Aerial Photography Aiding Landscape Studies on Merseyside

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Aerial photography has played a key role in the initial stages of an archaeological survey of Merseyside, even though few of the photographs studied had been taken for archaeological purposes. Most were from a collection, held by the Merseyside County Planning Department, of vertical monochrome prints and false-colour infra-red transparencies printed at a common scale of 1:10 000 and forming a series of surveys that began in 1945. The other significant collection was a set of vertical monochrome prints at 1: 5 000 taken for and held by the St Helens Planning Department. Study of the material was made possible by a commissioning grant from the County Planning Department and was intended to provide a basic understanding of the potential for field research.

The detail that emerged was variable, depending on the weather conditions that prevailed during the weeks before and at the time of the flights. Earthworks were rarely recorded because, taken with the sun high in the sky, little shadow was thrown from them. One set, however, was exceptional in the quality and quantity of information revealed: the series taken with infra-red film. The survey, a joint venture between the Merseyside County Council and the Department of the Environment, had been undertaken in clear air at the beginning of the 1975 drought and was found to hold so much information that the other surveys were studied only to determine what additional or modifying information they might contain.

The number and scale of the photographs indicated that, with limited resources, a systematic search for individual small features would be impracticable, but groups of features or single, larger, ones could be assessed very effectively. The pattern of information that emerged separates Wirral from the rest of the County, (see p.88) and the reason for this may be surmised from an examination of the land involved and its varying potential for different types of human subsistence. To do that it is first necessary to consider the results and effects of the last glaciation.

The last glacial retreat, about 10,000 years ago, left behind a trail of devastation that is clearly discernible today. The vast gouges ripped out by the main ice routes can be seen on a contour map as the parallel valleys of the Dee and Mersey, along the central axis of Wirral as the Fender and, further east as the Alt and Sankey (figure 1). The areas of sandstone bedrock that endured this onslaught survive as today's high ground, surrounded by clays, sands and gravels that were dumped by the glaciers. That early mineral jungle gradually drained of excess water and was slowly colonised by types of vegetation suited to the changed environment.

The land that emerged was then further shaped by two opposing effects. The water that had been locked up in glaciers was now released, submerging large areas of coastal lowland (***eustatic rise***) and, in so doing, separating Britain from Europe. This inundation was offset in the north of Britain, however, by a rise in the landmass itself (***isostatic recovery***).

Today's familiar coastline is an intermediate result of that process and greatly different from that known by earlier generations. The model of its progress is not yet fully understood, but research by Creswell (1953) and, more recently, by Tooley (1978) and Kenna (1980) is rapidly contributing to an understanding. The relative height of land above sea level will have affected the drainage of the land and, hence, the character of the landscape that developed upon it. Changing coastal winds and currents will also have deposited and, at times, removed sand from the coastline, thereby changing the ease with which land water could drain into the sea.

Several distinct landscapes resulted from these processes but, for the purpose of this discussion, they will be considered as only three with local variations. The first division is that observable in the surface geology along an east-west line between the northern extremity of Wirral, through Bootle (north Liverpool) to the southern edge of urban St Helens. The land to the north of this line is predominantly covered with sands of the Shirdley Hill series overlain with large areas of peat bog. To the south of the line the main drift deposits are of boulder clay, conveniently subdivided by the Mersey. The difference between these subdivisions will be discussed later. The resultant sectors, illustrated in figure 1, may be considered as north, south west and south east Merseyside.

1. North Merseyside

The low, flat lands of the western half of this quadrant and the damming effect of the drifting coastal sand dunes have combined to make poor drainage its predominant characteristic. Persistently excessive

rainfall has accentuated this characteristic so that peat bog (known locally as ***moss land***) has developed over much of the area. In the recent stages of development, the lowland moss and that on the higher ground around St Helens were both raised bog, but in the earlier stages it is reasonable to assume a fundamental difference between them. The lowland moss would have formed in water rich in minerals washed down from the higher ground, whereas the moss on the higher ground would have derived its supply of water only from the rain. In these conditions, different species of vegetation would have made up the bogs and each would have a different associated range of fauna, though with obvious overlap. As the bogs developed, the character of the lowland one appears to have changed. As the depth of vegetation increased, mineral downwash seems to have been out of reach of the new vegetation. With only direct rainfall to supply it, raised bog grew here too. Distribution of the surface deposits, including the bogs, may be examined in greater detail by studying the Ordnance Survey's maps of drift geology. They were surveyed in the last century when the mosslands, although significantly diminished by drainage schemes, were more extensive than the remnants of today.

The most significant implication of this landscape to an aerial study is that the peat resulting from the growth of a bog, even when drained, is a good buffer to dehydration. It tends, because of the slow rate of release, to distribute moisture evenly throughout its network. Buried features in soils where water drains and evaporates freely are often detected as ***cropmarks*** and differences of structure below the surface, caused by the presence of disused pits, ditches or foundations may then be indicated by differences in plant growth over them. This often occurs at the onset of a drought when the availability of a little extra moisture determines whether a plant thrives or dies. The pattern of affected plants then produces the cropmarks.

The mossland however, being peat, does not therefore readily reveal its history to the aerial observer. In its present drained state, it is highly prized for arable agriculture. In its natural form it would have offered peat as fuel, and a rich flora and fauna that would have provided valuable winter fodder for domestic animals as well as a variety of opportunities for hunting and gathering subsistence. The uses to which it was actually put, however, remain to be deduced from other techniques.

The mineral based soils in the remaining parts of this sector, especially those of the Shirdley Hill sands, may be expected under the appropriate conditions to produce cropmarks and, indeed, many have been observed. Although the large particle size of the sand means that the soils have an inferior ability to retain water and, hence, nutrients for the vegetation, they are light and easy to till with an ard or primitive plough. A natural admixture with peat, alluvium or boulder clay does, however, modify the characteristics to provide possibilities for successful agriculture. Such combinations are a common surface form in Merseyside. The cropmarks that have so far been studied on this type of soil are extremely prolific. There is a multitude of pits that require individual study before their functions can be established and a complex network of ploughed out field boundaries, most of which are recorded on 19th century tithe and Ordnance Survey maps. Some have an earlier, usually more complex or even unrelated form and it is examples of these that are described in the following pages. In this northern area, markedly different patterns of fields have been recorded from the air, some indicative of early wetland reclamation for agriculture and others of medieval arable agriculture on the drier land.

Wetland Reclamation

The course of the lower reaches of the river Alt appears to have been altered in recent centuries by movements of the coastal sand, shifting from an east west alignment along today's southern urban limits of Formby (Saxton 1577 and Speed 1610), southwards to its present estuary at Hightown. In the northern bend of the modern river, at North End, Ince Blundell, field boundaries indicated on the infrared photographs are of an unusual form within the local landscape. Most of the fields in the area have linear boundaries that denote their function in land drainage and reclamation schemes implemented over the past two centuries. The small, irregular boundaries would have served the same function, but on a smaller and less regimented scale. Their form suggests drainage of a more easily reclaimable piece of land and thus of an early date. Their location, on freshwater alluvium of the river Alt, suggests that the river had already provided the basic mechanism for drainage, and that before reclamation the area may have been covered with light fen-woodland vegetation, surrounded on the north and south by peat bog.

In the absence of basic documentary research, the date of these fields can be attributed only to some time between the 12th and 18th centuries AD, with a suggestion that a period in the earlier part of those six centuries seems likely. The later date bracket is inferred from examination of an estate plan (Lancs RO DDIn 53/113) of the north part of Ince Blundell, surveyed when the fields were owned by William Blundell of Crosby Hall and Henry Blundell of Ince. The field boundaries shown on the survey are little different from those of the 19th century and later Ordnance Survey maps, depicting only a portion of the pattern seen on the photographs. The earlier date is that of a grant of land from the Lord of the Manor, Henry Blundell, to the Cistercian Abbey at Stanlow, Wirral, for the provision of a monastic grange. The monks cleared and drained the land in order to use it for farming, so it is in this programme that an explanation of the field ditches might be sought. There was widescale land reclamation for farming throughout England from the early 12th century onwards. Monastic houses were responsible for much of the work, especially those of the Cistercian order (Hoskins 1955, 101). Future research will therefore necessitate a study of the original land grant and monastic records (Transcription in Latin in Hulton 1847) to verify whether the land was part of the monastic estate and, if so, to search for further

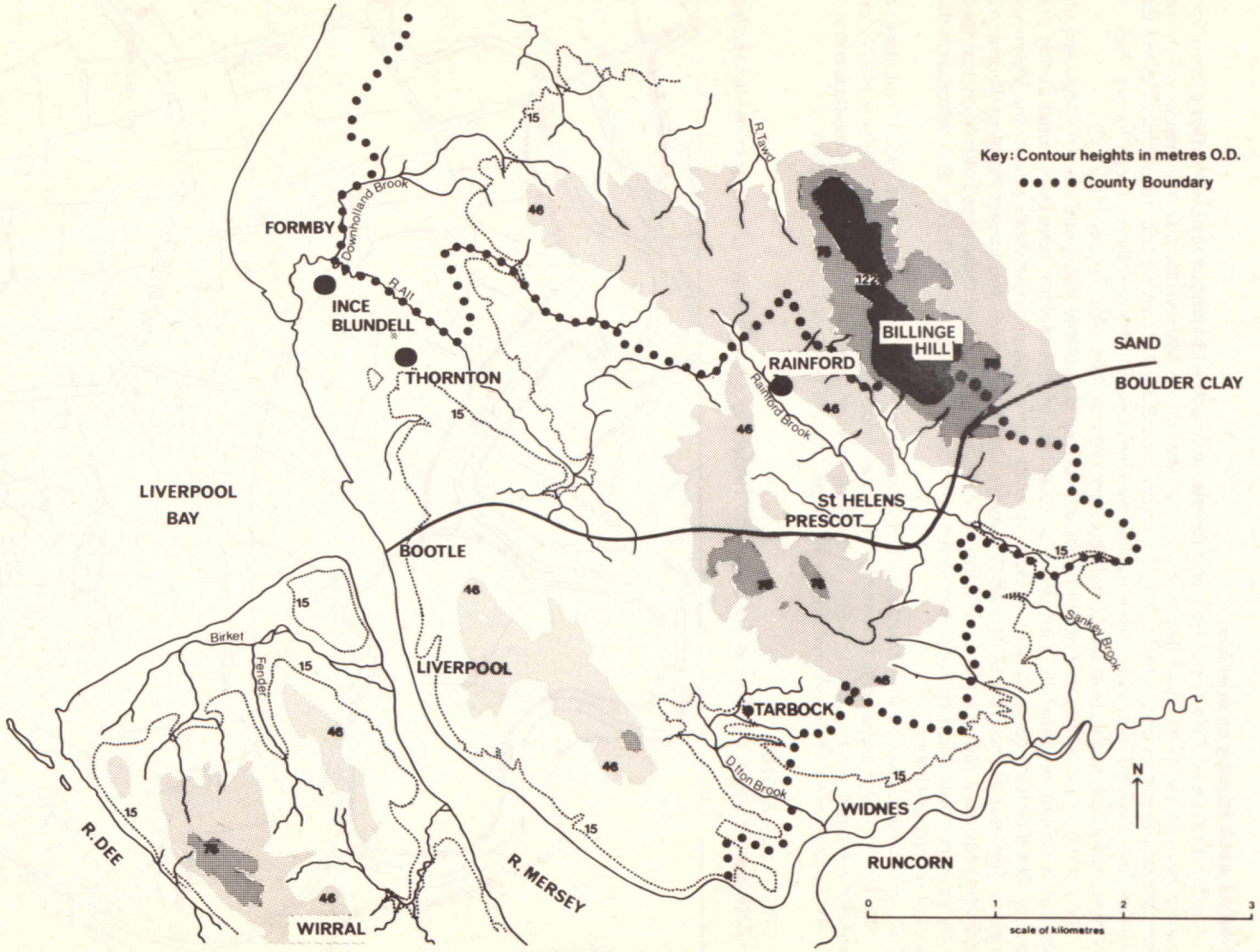


Figure 1: Topography of Merseyside

references to it. Documentation relating to this land is relatively abundant. Monastic papers provide information until the 16th century when the lands were seized by the Crown. The subsequent land exchange 'Licence of Alienation' from Whalley Abbey to Thomas Holte in 1543, and conveyance in the same year to Richard, heir of Sir William Molyneux of Sefton (Lancs RO DDM 46/64 and 46/65), then provides the bridge between ecclesiastical and private archives.

Medieval arable farming on drier land

A different type of field pattern, ***rig and furrow,*** although a ubiquitous feature in other parts of the country has not yet been identified as a common feature on Merseyside, but one area in which the photographs show it in great profusion is Thornton (figure 3). Another rig and furrow field lies in Ince Blundell, the township boundary being marked by Hunt's Brook. Its position in Ince Blundell Park is, however, accidental, as this land was outside the Park until the late 18th century (figure 3).

The pattern of ploughing that produces rig and furrow is normally associated with medieval agriculture but it cannot be dated by form alone as examples of this practice have been noted during this century. Documentary research does, however, provide some assistance. An estate plan of the Molyneux lands in Thornton (Lancs RO DDM 14/54), surveyed in 1769, names and locates many of Thornton's fields and provides a valuable key to establishing the location of some of those same fields when described in earlier documents. 18th century field names can then also be applied to the remains detected on the aerial photographs (figure 3).

A systematic study of early documents for this area has only recently begun but, even at this stage, it is possible to make superficial comment, from transcriptions made by Thomas Williams (1974) on medieval references to two of the fields. The reference given after the field name is of the page and the quoted recall number of the original document in the Lancashire Record Office at Preston.

CROOKS (108, 61M).

Exchange: Richard Tarleton of Thorneton, to Robert Ince of the same – 2 selions in the field called

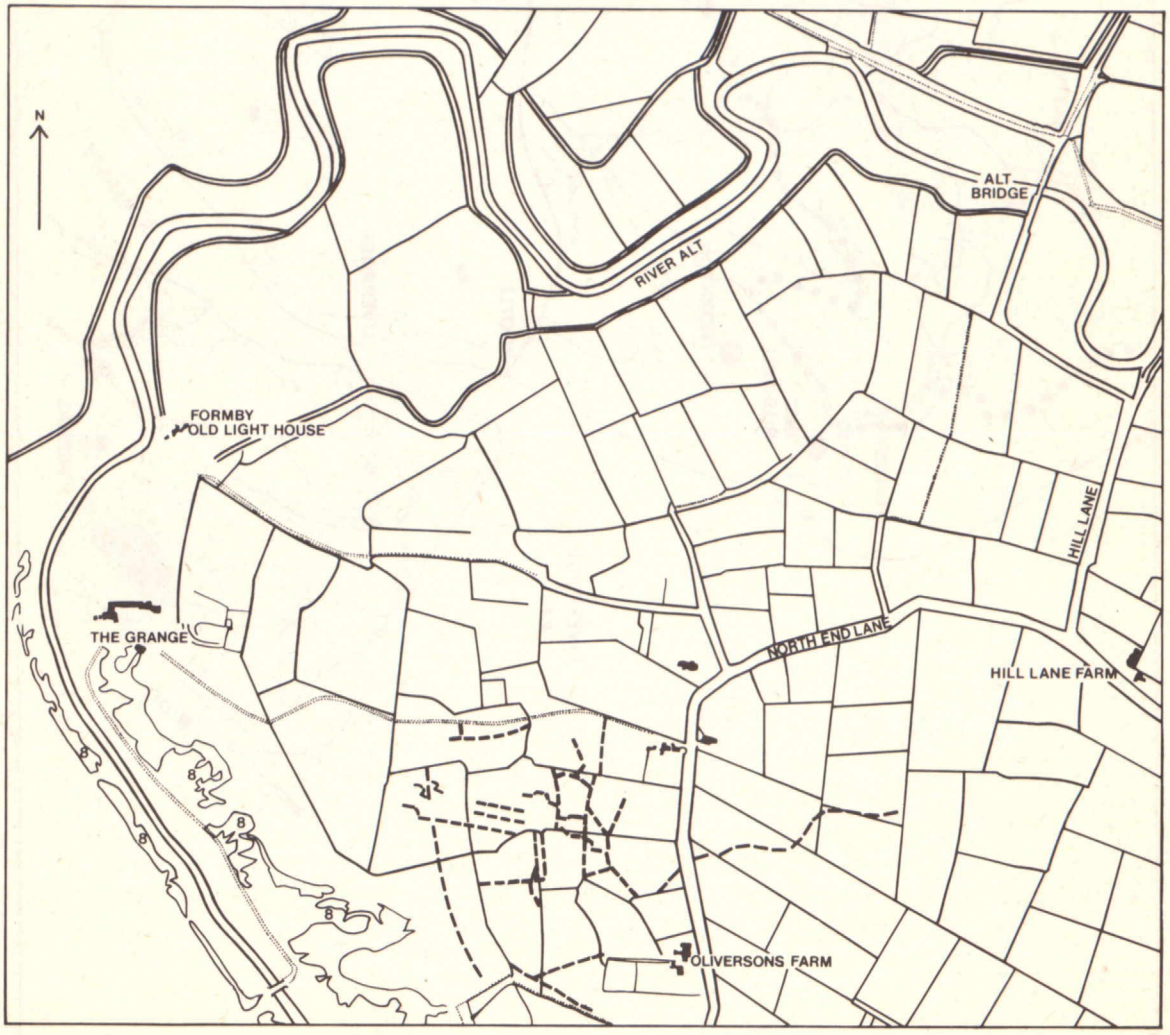
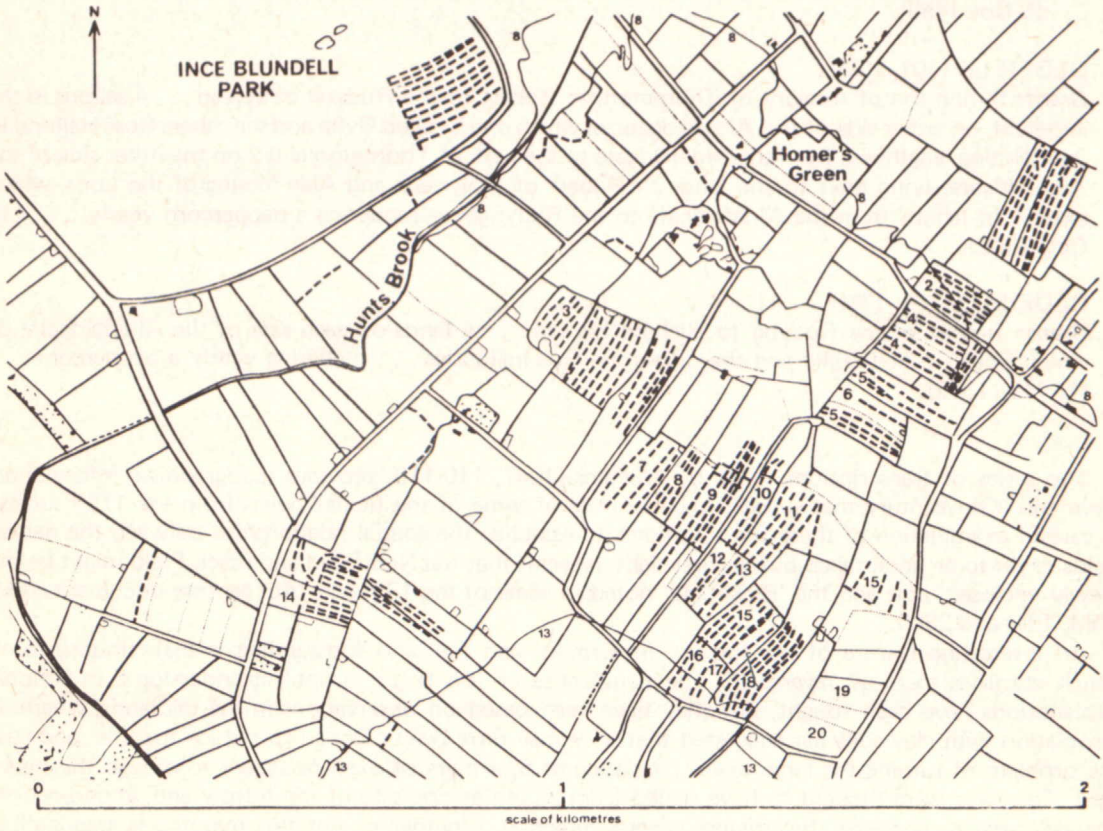


Figure 2: Early Land Reclamation for agriculture, North End, Ince Blundell

0 0·5 1
scale of kilometres



Field names taken from the Molyneux estate plan of 1769

1. Broad Lands
2. Wm. Ecclestone's
3. Mr. Bootles
4. Lunt Heys
5. Old Field
6. Thos. Stockforth's
7. Mr. Plumb's land
8. Field Hey
9. Wm. Cuthbertson's land
10. Mr. Abraham's
11. Higher Tush Pit Hey
12. Wall Butts
13. Lower Tush Pit Hey
14. Pit Field
15. Crooks
16. Little Kiln Hey
17. Mr. Abraham's
18. Horse Pasture
19. Higher Black Field
20. Black Field

Notes:

(A) Base map redrawn from 19th century O.S. map. Fine dotted lines are additional fields shown in 1769 survey.

(B) Rig and furrow shown here is confined to the better drained soils of the Astley Hall series. The belt of soil straddling Hunts Brook is of the Sollom complex.

(C) The Ordnance Survey's Soil Survey of 1967 describes the Astley Hall series as having imperfect natural drainage. It has a loamy sand to sandy loam surface with loamy sand to sand below. The Sollom complex has poor natural drainage, a peaty or humose loamy sand to sandy loam surface with sand below.

Figure 3: Rig and Furrow at Thornton and Ince Blundell

Crokis, between land of Robert Ince on the south and of Richard Tarleton on the north; . . . also a selion in the Crokis between lands of Robert Ince on the south and of Richard Tarleton on the north; . . . (8 Nov 1489).

OLDFIELD (101, 10M).
Grant: Simon son of Amaury of Thorneton, to Robert of the Rudyng of Sefton . . . 4 selions in the Aldefeld, on either side of the Aldefeldgate, of which one is called Gylle and the others Gose Hallondes, 2 extending lengthwise from the Aldefeldgate to the park of Thorneton and 2 on the other side of the Aldefeldgate, lying next to the lands of Robert of Molyneus and Alan Young of the Lont, which extend in length from the Aldefeldgate to the Rudynges – rendering a peppercorn yearly. . . . (19 Oct. 1302).

OLDFIELD (103, 17M).
Grant: Robert of the Rudyng to Richard his son . . . 4 lands on each side of the Aldefeldgate, of which one is called Gylle and the others the Gosehallondes . . . rendering yearly a peppercorn . . . (16 May 1312).

The series of transcriptions made by Williams (1947, 110-110) provides topographical information from the 13th century that suggests medieval use of some of the fields known from the 1769 survey. A careful examination of these transcriptions, to establish the spatial relationships between the named fields is yet to be undertaken but, at first sight, it seems that the New Field and Black Field might be the 'newly enclosed' acre and the 'Blakefield' noted in some of the 13th and 14th century documents (6M, 15M, 16M and 23M).

An interesting feature of the furrows in 'Crooks' and the land surrounding is their sinuous form, which classifies them as ***'reverse S'***. The significance of this shape is not yet understood. Functional explanations have been sought, but they have been based on observations in the midlands, where an association with clay soils has suggested that they may have been planned to reduce trample, and ease the problem of turning the large teams consisting of four pairs of oxen necessary to plough this heavy land. The oxen were thought to have pulled from a path at one side of the furrow and, at mid-course, changed side to continue the original general direction. Whether or not this hypothesis stands close examination in that context, long plough teams would not be necessary in Thornton.

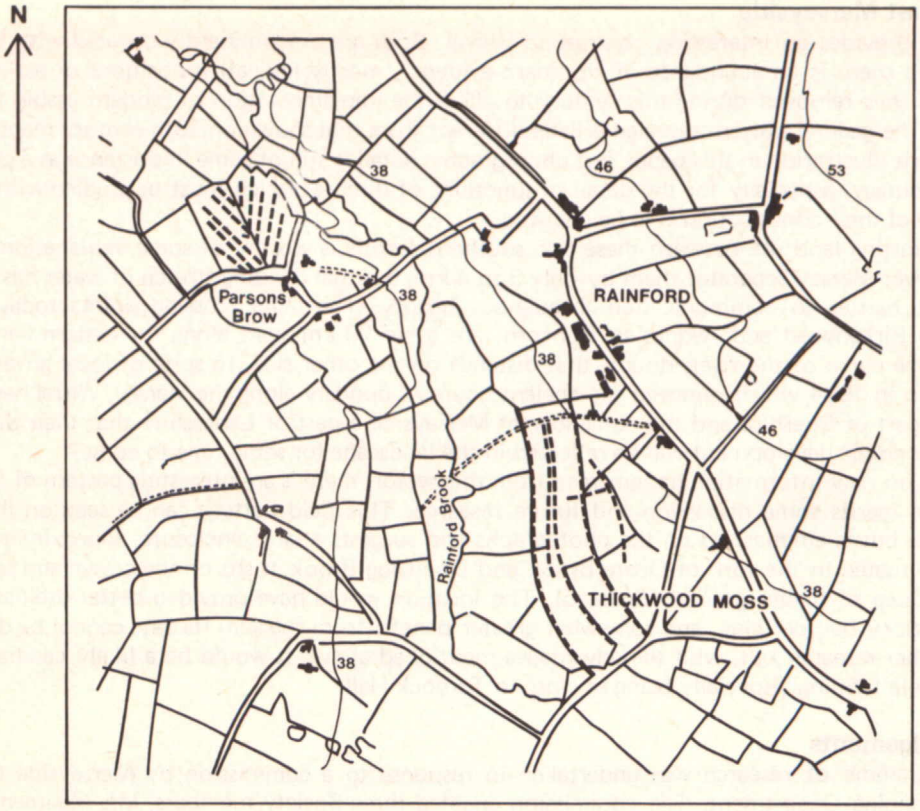
There is another example of this type of field at 'Thickwood Moss', 300 metres south of Rainford (figure 4). The photographs do not provide evidence of internal strips but do show small fields within those recorded on 19th century maps which conform to the reverse S shape. Without further evidence it would be unwise to attempt a positive attribution of these fields to the medieval period, though it remains a reasonable possibility. The soils have similar characteristics to those at Thornton, also being based on Shirdley Hill sands, and so would likewise appear to have offered reasonable scope for medieval arable agriculture.

Reverse S fields on light soils are not peculiar to Merseyside as Rhys Williams has also noted this combination in Cheshire (Williams 1978). There is, therefore, clearly a need for further observation and thought, before their true significance can be established.

2. South West Merseyside (Wirral)

The blanket of boulder clay that covers so much of Wirral might in itself suggest that a study of cropmarks would be unprofitable. This proved to be the case, but not entirely for the reason suggested by the drift geology. Boulder clay, having extremely small particles, is more efficient than sand at retaining water and is thus a more resistant medium to drought. Because water and nutrients are efficiently retained and the large surface area offered by the constituent particles offers an effective supply of minerals for solution in the moist soil, it tends to be a good, if not too damp, medium for plant growth. The heavy and sticky characteristics that accompany small particle size are irrelevant to a growing plant, provided it is not waterlogged, but make tilling a difficult and usually impractical exercise with primitive agricultural technology. These soils have thus lent themselves to the natural formation of dense woodland which when cleared would provide lush pasture for sheep and cattle. A closer examination of the photographs shows that the paucity of cropmarks, whilst influenced by the nature of the soil, cannot entirely be attributed to it. The use to which the land has recently been put provides greater clues. Whereas many cropmarks have been observed on similar geological deposits in south east Merseyside most of these were of ploughed out field boundaries, on Wirral, these boundaries have tended to be preserved in their original form. With no break in this century from predominantly pastoral agriculture, the early fields continue to be economically acceptable and are thus retained. Smaller features are less easily detected under these conditions because grass, having shallower roots than cereals, is less sensitive to minor variations below the surface.

Aerial photography has still a role to play on Wirral but its important application must now be to study early field systems and earthworks that are still detectable in contour. These have not been revealed in this programme of vertical prints but would be in photographs taken under conditions that produce long shadows to emphasise their form.



Key: Contour heights in metres O.D.
--- Crop marks

Figure 4: Reverse S fields at Thickwood Moss, Rainford

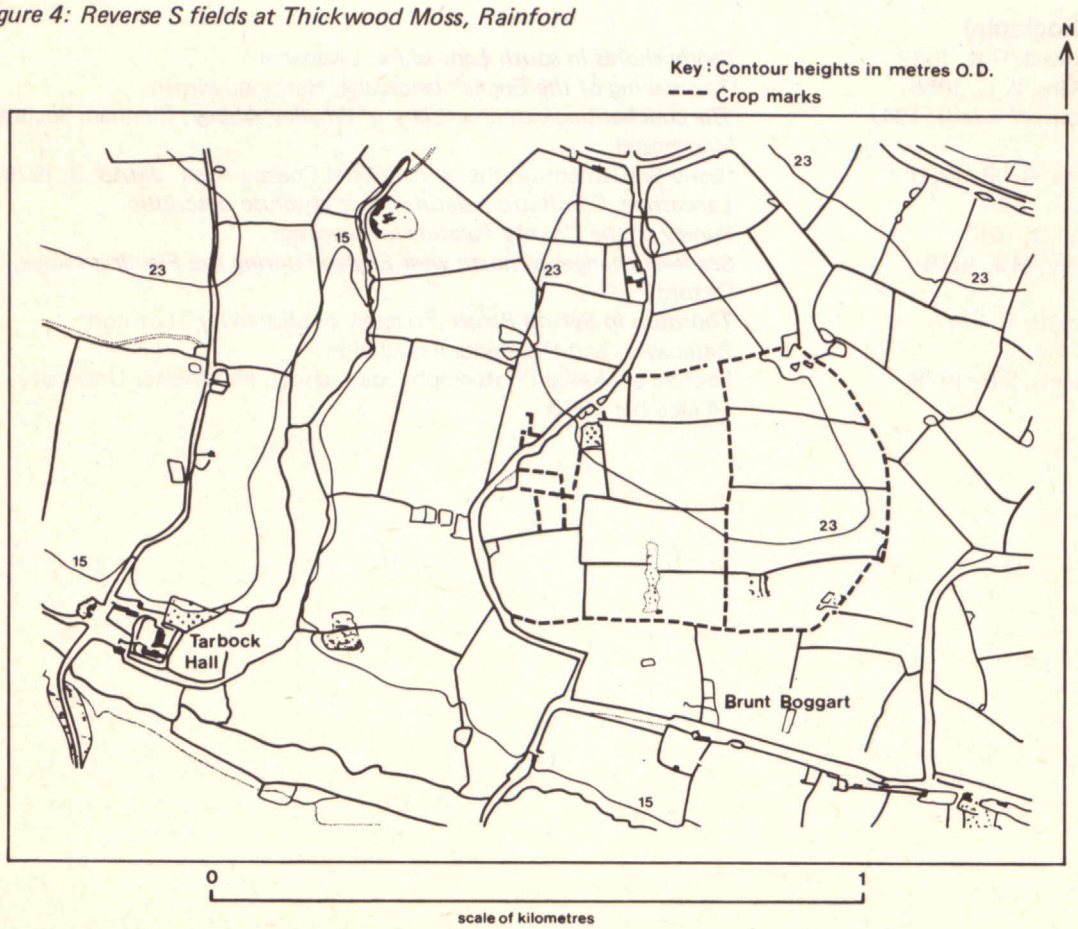


Figure 5: Enclosure at Tarbock

3. South East Merseyside

This area provides an interesting contrast to Wirral. Both are predominantly covered with boulder clay but here there is an abundance of cropmark evidence, mostly indicating positions of earlier field boundary ditches removed during this century to allow the implementation of modern arable farming techniques. The general pattern revealed is little different from that shown on 19th century maps and so does not merit illustration in this paper, but photographic detail is still of some importance as a check to surveying accuracy, especially for the detail of junctions of ditches, which must be studied with care if the sequence of their construction is to be deduced.

The contrasting land use between these two southern sectors is worthy of some explanation at this point. The river Mersey separates them by only 3 to 4 km, but that dividing stretch of water has proved a significant barrier to communication throughout history. The main crossing points today, from Liverpool to Birkenhead and Widnes to Runcorn, are some 20 km apart along the eastern bank and, because of the curve of the river, double that distance on the other side. In spite of local government reorganisation in 1974 which removed the ancient county boundary along the Mersey, Wirral has for so long been a part of Cheshire and the remainder of Merseyside a part of Lancashire that their different social and economic development will be reflected in the landscape for some time to come.

Although no new information has emerged from this sector, there is an interesting pattern of fields at Tarbock that merits some discussion and future research. This field pattern can be seen on the 19th century maps but is emphasized on the photographs and suggests a large enclosure, approximately 600 by 400 m. Situated in the fork of Ochre Brook and Dog Clog Brook, it sits on the crown and southern slope of an area of higher ground (figure 5). The location would have provided better drained fields amidst the sticky boulder clay, and somewhat greater benefit from the sun. Its date cannot be deduced without further research but, with the advantages mentioned above, it would be a likely candidate for medieval arable farming, especially being so close to Tarbock Hall.

Acknowledgements

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