (ii) *D-shaped*, and (iii) a more *oval* form. (i)

*i Circles.* This group, comprising a total of 39 examples, are found both as solid, and hollow circles. The latter, 27 examples, are found predominantly in a single ditched form, with only 3 concentric examples and occur in a variety of associations, examples of which are illustrated in Fig. 8. One unusual example, of a more elliptical shape, forms a component of a larger group of circles (TF 181944). Cropmark circles as a monument type (‘ring-ditches’) are analysed more fully below (section 7.1.2). Those ditched circles (‘round-houses’) recognised as subsidiary elements forming an integral part of larger units are not considered in this group.

(ii) *D-shaped enclosures.* The four possible examples found of this form each have one straight side, and the remainder of the circuit curved or slightly angular. One example has a smaller rectilinear enclosure attached to the exterior (TF 211912) while another (TF 319291) is found associated with a trapezoidal shaped enclosure of similar size (TF 319291).

(iii) *Oval form.* A wide, extended oval shape, more curvilinear than rectilinear, with one end pointed. One complete example occurs (SK 812946), with part of a second (possibly representing a duck decoy of more recent date comparable to recorded examples at South Carlton and Skellingthorpe) showing within an irregular Romano-British complex (SK 977926).

b) Rectilinear enclosures

Rectilinear enclosures of simple plan are found mainly in a single-ditched form (49 examples) with a small minority (4 possible examples) defined wholly or partly by double ditches. The double ditched element also figures amongst cropmark sites of complex form (eg. SK 842941) and may have a specific function (discussed below, 7.3.2).

Amongst the single-ditched variety of simple rectilinear enclosures two distinctive forms can be identified. The first, comprising 4 possible examples, has a slightly rectangular or square shape, with, characteristically, a single entrance gap on one side (eg. TF 111926, TF 197940). The second comprises a group (6 examples) of enclosures of narrow, more elongated form, straight sided, with terminals of varied shape, either rounded or flat (eg. TF 171928, TF 164941). This form has a very localised pattern of distribution in the transect, and appears to form a distinct category of monument (discussed in 7.1.1., below).

c) Linear features

Twenty examples of linear features not defining enclosures are recorded in the transect either in the form of continuous cropmark ditches, or lines of pits. These are divided into three groups according to the number of component lines.

(i) single line . . . . 14 examples (10 cropmark ditches, 4 pit alignments).

(ii) double lines . . . . 3 examples.

(iii) multiple lines (three or more) . . . . 3 examples.

Amongst these, two distinct groups can be identified, boundary type features, and the markedly straighter lines of former roads, both of which are discussed below (sections 7.2, 7.4 respectively).

2. Complex forms

In this category are grouped those sites revealing a more extensive or intricate arrangement of enclosures, the majority of which show evidence of either subdivision, or
Fig. 8 The morphological classification of cropmarks.
superimposition. The complexes display a great diversity of form, but are basically rectilinear, though possessing curvilinear elements in some examples. They are divided into two broad groups, regular, and irregular.

(a) **Regular rectilinear complexes**
   This group comprising eight examples displays a very marked rectilinearity and symmetry of plan. Most remarkable amongst these are the distinct ‘ladder’ formations of enclosures (TF 191946, TF 147926, TF 174932) which show clear evidence of regular subdivision consistent with a degree of planning (discussed in section 7.3.2). Three of the remaining complexes (SK 838931, SK 961939, SK 989907) form networks of lesser enclosures interpreted as minor field systems.

(b) **Irregular rectilinear complexes**
   The 18 complexes assigned to this category display a variety of shape. Amongst these, three (SK 991906, TF 017919, TF 034915) may be identified as belonging to a distinct group, characterised by a tight nucleus of enclosures, bounded by varying extent by a perimeter ditch, with, in places, slight external elements. Their shape contrasts markedly with the sprawling character of the ‘open’, unenclosed, complexes recorded at TF 015925, and TF 242928, which may be the result of a more organic form of development. Of the remaining complexes most unusual is the irregular chain of congested enclosures (TF 147923), found associated with a regular rectilinear complex at Walesby (TF 147926), and the complex comprising a cluster of three double-ditched enclosures (SK 542941), which is discussed later (section 7.3.2). This double-ditched element is also encountered at one of the more nucleated complexes (SK 991906), and at a dispersed group of enclosures (illustrated in Fig. 17, at SK 982909).

7. DISCUSSION OF MONUMENT TYPES

7.1 Prehistoric Funerary Monuments

7.1.1 Long Barrows

In northern Lincolnshire a total of some two dozen cropmark and soilmark enclosures of elongated form have so far been recognised which may belong to a distinctive category of cropmark site identified in increasing numbers in recent years (Marsac et al., 1982; Loveday and Petchey, 1982). Their distribution, like that of extant long barrows, is confined to the uplands of the Wolds, where the overall evidence supports a ploughed-out long barrow interpretation. The Lincolnshire examples show considerable variability in form, orientation, siting, and uniformity of size (where calculable) with the extent long mounds, and in two instances, at Claxby (TF 444718) and Skendleby (TF 427713) are seen to form part of an extant long barrow group RC9503 Archive nos TF 472/2/378-380, TF 4472/3/382-383; TF 4271/7/27, TF 4271/8/28, respectively.

In the transect six possible examples of ploughed-out long barrows have been identified from aerial photographs. No examples of extant long barrows were known to occur, though one may have existed in the vicinity of Adam’s Head Spring, TF 29289025 (Phillips, 1932, 199). On morphological grounds the cropmark sites may be divided into three types:

(i) elongated oblong ditches, parallel-sided, with ditch circuit complete ... 1

(ii) elongated oblong ditches, parallel-sided, with ditch circuit incomplete ... 3

(iii) trapezoidal form with tapering side ditches ... 2

These six examples form part of a scattered group of ten recorded so far on the chalk in the vicinity of the High Street ridgeway, between Ludford and Nettleton, all of which, like their earthwork counterparts, occupy prominent topographical situations either on upper valley slopes, towards the heads of river valleys, or on false crest positions below the summits of ridges or plateaus. This is in contrast to the sitting of round barrows and ring-ditches, some of which are sited on plateaus or ridges, eg. the extent round barrows at Bully Hill (TF 17279227) and Walesby Top (Fig. 14, ‘M’). Most significant from the point of view of interpretation of the cropmark sites is that two examples (Figs. 8, TF 146936, and TF 164941) display some features - wide flanking ditches, narrower terminal ones, and a gap, or causeway, at one end - which can be paralleled at the excavated Giants’ Hills I, Skendleby long barrow, the ditch circuit of which shows a similar, elongated oblong form (Phillips, 1956).

Three cropmark sites are found in close proximity to rectilinear features, the full extent, date, and function of which are not known. Whether these in some way associated with the long barrows is a matter of speculation at this stage, particularly in view of the incomplete nature of the evidence, but the frequency of the occurrence would seem to point in this direction.

7.1.2 Round Barrows and Ring-Ditches

A total of 51 possible barrow sites are recorded from the transect in the form of earthworks, ring-ditch cropmarks, or in a number of instances on the chalk, as circular soilmarks. The overwhelming majority of these, 39 sites, have been discovered through the medium of aerial photography, and only the minority, 12, via field investigation. These figures underline the contribution which can be made by aerial reconnaissance of even a limited nature in a lowland context where we are dealing with a palimpsest of landscapes in which little of pre-medieval date survives. In this case it has resulted in over a threefold increase in the number of sites known.

Round barrows and ring-ditches appear to have a very localised pattern of distribution in the transect, being found principally on the Wolds (47 sites) with a minority (4 sites) on the Jurassic limestone ridge. On the Wolds there occurs a marked concentration of sites in the altitude range 120m - 140m O.D. No certain examples are known from the lowland areas of the transect, though one possible ring-ditch, ill-recorded in lodged crops, may occur on the common deposits of the Mid Clay Vale, to the east of Osgodby (at TF 086926). Outside the transect groups of round barrows are recorded in lowland contexts in Lincolnshire, e.g. at Stainfield (TF 98733), in the Witham Valley (Eversen & Hayes, 1984, 36, fig. 6), and Butterbump Farm, Willoughby with Slinby, in the Marshland (TF 493724).

Barrows tend to be found on prominent elevated positions, primarily on the summits of ridges and plateaus, along the upper slopes and rams of valleys, and occasionally on false crests. They are rarely found in valley bottom positions. On the chalk Wolds round barrows and ring-ditches are concentrated on the higher ground overlooking the steep western escarment, especially along the High Street ridgeway, and, to a lesser extent, along the edge of the eastern escarment where distinctive clusters of triple barrows in triangular configuration occur. In the central area a less dense, more dispersed, scatter of sites is found, predominantly single barrows, but with two interesting groups at the heads of the valleys of streams which form the Waith Beck.
In terms of morphology the majority of ring-ditches comprise a single ring type (27 examples). Far less common (3 examples) is the concentric or double-ring variety which in each instance is found as part of a group or cluster. A total of eight individual sites, both single and double or concentric ring, exhibit a central feature (probable internment), while three seem, on present evidence, to be annular. Most unusual amongst the latter is one example exhibiting a pronounced elliptical shape, again forming part of a group of ring-ditches (Fig. 8, TF 181944).

Very rarely in the transect are barrow sites found in close proximity to, and presumably in association with, other archaeological features. At Bully Hill a single linear ditch is recorded on the eastern side of a large extant barrow; a similar arrangement may occur further south along the ridgeway (at TF 17929053) where slight, fragmentary cropmarks of linear character can be seen adjacent to a large ring-ditch with an interrupted circuit.

There exist two examples where ring-ditch groups are found in close proximity to large enclosures. In both instances the two elements are physically unconnected, but appear to respect one another, suggesting a degree of contemporaneity. The interpretation of these enclosures is problematical due to the dearth of information and will only be resolved through the process of excavation. One may presume, however, on the basis of the present evidence, a funerary function of some kind.

Of the two examples known, the North Top group is the more complex, comprising up to five ploughed-out barrow sites (three of which are illustrated in Fig. 10), associated with a fragmentary linear cropmark and conjoined enclosures. It occupies a prominent position on the summit of a flat topped spur, which provides a panoramic view of the river valleys to the north, and lies within sight of the second example lying, unusually, in a valley bottom position, about 1.2km distant. The latter (Fig. 8, TF 181944) comprises four ring-ditches, three of which form a close knit group in a triangular configuration, lying adjacent to a large, regular, rectangular-shaped enclosure.

7.2 Linear Features and Pit Alignments

Linear features and pit alignments form a category of monument readily recognisable and well attested in the aerial record in both lowland and upland Britain, but one which is less easily understood. Work in recent years in Wessex (Bowen, 1978), and North Yorkshire (Spratt, 1982, 172-184) has revealed local ‘systems’ or networks of linear features, interpreted as land boundaries which form an integral part of the later prehistoric landscape of those regions. In Lincolnshire aerial reconnaissance has attested the existence of linear features of similar form in the southern half of the county (Pickering, 1978) and the work
north of the Lincoln Gap at 73m O.D. (marked on the current O.S. map, 1:50,000 scale, by a triangulation point), a position which forms a natural focal point in the landscape with a broad vista of the Trent valley lowlands to the west and the Ancholme Valley to the east. It comprises a single ditch approaching the summit from the north-west, where it is abutted at right angles by a second, wider ditch, running off to the south-west, which disappears beneath the disused airfield at Hemswell. Beyond the junction the linear feature changes course suddenly, turning across the ridge where it is visible for some distance as a multiple of four ditches. The form of this multiple section appears unusual in that the additional ditches flank both sides of the original line, two to the north and one to the south, which might be an indication that one group of ditches, if not all, are a secondary element, and may represent an attempt to accentuate the line of the original boundary from both sides. Close to the junction, and running along the eastern lip of the ridge, two further lengths of single linear features can be seen, but their relationship to the others is not known. One, lying to the north-east follows a course at right angles to the multiple ditches, while the other, to the south-east, protruding from beneath the eastern perimeter of the airfield, can be viewed, with minor breaks, running for a distance of some 1.4km, with several changes of direction, and is abutted at two points by short lengths of single ditches. Other more fragmentary evidence of single ditches from within the transect has been found in the Trent valley and along the western edge of the summit of the Wolds where two appear to be of cross-ridge type.

In addition to linear ditches four examples of pit alignments of linear form and of presumed similar function are recorded. All comprise a straight line of single pits, one being slightly irregular in having an inverted L shape, and as a group they have a localised distribution on the limestone ridge and dip slope. Of the four the two found on the dip slope are most conspicuous following a distinctly parallel course approximately north-south, some 1.3km apart (illustrated in Fig. 17).

Very few of these linear cropmarks are found in close association with other classes of monument. More intriguing, and deserving of further investigation is the possible relationship between prehistoric linear boundaries and later administratively defined boundaries. The most striking example is presented by the multiple section of the T-junction, discussed above, whose course coincides with, and is respected by the Willoughton-Hemswell parish boundary (previously noted by Everson). Also worthy of consideration is the evidence of the two pit alignments situated further north on the limestone ridge adjacent to the Willoughton-Blyborough parish boundary. Both run obliquely towards the boundary, stopping short of it, but one continues laterally for a short distance on a course parallel to it. A similar situation is encountered along the edge of the eastern escarpment of the Wolds where a single linear can be seen running on a parallel course to the Binbrook-Wyham cum Cadby parish boundary.

7.3 Later Prehistoric and Roman-British Settlements

Our knowledge of the archaeology of rural settlement in northern Lincolnshire during later prehistoric and Roman times is deficient, principally due to limited fieldwork activity, both excavation and fieldwalking, in the past. During the last decade aerial reconnaissance has added significantly to the store of knowledge on the subject, but this body of evidence has not, as yet, undergone proper analysis or investigation on the ground. Consequently our understanding of the nature of early settlement has to rely heavily on the results of a limited
number of excavations and on accidental discoveries resulting mostly from agricultural activity.

7.3.1 Pre-Roman Settlements

An unusual feature of the later prehistoric archaeology of the county and the East Midlands in general, is the scarcity of major fortified enclosures or hillforts, common elsewhere in lowland England. Three defended earthwork enclosures, Honington Camp, south-west of Ancaster, Round Hills, Ingoldsby, south-east of Grantham, and Careby Camp, south-west of Bourne, may fall into this category. A late Iron Age date has been confirmed by excavations for a large double-ditched cropmark enclosure at Tattershall Thorpe, the function of which is uncertain. A military role remains a possibility but environmental evidence indicated an agricultural usage of some kind involved with stock grazing (Chowne, 1986).

Major settlements of the later Iron Age are known from northern Lincolnshire, identified at Owney, on the Jurassic ridge, and Ludford, Horncastle, and Spilsby on the Wolds. There is strong evidence to suggest that these form part of a group of rich nucleated settlements which developed in the region of the Corieltauvii during the first century B.C. in an atmosphere of political stability and economic prosperity (May, 1984). In the transect no major settlements on this scale, covering some 30 ha, in the case of Owney, are known. The settlement at Ludford (centred on approximately TF 200 890) lies some 1km outside the southern limits of the transect. Probably typical of the minor farmstead type of settlements of the later Iron Age and early post-Conquest periods in Lincolnshire is the group of sites at Tallington on the Welland gravels (Simpson, 1966, 15-25; Whitwell, 1982, 21) and the small ditched enclosure possibly accommodating a single family, or extended family group, represented by the defended enclosure at Colsterworth, south of Grantham (Grimes, 1961, 23-25).

The amount of material of Iron Age date recorded from the area of the transect is slight. Single potsherds possibly attributable to this period are known from the area to the south, of Claxby (TF 11938) and from excavations at Kingerby (TF 057929) in 1965. (LCM records; EMA 8 1965, 16, 24). Iron Age pottery is listed amongst the material from the excavations of a multi-period site north of Otby (TF 126941) in Normandy le Wold parish (LCM records; LHA 3 1968, 38) and from a site discovered on the route of a gas pipeline, at TF 181907, in Tealby parish (P. Catherall, pers. comm.). In addition, a gold staters is known from an unspecified location at Utterby (TF 310933) on the edge of the Marshland (J. May, pers. comm.).

The material evidence of Iron Age occupation discovered during this survey also proved meagre, and has been positively identified at only one site, Low Place (TF 016924) in the Ancholme Valley. On morphological grounds, a late Iron Age date may tentatively be assigned to a limited number of independently dated cropmark sites which share similarities of form with the excavated sites of the period. On Swinehope Hill, Binbrook (TF 211946), towards the centre of the Wolds, a large, D-shaped enclosure of possible minor hillfort type is found (Fig. 11) comparable in plan to the defended enclosure at Colsterworth but enclosing approximately twice the area. A circular round-house feature is visible on the interior, and a small annex of rectangular form is attached to the north side where the position of a possible entrance into the main enclosure may be marked by a break in the ditch circuit. The enclosure is well-sited in terms of its defence, occupying a vantage point along the lip of a steep-sided valley, with steeply sloping ground on three sides, and has a commanding view of the river valley approaches and the natural point of crossing at the head of the valley at Binbrook. The site was examined after ploughing, but, unfortunately, did not yield any surface finds.

![Fig. 11 Swinehope Hill, Binbrook (TF 211946): cropmark of a defended enclosure with round-house recorded on chalk (as in. 343b); viewed from north-west. The siting of this probably late prehistoric enclosure, on an elevated position along the crest, contrasts with the valley bottom location favoured by later, medieval settlements on the Wolds. Illustrated here by the round village, earthwork elements of which can be seen middle to top right. Copyright Cambridge University Committee for Aerial Photography. Archive no. B67 67 (photographed 13.07.1976).

A lesser enclosure of similar form but less certain age occurs at Fotherby on the margins of the Marshland at the foot of the eastern escarpment of the Wolds (Fig. 8, TF 312911). This encloses an area of approximately 0.35 ha, that is, on a scale closer to the Colsterworth farmstead than the enclosure at Binbrook. Adjacent to it on the north, lies a second enclosure of similar size but more trapezoidal plan (Fig. 8, TF 312912). Both enclosures show a small area of disturbance internally, but otherwise no features are evident. Although one of these enclosures displays morphological similarities with the farmstead at Colsterworth, the possibility occurs that the Fotherby enclosures are considerably later in date. The writer’s attention has been drawn (by D. N. Robinson) to the supposed stock enclosure of probable medieval date at Claxby near Alford (TF 45257120) further to the south, and the comparable earthwork, ‘Dam Close’ at Willoughby with Sloothby (TF 46887170) which occupies a position on low ground at the foot of the Wolds escarpment similar to that of the Fotherby cropmark sites. Fieldwalking at Fotherby failed to produce surface finds of any kind, and the date of the two enclosures must remain an open question, for now.

On morphological grounds an Iron Age date has been proposed for a single-ditched enclosure of oval form at Fir Tree Farm (Fig. 8, SK 812946) on Byton Common in the Trent Valley (P. Chowne, pers. comm.). Probably more certain is the dating of the cropmark site photographed 1km to the west of Wharton in the Trent Valley (Fig. 8, SK 833931) which shows good similarity with the Tallington farmstead (site 39), but comprising in this instance at least two contiguous enclosures attached to a droueway, the largest of which contains a round house
structure. A second cropmark site of similar form is also recorded on the north side of the Otby Beck, on Otby Moor in the Mid Clay Vale (illustrated in Fig. 20, at TF 115931).

7.3.2 Romano-British Settlements

In contrast to later prehistory the evidence of settlement in the post-Conquest period is more extensive and widespread in the transect both in terms of material finds and cropmark evidence. Not unexpectedly the pattern of settlement distribution revealed by the cropmark evidence shows a bias in favour of the areas of lighter soils, but the inclusion of surface assemblages produces a more evenly balanced pattern with sites equally well represented on the less responsive heavier clay lands of the Trent Valley, the Mid Clay Vale, and to a lesser extent, on the Marshland, where a special set of circumstances prevail. The only major irregularity in the overall pattern of distribution occurs on the eastern half of the Wolds where cropmarks and findspots alike of this period are a rarity. A satisfactory explanation for this apparent anomaly may be found in the lack of fieldwork activity, and the limited opportunities available for reconnaissance in this part of the Wolds due to the existence of a military airfield at Binbrook.

Native-type settlements

The round-house represents the traditional, or native building form of the later prehistoric period, the use of which continued well into the post-Conquest period. On the site of the medieval manor at Goltho the earliest settlement was represented by a Romano-British farmstead of three circular timber buildings occupied in succession from c.50-200 A.D. (Beresford, 1987, 15-21), while at the Winterton villa the more usual timber form of construction sees a transition to the use of stone, dated in the case of building E, to after c.130 A.D. (Stead, 1976, 80-83). A similar situation exists in respect of the pottery tradition of the later Iron Age, with the result that it is not possible to make a fine distinction between pre-Conquest and post-Conquest material (May, 1984, 18).

In the transect, examples of minor, farmstead-type settlements in this native tradition can be identified which are probably of first century A.D. or later date. These form a sparse scatter of sites, nowhere achieving the densities or spreads encountered on the gravels of the Trent in Nottinghamshire (eg. at South Muscham, or the Cromwell area), or along the Welland in southern Lincolnshire.

Most noteworthy of the sites in this category is an undated example recorded on the lower dip slope adjacent to Atterby Carr on the western edge of the Mid Clay Vale (Fig. 8, TF 007938) showing native round-houses contained within a group of overlapping rectangular enclosures, and possibly comparable to the farmstead discovered at Goltho. A less complete example of different form comprising a small cluster of closely associated enclosures is seen near Wadesby Top (Fig. 8, TF 142949 and TF 143948) on the edge of the steep western escarpment where fieldwalking produced ceramic evidence of second century A.D. date and later, including a rim fragment of a samian cup (Dragendorff form 33) of Antonine date, and a colour-coated flagon with rouletted decoration.

A short distance to the east at Kirmond le Mire an interesting situation occurs where a round-house with associated enclosures is found in close proximity to the site of a Roman villa (Fig. 8, TF 185935). What is not known and warrants investigation is whether these features represent contemporaneous auxiliary elements of the villa estate or whether they represent evidence of an earlier phase of occupation pre-dating the Roman villa phase, as was the case at Winterton, To the east of Binbrook, Romano-British occupation, not closely dateable, is evidenced from two minor sites, at Bingham’s Top (Fig. 8, TF 224945), and Highfield Farm (Fig. 8, TF 230940), both of which occupy prominent positions overlooking the heads of dry valleys.

On morphological grounds a Romano-British date may also tentatively be assigned to a unique site of more complex form, of possibly native type, recorded at Poplar Tree Farm on the Trent Valley lowlands, near Blyton (Fig. 8, SK 842941), which is considered worthy of special note. The cropmarks (Fig. 12) are revealed with no great clarity of detail on a typical sandy gley soil (soil association 821b) developed in aegolian deposits, and comprise a cluster of three double-ditched enclosures associated with a small group of fields or paddocks. The main enclosure has a central area of approximately 0.22ha., while the lesser ones are of 0.05ha. each. The width of the interval between the ditches of these enclosures differs considerably, ranging from between approximately 5m and 10m in the case of the larger example to approximately 2.5m in the lesser ones, and probably indicates a difference of function. Adjacent to the main enclosure, and possibly elsewhere, are indications of at least one round-house type structure. Access into the complex is gained via a broad drove-way on the north. The site was examined on the ground soon after the period of crop germination but failed to yield material evidence of any antiquity.

Fig. 12 Poplar Tree Farm, Blyton (SK 842941): the cropmarks, formed on patterned sandy gley soil (Blackwood assoc., 821b) are of variable strength and quality. The main double-ditched enclosure is visible at centre with a large pit adjacent (right), and one of the two lesser double-ditched enclosures to the south (bottom). The full plan of the complex has only been revealed as a result of repeated reconnaissance over a number of years.

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Large enclosures defined by a pair of widely spaced ditches, the function of which may not be primarily for defence, are well-represented in the archaeological record in this part of the East Midlands in both later prehistoric and Romano-British contexts. The form is seen at the curvilinear, ‘stock’ enclosure of late Iron Age date at Tattershall Thorpe, and is a recognisable feature defining the precincts of the villas at Lockington, Leicestershire (Frere & St. Joseph 1983, 199-89 with pl. 120), and Cromwell, Nottinghamshire (ibid., 199-200 with pl. 121), where the enclosures have a markedly rectilinear plan.

Examples of smaller, double-ditched enclosures of rectilinear form, with ditches set more closely together, make up part of that extensive landscape of field systems and associated enclosures identified on the western side of the Trent in north Nottinghamshire and South Yorkshire (Riley, 1980). Examination by sondages of four sites, including a double-ditched example at Flint Hill, Elkesley (enclosing an area of 0.12 ha., with an interval of 2m between the ditches), suggested that the settlements and probably the associated field systems were flourishing in about the third century A.D. (ibid., 74-81). It is worth noting that, in this same landscape, at Potteric Carr, is found an example of a large enclosure (of 1.7 ha.) of slightly more curvilinear form, and uncertain date, whose limits are defined by a pair of ditches spaced 10m apart; on its interior can be seen a circular feature of 25m diameter (ibid., 91 and map 6).

No traces of comparable systems of fields have been recorded so far in the vicinity of the Poplar Tree Farm site, or for that matter, anywhere else in the Trent Valley in northern Lincolnshire. The form of the cluster, however, though it may not be closely paralleled in that landscape on the west side of the Trent, clearly belongs to the same agricultural tradition.

The function of this distinctive type of rectilinear enclosure, defined by a pair of ditches spaced well apart, complete examples of which can be seen in the transect at Poplar Tree Farm, and on Otby Moor (Fig. 15), is a matter of speculation. The evidence from Otby Moor suggests some form of stock management and this interpretation may hold good for this type of enclosure as a whole, including perhaps those examples found associated with villas like Cromwell and Lockington, and Newville Farm in the transect. Indeed it is conceivable that the form may well have its antecedents in the curvilinear, double-ditched ‘stock’ enclosures of the later Iron Age like Tattershall Thorpe.

Some 0.6km north of the Poplar Tree Farm cluster, and extending outside the northern limits of the transect, aerial photography records a more dispersed group of cropmark enclosures, prominent amongst which, and lying within the study area, is a small, square-shaped, single-ditched, enclosure, of some 400m², having an entrance gap on the east side (Fig. 13). This enclosure would appear to represent a distinct category, several examples of which, varying in size, can be identified in the transect, eg. on the Wolds, as part of an open group of enclosures north-west of Tum Water Heads, (Fig. 8, TF 156927), and in an independent feature c.0.5km south of Priory Farm, near Orford (Fig. 8, TF 197940). The dating and function of the type is uncertain, but the form can be compared to a larger cropmark enclosure of some 0.6ha. sited within a group of fields, to the east of Hesley Hall, Ransom, South Yorkshire (SK 626597) (Riley, 1980, 46, pl. 12), which has at its centre a small circular round-house type structure, and a second lesser enclosure of 0.15ha., situated to the south of Apleyhead Farm, Elkesley (ibid., 132-3, map 27).

Fig. 13 South of Sandbeck Farm, Blyton (SK 845950): a dispersed group of minor cropmark enclosures recorded on patterned, deep, permeable sandy gley soils (Blackwood association, 821b), which include, in the foreground, a square-shaped enclosure of distinctive form. Additional features are visible beyond, overlaid in part by the parallel lines of ploughed out ridge and furrow, which run downslope onto the margin of the cover sands from the Keuper Marl escarpment to the east (right). Copyright D. N. Riley. RHCM Archive no. SK845953 (photographed 23.06.1979).

Villas
The villa was the characteristic feature of the rural landscape of Roman times though it may be outnumbered by ‘native’ type settlements by a factor of three to one in the East Midlands area generally (Whitwell, 1982, 92-93). Literally meaning ‘a farm’, the term encompasses a wide variety of establishments of different economic and social status, ranging from the more luxurious country houses of wealthy landowners and businessmen, to the more modest romanized holdings of less affluent farmers. In plan, the principal buildings, however sophisticated or complex, have a common rectilinearity of form distinct from the native building tradition, and are usually found to utilise stone and tile in building and roofing construction.

In Lincolnshire as a whole surprisingly few villas have been identified so far, though numerous sites are known which have produced Roman building material (ibid., 372, fig. 8 facing, 380, fig. 15). In the northern part of the historic county the distribution of villas falls within two areas. A main group is found on the west, dispersed along the edge of the Jurassic limestone ridge, eg. at Burton, Scampton, and Glentworth, with a smaller outlying group to the east, on the edge of the chalk Wolds.
escarpment at Claxby and Walseby, on the interior at Kirmond le Mire, and further north at Worleby in south Huntingdonshire. The proximity of the villas along the Wolds edge to the industries of the adjacent blown sand belt may indicate a connection between the two, possibly tenurial, as has been proposed between the villa at Winterton and the nearby iron smelting industry at Thealby (ibid., 131-2).

Four villa sites have been recorded in the transect. Little information occurs on the sites at White House Farm, Blyborough, and Claxby, where mosaic pavements were exposed in the nineteenth century. At the excavated Walseby (Top Farm) villa the details of the discoveries are vague (ILN 25 May, 1861; Philpot, 1861), but the cropmark evidence (Fig. 14) strongly suggests that the villa complex, as an unit, was of the courtyard type, where the villa residence and its ancillary elements were ranged around an open, central courtyard. In the case of Walseby the principal buildings (Fig. 14, ‘B’) appear to have occupied the west side of the courtyard, while the other three sides were taken up by paddocks or closes of unknown purpose, but presumably associated with the working life or economy of the villa estate. At the Kirmond le Mire villa, discovered more recently in the 1970s (White, 1976) the evidence from fieldwalking indicates a winged corridor villa set centrally within a rectangular ditched enclosure.

To this list may be added several cropmark sites which are tentatively assigned villa status either on morphological grounds, or by virtue of the fact that they show surface evidence of buildings in the Roman tradition. Included in the former group are sites at Newville Farm in the Trent Valley, and a more enigmatic enclosure recorded on Otby Moor in the Mid Clay Vale, both of which display plans which conform to that of well-established villa complexes or the enclosures which encompass some villa residences.

At Newville Farm (Fig. 8, SK 813938; Everson & Hayes, 1984, 37, fig. 8) situated on the low lands bordering the Trent, some 2.5km south-east of the riverside village of East Stockwith, aerial photography has revealed part of an extensive complex of rectilinear cropmarkings of regular plan interpreted as a villa enclosure with associated fields. No traces are discernible of the principal villa buildings which presumably lay within the main, double-ditched enclosure, at centre, but the site of a circular, ancillary building is visible on the north side.

A point worth noting with regard to the Newville Farm site, and which may have wider significance, is the fact that fieldwalking failed to produce any surface material other than of recent date. The precise reasons for this are a matter of speculation, but one possible explanation may be found in the presence of river warp material, the deposition of which may have provided a measure of protection for the archaeological levels from the depredations of ploughing. If this assessment is correct then clearly there are implications regarding the state of preservation of archaeological sites on the warped lands in general.

On Otby Moor on the eastern edge of the Mid Clay Vale can be seen a larger example of a double-ditched rectilinear enclosure of a more simple form (Figs. 15, 20). In plan the cropmark shows considerable similarity to the villa enclosures recorded at Cromwell, Nottinghamshire, (Wilson, 1974, 249 with pl. XXIII; Todd, 1953, 91, fig. 21) and Allington Hill, Bottisham, Cambridgeshire (Wilson, 1974, 256 with pl. XXIV; Freer and St. Joseph, 1953, 193 with pl. 115) (of 3 ha. and 1.2 ha. respectively), displaying the double enclosing ditches of the former, and the subsidiary, internal angle enclosure of the latter site (where the main enclosure is defined by a single ditch). In contrast to these two sites, however, the Otby Moor enclosure has not so far produced any aerial evidence of the existence of villa buildings; nor have traces of domestic occupation been observed on the ground despite frequent investigations of the general area in recent years by Mrs. J.M. Lewis of Claxby, during which time a pottery kiln site and a pagan Saxon shed (with impressed decoration) have been discovered. Interpretation of the nature of occupation within the enclosure must therefore await the results of future reconnaissance and fieldwork. Perhaps less questionable is its apparent use for agricultural purposes, as deduced from the splayed shape of the entrance which was presumably intended to facilitate the passage of stock into the wide corridor between the perimeter ditches.

Fig. 14 Prehistoric funerary monuments and Romano-British settlement sites in the Walseby Top area.
Fig. 15 Otley Moor (TF 110931): the large 'stock' enclosure recorded on the windblown cover sand deposits, south-east of Clasby (deep, permeable, sandy gleys soils; Blackwood association, 821b); photographed from the north, with Otby Beck bottom left. The enclosure is viewed against the mottled background of soil patterns typical of this association (cf. Figs. 12, 13), showing probable ground ice depressions (darker toned areas), a large example of which (partly visible, top left) may have been exploited as a source of clay. To the east (left) of the enclosure, and on its interior, can be seen several pit-like features possibly of archaeological origin.


A third possible villa may be located at Snitterby (Fig. 16) on the dip slope, some 1.8km to the east of Ermine Street. The cropmark evidence here is less complete and informative, but the overall evidence again suggests a site of some status. Aerial photographs show a main enclosure of simple rectilinear plan, the full extent of which has yet to be revealed. The existence of a building had been suspected from the presence of a dense scatter of stones recorded on aerial photographs in the general area of the main enclosure. This was confirmed by the landowner who revealed that extensive sections of walling surviving to a substantial height were exposed during drainage operations in 1982, including a masonry platform about 2m square. A collection of associated pottery recovered at that time appeared to be of late third to fourth century A.D. date.

In addition to the villa-type complexes displaying a strict, rectilinear form, three examples are recorded of nucleated settlements, which, despite their more irregular appearance, may justifiably be included in this category. All show evidence of building remains of Roman date, and like the previous group of sites have their limits defined wholly, or partly, by a perimeter ditch; a common feature also is their complex character which may be indicative of multi-phase development.

The three examples identified are found in close proximity, on the dip slope and the Anholme Valley margins. The first, a major complex recorded approximately 0.7km south-east of Glentham Cliff farm (Fig. 17, SK 991906) is clearly of composite plan and focused on a large double-ditched enclosure, which is only partly visible. Fieldwalking by the writer yielded material of third to fourth century A.D. date from the southern half of the complex (area centred on SK 99189057) but none from that part in the adjacent field to the north. Most significant amongst the finds were a large fragment of opus signinum, two imbric fragment, and fragments of two other tiles, including possibly part of a box tile, all of which combine to suggest the presence of a building of some substance.

It is worth mentioning here that building debris associated with pottery of mostly third and fourth century A.D. date has also been recorded from the area to the west of Glentham Cliff farm (Fig. 17, 'B'; LAASRP 6, n.s., 1955-6, 10) where, interestingly, aerial photography has revealed traces of possibly another double-ditched rectilinear enclosure. Romano-British pottery is known from the field on the opposite side of the Mellow's Beck (Fig. 17, 'P'; LHA 3, 1968, 26), and cropmarks show in the field immediately to the east. Interpretation is difficult in view of the fragmentary nature of the evidence, but it could well be that these dispersed elements form part of an extended settlement, comparable to the suggested villa site at Bishop Norton (Fig. 8, SK 977926; NAR antiquity no. SK 99 SE 1; Whitwell, 1982, 149) which occupies a similar position along the flanks of one of the minor streams which dissect the dip slope.

At the second nucleated settlement in this group, located approximately 3.5km north-east of Glentham Cliff farm, at Cross Lane Bridge (Fig. 19, TF 017919), similar traces of occupation are found. Stone buildings had been recorded previously, associated with material of predominantly third and fourth century A.D. date (LHA 11, 1976, 55), and, most significantly, an early cruciform brooch, one of a number of metalwork finds with early Germanic associations from Lincolnshire which are recorded mainly in the context of villas or major settlements (Everson, 1978, 86). Further investigation in the field corroborated some of these findings, producing pottery of similar date, and structural evidence in the form of tegulae fragments and opus signinum. Additionally, it provided evidence of human burial, in the form of a cranium fragment, identified as that of a young adult of approximately 20-25 years of age (Dr. J.T. Chesterman, pers. comm.).

The third example (Fig. 8, TF 034915) occupies a riverine position on the eastern side of the Anholme near Bishopbridge. The complex shows a similar nucleated form but is more unusual in that it has a dovecote extending to the river on the west, and some evidence of external enclosures on the south. On the interior, as in the case of the other examples, can be seen a confusion of overlapping or superimposed cropmarkings, impossible to disentangle.
Building remains, brick and tile associated with querns, greyware, and samian, were discovered towards the northern end of the enclosure in 1960 (NAR, antiquity no. TF09 SW3).

How to explain the difference between the two forms of suggested villa represented by these groups of sites is problematic in view of the tenuous nature of the evidence available at present, a situation which can only be rectified by more intensive archaeological investigation. Possibly we are here dealing with two groups of sites having different origins. Sites of more regular, rectilinear plan, exemplified by those discovered at Neville Farm and Snitterby, may represent new foundations of possibly higher status, while those sites of more irregular form like Bishopbridge, may represent settlements of native origin which have undergone a process of romanization. In support of this argument it should be noted that at the site of Cross Lane Bridge the pottery is predominantly of third and fourth century A.D. date, but earlier occupation may be evidenced by the presence of a Nauheim derivative brooch, a form, in existence in the pre-Conquest period, which continued in use well into the second half of the first century A.D. Similarly, at the site recorded south-east of Glentham Cliff farm there are suggestions that the central, double-ditched enclosure may contain native round-house type features, which may represent an earlier phase of occupation.

In this discussion on rectilinear enclosures reference must be made to two quite remarkable complexes recorded on the Wolds near North Top, Kirmond le Mire (Fig. 8, TF 174932) and Priory Farm, Stainton le Vale (Fig. 8, TF 191946, and Fig. 18). Though outwardly different in plan - the former comprises a group of four separate enclosures arranged in a block, the latter, one unified structure - both complexes show a high degree of similarity of form, comprising in each case a 'ladder' of component enclosures of uniform size, which strongly suggests an element of deliberate planning. Both sites were examined on the ground and produced Romano-British material, not closely datable. At the Priory Farm site, a number of tile fragments were found, not all certainly of antiquity, together with a large fragment of the base of a greyware colander, of unusual thickness, while at North Top tegulae fragments could be positively identified.

The evidence available at present is too slight to permit a reasoned interpretation of either site, but it may be of some functional significance that both occupy prominent positions on Wolds slopes, no great distance from the valley-bottom sited villa at Kirmond le Mire. The North Top enclosure group occupies high ground 1km to the west.
of the villa, obscured from it by an intervening spur, while the complex at Priory Farm, is sited on the south facing slope of the main river valley, approximately 1.5km north-east of the villa. Until further investigation is carried out one can do no more than suggest that both complexes performed a function associated in some way with the agricultural economy of the nearby villa. Possible parallels for the type may be found in the landscape of Roman-British field systems on the Nottinghamshire side of the Trent where ladders of enclosures are integrated with brickwork plan fields, eg, at Knives Hill, Bamby Moor, north-west of Retford, where, interestingly, an example of an enclosure cluster is recorded on a hillside slope position (Riley, 1980, 32, pl. 8, and 122).

Irregular rectilinear complexes

The cropmark complexes in this category display a great diversity of form and apparently function. Several informative examples have been discussed in the preceding sections dealing with native-type settlements and villas (namely the possible stock enclosure and farmstead complex at Poplar Tree Farm, and the group of three villatype settlements situated south-east of Glentham Cliff Farm, at Cross Lane Bridge, and near Bishopbridge). Of the remainder the following sites are considered worthy of special mention.

At Low Place alongside Cross Lane in the Ancholme Valley (Fig. 19, TF 015925) aerial photography has revealed an extensive spread of overlapping rectilinear enclosures in a roughly rectangular configuration which shows at its western extremity two 'native' round-houses of possibly earlier date. The complex lies close to the suggested villa site at Cross Lane Bridge, and may represent a dependent village. Fieldwalking by the writer over the main area of settlement on the east side of the road at Low Place produced a quantity of ceramic material of generally early types, suggesting a main period of occupation of perhaps the first to the third century A.D. Interestingly, one rim fragment of a bowl in a shell gritted fabric, identified as being of earlier, Iron Age date, was also found. Whether this represents a find disturbed in situ or one which has strayed from the adjacent 'native' site some 300m to the west cannot be determined, but it does raise the possibility of an earlier, pre-Roman phase of occupation on the site. A point worth noting with regard to the condition of the archaeological sites at Low Place and Cross Lane Bridge is that both are clearly visible as soilmarks on the ground, which gives an indication of the amount of plough damage currently going on.

On Othy Moor (Fig. 20) on the opposite side of the Vale can be seen a cluster of irregular complexes of indeterminate function and date. These lie within that extensive landscape of windblown cover sand of late Devensian origin found along the foot of the western escarpment of the Wolds between Linwood and Caistor which appears to have been the scene of widespread industrial activity during the Roman period.

A total of twelve possible pottery kiln sites, in production during the third and early fourth centuries A.D., have been identified from scatters of kiln debris, or
their presence inferred by the evidence of waster heaps on Otby Moor, concentrated mainly along the Otby Beck, with outliers to the north in the vicinity of Claxby House Farm (J.M. Lewis field records; Swan, 1984, (fiche) 439-441, 469-471). Scatters of iron slag from the adjacent areas to the west evidence ironworking activity on the moor also, which may have been carried out in combination with pottery manufacture, as was apparently the case at the industrial complex at Holme-on-Spalding Moor, Humberside (Halkon, 1983), and possibly Linwood Warren, south of Market Rasen (Whitwell, 1970, 113).

Whether the irregular cropmark complexes recorded on the moor are associated with this industrial activity or, like the double-ditched 'villa-type' enclosure on the west (Fig. 20, TF 110931), are related to some form of agricultural activity is not known. An industrial function may perhaps be appropriate in the case of the cluster of minor enclosures (Fig. 20, TF 116928) found in the area of kiln concentration on the south side of the Otby Beck, which could represent compounds involved in the process of pottery manufacture. A source of the raw material for this industry was to be found in the underlying deposits of Kimmeridge clay, which may have been extracted from two of the ground-ice depressions formed on this landscape in late Pleistocene times. The southernmost and largest of these 'clay-pits' (depicted as stippled areas on Fig. 20), both of which show evidence of disturbance on aerial photographs, is discernible on the ground as a very marked, circular hollow, some 100m across, containing a small plantation of poplars. A smaller clay-pit, with a kiln adjacent to it, has been identified in the area north-west of Claxby House Farm, at TF 114936, on the opposite side of the Otby Beck (EMAB 8, 1965, 20).

Of the irregular complexes recorded on the Wolds, two examples, totally different in character, are especially remarkable. The first, situated on the high Wolds at Binbrook Walk House, some 3km south-east of Binbrook (Fig. 8, TF 242928) occupies a prominent position on a low, flat-topped spur, on the western edge of the central plateau, in an area where few cropmarks have been observed so far. The complex is of particular interest from the point of view of the study of the development of cropmarks for the fact that it lies in permanent (sheep) pasture, a normally unresponsive environment which proved productive during
the exceptional drought conditions of 1976. The lines of parching revealed an extensive grouping of rectilinear ditched enclosures in a very irregular arrangement, running in the main along the long axis of the spur for some 300m. Its full extent on the east is not known, nor on the north where the ground falls rapidly away to the head of a dry valley. A group of enclosures recorded on an adjacent spur, c.200m to the north, would appear to form part of the same complex. The nature of the occupation of the site is not known, but it clearly represents a major settlement of some kind. Ground examination of the main area of cropmarks (centred on TF 242928) yielded one potsherd (R-B greyware, rim fragment of a dish or bowl of nondiagnostic type) from a moheshill.

At Churn Water Heads (Fig. 8, TF 158925) on the western edge of the Wolds, where aerial photographs show a far less distinguished group of cropmarks, fieldwalking produced surprising results. Amongst the material found were brick and tegulae fragments, and one other tile which displayed possible evidence of plaster keying, indicating the presence of a building of some substance. The pottery suggested a date to second century A.D., with possibly earlier occupation (first century A.D.) evidenced by shell gritted ware. Some 200m to the north is found a lesser group of enclosures (Fig. 8, TF 156927) which may be associated with that establishment. Fieldwalking here produced a smaller quantity of Romano-British material, not closely datable, apart from a fragment of a carinated bowl of late second to early third century A.D.

A notable feature of the complex is its topographical position, which would appear to be typical of Romano-British settlements located in the vicinity of the High Street ridgeway. Like the nearby villa at Waltham, situated some 1.2km to the west, on the opposite side of Waltham Top, the site at Churn Water Heads occupies a prominent position overlooking the head of one of the valleys which incise the west escarpment, in this case that of the river Rase. Two other examples of settlements are found in analogous situations further to the south, in the vicinity of Kimmond Top, at TF 181911 (LHA, 6, 1971, 8) and TF 189905 (Fig. 8), but overlooking, on this occasion, the heads of valleys of rivers flowing north-eastwards into the Marshland.

7.4 Roman Roads

Northwards from Lincoln, Ermine Street follows a direct course along the dip slope towards a crossing of the Humber at Winteringham (Marry, 1973, 236-8). At the major prehistoric and Romano-British settlement at Owning, approximately 1.5km north of the city, a secondary road (ibid., 242) branches off north-eastwards in the general direction of the Wolds-edge villus and pottery industries of the Claxby area. In the transect sections of paving presumably of this same road were observed in the early nineteenth century by J. Cragg during the clearance of Osgodby Moor (Phillips, 1934, 115) and south of Cote Hill Farm, Osgodby (at TF 069916 and TF 075919) by the late C.W. Phillips in 1929. Additional sections of road were recorded by A. Sharpe in 1913 some distance to the north-east, just south of Uselby (between TF 081923 and TF 100932), the line of which may be preserved in part in the existing field boundaries, and in a lane leading to Wood Cottage (TF 098931). Beyond this point, the road, supposedly of chalk construction, and visible both as a soilmark and cropmark from the ground, follows a dog-leg course to the Otby Beck (TF 159036) and then straight to connect with Normanby Rise on the southern outskirts of Claxby village (TF 112943). On Uselby Moor the line of the road may be discernible on aerial photographs (RCHME Archive no. TF 1092/S) as a lighter-toned cropmark running from the edge of woodland (TF 100932) almost to the Lincoln-Grimby railway line (TF 1039340). At Osgodby surface finds evidence a ribbon of occupation sites flanking the Roman road for a distance of some 1.6km. The very plausible suggestion has been made that this extended settlement may represent the living quarters of the potters employed in the industry on Otby Moor which lies some 5km to the north-east (Whittwell, 1982, 84).

Approximately 7km north of Owning, on the dip slope, aerial photography has revealed a previously unknown road branching off Ermine Street in a north-easterly direction, apparently towards the settlement adjacent to the Atterby Beck at Bishop Norton (Fig. 8, SK 965922-969924, and Fig. 21). There is no evidence available at present to show whether this only represents an access road to the settlement, or whether, as at Owning, it continues beyond into the Mid Clay Vale.

Fig. 21 Bishop Norton (SK 967924): Roman road branching off Ermine Street, viewed from north-east. The cropmarks, recorded on the shallow, well-drained, fine calcareous soils of the Jurassic limetone ridge (Elerton 1 association 343a) reveal the darker lines of the two roadside ditches flanked, on either side, by the faint lines of marking out ditches. The more prominent line on the right, on a slightly different alignment, marks a former field boundary.

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On the eastern side of the county the evidence of Roman roads is less tangible. North-east of the major Romano-British settlement at Ludford the line of a tentative Roman road connecting Lincoln with a possible natural harbour on the coast near Grinthorpe Haven (Marry, 1973, 241-2) has been traced by Phillips along lanes and footpaths which for long stretches are followed by parish and ancient wapentake boundaries. This road enters the transect on the south in the vicinity of Great Tows (TF 226904) and continues in a direct line north-eastwards to connect eventually with Pear Tree Lane (TF 291944) leading to Grinthorpe Haven some 13km beyond. Proof of the antiquity of this route may be found in the number of prehistoric monuments located along its line. Between Great Tows and the disused airfield at Kelstern, a distance of some 4km, three ploughed out round barrow sites are recorded, at TF 2489167, TF 25189129, and TF 25719238 (NAR, antiquity nos. TF29 SW4, TF29 SE2, TF29 SE1, respectively).

Although no traces of road surfaces suggestive of Roman construction have been observed on the Wolds along this line, it is reasonable to assume that this route, like the
prehistoric High Street ridgeway, continued in use during the Roman period. In support of this it should be noted that aerial photography has revealed a group of rectilinear cropmarks at the disused airfield at Ketton (TF 254919) immediately adjacent to the line of the road, and an extensive settlement complex at Binbrook Walk House (TF 242928) just over 1km to the north-west.

8. CONCLUSIONS
This survey has examined aspects of the aerial archaeology of a corridor of land of approximately 335km² in area considered to be representative of the landscape of northern Lincolnshire. The objectives of the survey, to recapitulate, were threefold:

(i) to assess the extent, deficiencies, and quality of the existing air photographic record.
(ii) to evaluate the ability of the soils of northern Lincolnshire to develop archaeological cropmarks.
(iii) to examine, specifically, the cropmark evidence of prehistoric and Romano-British settlement.

(i) Analysis of the primary photographic record of the transect has highlighted the limitations in the air cover of the northern half of the county, stemming directly from a lack of systematic air survey. This is borne out by the figures relating to the frequency of recording of sites, and by the number of cropmark sites which have only been partially recorded. It will only be through the introduction of a programme of intensive aerial reconnaissance that allows the landscape to be examined under different crops, different conditions of cultivation, and extremes of climatic conditions of cultivation, and in successive years that we will begin to obtain a more reliable view of the underlying archaeology.

(ii) Despite the shortcomings in the record the air photographic and archaeological potential of the northern half of the county is amply proven. The extensive landscapes of lighter, more permeable soils represented by the cover and deposits of the Trent Valley and Wolds margins, the Jurassic limestone ridge and dip slope, and particularly the uplands of the chalk Wolds, stand out as prime archaeological environments. Demonstratively sensitive to aerial survey, there is no doubt that these areas deserve far greater attention than they have received hitherto.

On the soils of the heavier clay-lands cropmark photography is generally found to be unproductive by comparison, and in these circumstances we have to rely more on other techniques of discovery. Of these so far unproductive areas the Marshland can be singled out as an environment whose cropmark potential is uncertain, and which requires special consideration.

An important point which needs to be stressed is that even on the more sensitive soils aerial survey can only reveal part of the story, albeit a very important part, and that its results need to be complemented by the evidence derived from fieldwalking and excavation. Only by this integrated approach can a more comprehensive picture of the evolution of the landscape be pieced together.

(iii) Aerial reconnaissance in the years following 1975, though of limited extent, has drawn attention to the richness and variety of the cropmark archaeology of the prehistoric and Romano-British landscapes of northern Lincolnshire. The range of monument type, if not their numbers, compares well with the evidence from the more familiar archaeological landscapes of the fenland margins to the south, the Trent Valley to the west, and to a degree also with the chalklands north of the Humber, areas which have come under the scrutiny of aerial photographers for a considerably longer period of time. There is every reason to suppose that the responsive landscapes of northern Lincolnshire, given the same level of attention, can attain a similar ranking in terms of archaeological importance.

9. BIBLIOGRAPHY AND ABBREVIATIONS
CUCAP: Cambridge University Committee for Aerial Photography.
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ILN: The Illustrated London News.
LAASPR: Lincolnshire Architectural and Archaeological Society Reports and Papers.
LCCM: Lincoln City and County Museum.
LHA: Lincolnshire History and Archaeology.
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NAR: National Archaeological Record (formerly the Ordnance Survey Archaeology Division Record).

NLAU: North Lincolnshire Archaeological Unit.


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