THE DRAINING OF THE MARSHLANDS OF EAST YORKSHIRE

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ABSTRACT

Holderness, the Vale of York, and the Vale of Pickering are three fairly typical marshland areas, and all three were originally wasteland. Medieval reclamation improved the siltlands of each area for arable and pasture, but the peatlands remained waterlogged for three-quarters of the year and were used mainly for summer pasture and as sources of fish, fowl and fuel, until the mid-eighteenth century. Between 1760 and 1900 they were drained by the use of large-scale engineering methods. Improvements were greatest in Holderness, while in the other two areas much still remained to be done in the twentieth century.

There are various reasons both for the similarities and differences in the drainage history of the three regions, and for the differences between these regions and the other marshland areas of England and Wales. Location, size, the existence or otherwise of a frontage on tidal water and the resulting existence of a Court of Sewers, farming systems, patterns of ownership, navigation interests, and the influence of settlements, as well as the physical geography, are all shown to have had an influence both on the pace of improvement and on the pattern of drains developed. The present geography of the three areas shows clear traces of the earlier stages in their history.

CONTENTS

MAPS and DIAGRAMS

ABBREVIATIONS

B. and B.D.	Beverley and Barmston Drainage
B.M.	British Museum
B.and S.D.	Beverley and Skidby Drainage
E.P.N.S.	English Place-Name Society
E.R.A.S.	East Riding Antiquarian Society
E.R.R.O.	East Riding Record Office
H.D.	Holderness Drainage
Melsa	Chronica Monasterii de Melsa
Minutes E.P.etc.	Minute books of the Court of Sewers for the East Parts of the East Riding
M.W.D.	Market Weighton Drainage
M.and Y.D.	Muston and Yedingham Drainage
P.R.O.	Public Record Office
P.Y.G.S.	Proceedings of the Yorkshire Geological Society
Q.J.G.S.	Quarterly Journal of the Geological Society
R.G.S.	Royal Geographical Society
Sewers 1,2,etc.	Bundles of Court of Sewers documents in the East Riding Record Office
V.C.H.	Victoria County History
W.W.M.	Wentworth Woodhouse Muniments
Y.A.J.	Yorkshire Archaeological Journal
Y.A.S.	Yorkshire Archaeological Society
Y.A.S.R.S.	Yorkshire Archaeological Society Record Series

SECTION I

I N T R O D U C T I O N

CHAPTER I

The Marshlands of England and Wales .

Artificial drainage has played an important part in bringing the countryside of England and Wales to its present improved state. Its major contribution has been to add considerable stretches of former marshland to the farmed area, but it has also played a significant part in improving the productivity of areas with a clay subsoil.

Fig. 1 shows the main marshland tracts of England and Wales. They are concentrated in the eastern half of the country, where they form part of the great arc of marshland that surrounds the southern North Sea and extends on the continent of Europe from north-east France to Denmark. The coastal marshlands are considerably more numerous and extensive than those inland, and the Somerset Levels and the Lancashire mosses are the only large areas of marshland on the west side of the country.

The claylands are more widely distributed, and they were not so unattractive as the marshlands in their original state. Their draining was begun when they were

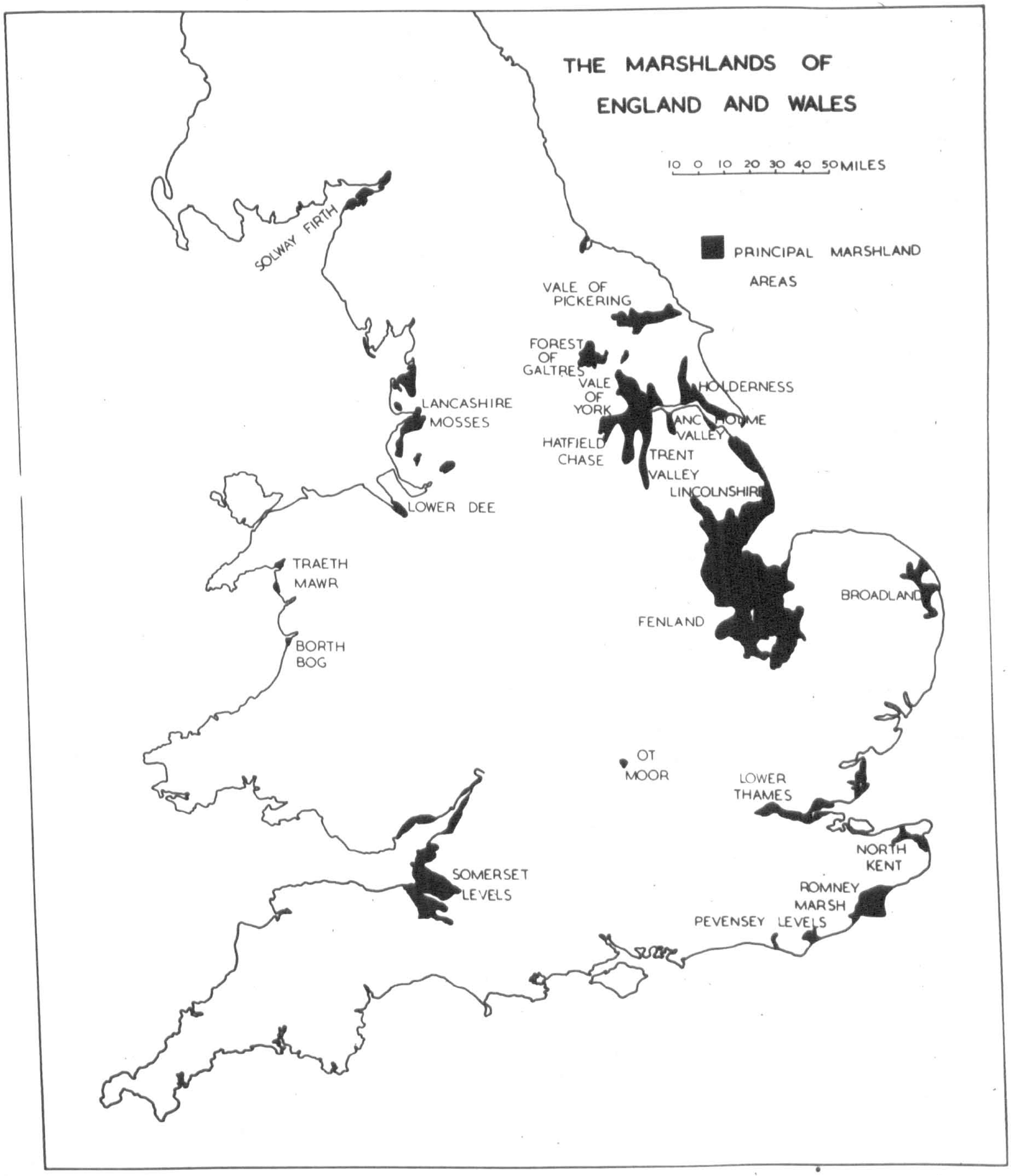

THE MARSHLANDS OF ENGLAND AND WALES
10 0 10 20 30 40 50 MILES
PRINCIPAL MARSHLAND AREAS
SOLWAY FIRTH
VALE OF PICKERING
FOREST OF GALTRES
VALE OF YORK
HOLDERNESS
ANC HOLME VALLEY
LANCASHIRE MOSSES
HATFIELD CHASE
TRENT VALLEY
LINCOLNSHIRE
LOWER DEE
TRAETH MAWR
BORTH BOG
FENLAND
BROADLAND
OT MOOR
LOWER THAMES
NORTH KENT
SOMERSET LEVELS
ROMNEY MARSH
PEVENSEY LEVELS

Fig.1.

first settled and cultivated, mostly between the sixth and eleventh centuries. Surface furrows first carried away the excess water, and there was little change in this technique until the end of the eighteenth century, when the benefits of underdrainage first came to be appreciated. At first underdrainage was effected by the use of brushwood and stones, but by the middle of the nineteenth century these had been largely replaced by tile drains. There has been little geographical study of this aspect of the improvement of the countryside, principally because underdrainage was a matter for the individual farmer, and no comprehensive details are therefore available. In many areas, however, clayland drainage was closely linked with marshland drainage. Many marshland areas were affected first by the influx of silt following the formation of drainage furrows across the open arable fields, and later by the large additional amounts of water produced by underdrainage. The draining of the claylands is therefore closely bound up with the draining of the adjacent marshlands, and in regional studies the two must be considered together.

The draining of the marshlands is a subject of vital interest to the geographer, for the resulting degree of change in landscape and land use can hardly be rivalled by any other improvement. It is therefore surprising how little attention has been given to this subject by geographers. The largest marshland area, the Fenland, has been subjected to detailed study by H.C. Darby[1], but few other areas have been investigated. There is in consequence a danger that the pattern of development in the Fenland may be regarded as typical, and generalisations about the draining of all the English marshlands tend to be based upon this one tract. Yet the very factors which made the Fenland area easy to study, i.e. its size and the amount of attention it has attracted, probably also resulted in a development which was far from typical. A true understanding of the draining of the marshlands will not be possible until many more tracts have been studied in detail. This thesis is a study of three marshland areas in east Yorkshire that are of medium extent; Holderness, the south-eastern part of the Vale of York and the Vale of Pickering.[2]

Our present knowledge of the marshlands is principally derived from the work of local historians and drainage engineers. There are also brief accounts in some reports of the Land Utilisation Survey and in other geographical works. These sources suggest the broad outline of the stages by which

(1) H.C. Darby. The Medieval Fenland, and The Draining of the Fens, 1940.

(2) Another similar study is in progress on Hatfield Chase, by B. Metcalfe of the University of Leeds Department of Geography.

the marshlands were reclaimed. Even this outline is incomplete, for local historians largely ignore some marshlands e.g. those round the Solway Firth, the Forest of Galtres and the Norfolk Broadland. The general outline of development, however, is sufficient to provide a background against which the special features of the Yorkshire marshlands show up fairly clearly.

The earliest areas reclaimed from the marsh appear to have been the northern part of Romney Marsh(3), part of the Pevensey Levels(4), and part of the Fenland adjacent to the Wash(5). These lands were settled by 1066. All have soils of a silty character, which must have been relatively easy to improve, and which are among the most fertile in the country(6). In their natural state they were probably only occasionally flooded at high spring tides and were therefore embanked without great difficulty. There may have been similar reclamation in other silt areas, e.g. along the margin of the Somerset Levels, but the improved areas can have amounted to only a small proportion of the marshland.

(3) W. Maclean Homan. The Marshes between Hythe and Pett. Sussex Archaeological Collections 1938 pp.119-223. N. Harvey The Inning & Winning of the Romney Marshes, Agriculture, Oct. 1955.

(4) L.F. Salzmann. The Inning of Pevensey Levels. Sussex Arch. Coll. 1910, pp.32-60. A charter of 772 A.D. mentions dikes in the level and thereby suggests the existence of small areas of reclaimed land.

(5) H.E. Hallam. The New Lands of Elloe. University College of Leicester, Dept. of English Local History. Occasional papers No. 6, 1954.

(6) Land Classification Map of Britain, South sheet.

There was little change during the fifty years which followed the Norman Conquest. Between about 1100 and 1150, however, there began a period of great reclamation activity which lasted until the beginning of the fourteenth century. The southern part of Romney Marsh was reclaimed and the Rother confined to two channels to Romney and Rye[7]. Most of the Pevensey Levels[8] and some of the marshlands of North Kent and the Lower Thames estuary were drained[9]. In the Fenland, new land was embanked and drained on both the seaward and the landward margins of the pre-Norman settlements[10]. There may have been similar activity along the coastal silts of the Somerset Levels.[11] All the land improved during this period lay in proximity to the sea or a tidal waterway and had a silt soil. The silt soils were fertile and easily cultivated, and the seaward location made drainage fairly easy, for adequate gradients drew off the landwater at low tide. High tides were the

(7) W. MacLean Homan, op. cit.

(8) Salzmann, op. cit.

(9) B.E. Cracknell. The Alluvial Marshlands of the Lower Thames Estuary. London University Ph.D. thesis 1953.

(10) H.E. Hallam, op. cit.

(11) C.S. Morland in the L.U.S. report on Somerset, p.136, refers to the large villages on the silts in Medieval times.

main problem, and made necessary banks and primitive sluices on the drains to prevent the entry of salt water.

Drainage and reclamation activity declined very markedly in all the marshland areas during the first half of the fourteenth century. Two main reasons for this decline have been put forward. First, it is suggested that greater storminess about this time, combined with the slowly rising sea-level, drew attention from the extension of the area of improved land to the maintenance of existing works. There is no doubt that many storms were experienced in the thirteenth fourteenth and early fifteenth centuries, e.g. in the Netherlands, storms and floods occurred in 1237, 1250, 1285, 1374, 1376, 1377, 1379, 1393, 1396, 1405 and 1421[12]; in Romney Marsh the storms of 1250 (when Old Winchelsea was half-ruined) and 1287 were notable[13]; Pevensey Levels were flooded as a result of storm breaches in the banks in 1469[14]; and in Lincolnshire storm damage was recorded in 1237, 1335, 1404, 1421 and 1430[15]. There may well have been some broad general relationship between this period of storminess and

(12) Admiralty Handbook on the Netherlands, p.269

(13) W. MacLean Homan, op. cit.

(14) Salzmann, op. cit.

(15) A.E.B. Owen. Coastal Erosion in E. Lincolnshire. Lincolnshire Historian, 1952.

the virtual cessation of reclamation, although in many areas reclamation continued after the earlier storms.

The second reason suggested for the decline in reclamation activity is the effect of the Black Death of 1349. This led to a fall in the number of labourers available to construct banks and ditches and to maintain those which already existed. It is likely that for some years at least this resulted in a partial cessation of new reclamation. The dates of reclamation in Romney Marsh suggest its effect there, for in contrast with five areas reclaimed between 1200 and 1300, there was only one intake between 1300 and 1400 and that was in 1339. Between 1400 and 1500 there were four intakes.(16) Yet it seems unlikely that the Black Death can explain the continued small amount of reclamation during the fifteenth and sixteenth centuries, so long afterwards.

Although these two factors may well have operated jointly to give rise to the decline in reclamation, to the geographer a third possible cause appears to be worth consideration, that is, the exhaustion of suitable land. It has already been pointed out that it was the siltlands which were chosen for reclamation during the period of medieval activity, although Hallam endeavours to prove that peat-fen was reclaimed in Holland (Lincs.) at the same time(17). Certainly, in

(16) N. Harvey, op. cit.

(17) H.E. Hallam, op. cit. p.41

Holland the siltland villages were reclaiming land on the edge of the fen, but this was a zone where the peat must have been relatively thin, so that by paring and burning it the underlying silts would easily have been reached. This area does not therefore contradict the general pattern. Most of the siltland marshes had been embanked and drained by the beginning of the fourteenth century and the decline in activity after that date may well represent the shortage of further suitable siltland. Medieval reclamation was carried out partly by individuals and partly by the co-operative efforts of one or more townships, but always on a small scale. The siltlands were amenable to small-scale improvements, but peat areas required large-scale developments to cope with their greater engineering problems, and were therefore left largely untouched at this time. Such improvements of peatland as were made were usually incidental to works carried out by large monastic houses for other purposes. For example, the monks of Glastonbury Abbey cut a canal from the Brue to the Axe to provide a navigable link with the lands to the north, and this is believed to have led to some improvement in the peat levels.(18) But such changes in the peatlands in Medieval times were few.

Probably all three factors played their part in bringing

(18) W. Phelps. The History and Antiquities of Somersetshire. 1836-9 Ch. V.

about a diminution in reclamation activity. Only detailed local studies can assess their relative importance. In addition, other more general factors may have been concerned, for drainage shared with other forms of agricultural improvement the spurt of activity between about 1050 and 1350 A.D., and the succeeding recession. Nevertheless, the three factors mentioned above no doubt reinforced any more general tendencies, and will therefore be considered again later in relation to the three Yorkshire marshland areas.

The period of relative inactivity lasted until about 1600. Here and there minor improvements were made. For example, a little further reclamation took place in the south of Romney Marsh, and in the Fens Bishop Morton's Learn was cut to improve the Nene drainage. But the problems involved in peatland drainage continued to be too difficult to be tackled. These lands received large volumes of water from the rivers which flowed into them, but had only very slight gradients to the sea. The outflow was less rapid than the inflow, and flood-water accumulated to cover the land for three-quarters of the year or more. Improvement could be obtained by increasing the outflow, which involved widening and straightening the rivers, an expensive process. Banks would be needed along the rivers to hold back flood-waters, but the local peaty soil was useless to build them.

To weigh against the difficulty and expense of drainage were the profits to be gained from the peatlands in their undrained state. They provided reeds for thatching and floor covering, fish and fowl to supplement the diet, and peat and turf for fuel, all products not easily obtainable elsewhere. In addition they provided pasture during the few summer months when they were dry[19] and thus released meadow and arable land from the necessity to support the cattle at that time. So long as such products and uses were valued there was little interest in the possibility of draining the peatlands on the part of those to whom they belonged.

The same attitude on the part of those who used the peatlands continued into the seventeenth century, but among the upper and middle classes a different attitude arose. Some peatland had been reclaimed in the Netherlands during the sixteenth century, and by the early seventeenth century large areas were drained by windmills and were being cultivated.[20] Various persons in England came to realise that the English peatlands too could be improved. As in the Netherlands,

(19) Dr. Joan Thirsk. The Isle of Axholme before Vermuyden. Ag. Hist. Rev. Vol. I 1953, and Fenland Farming in the Sixteenth Century. University College of Leicester Department of English Local History, Occasional Papers No. 3 1953.

(20) Admiralty Handbook on the Netherlands, pp. 286-7

merchants in England had accumulated considerable amounts of capital which they were prepared to invest in land improvement. The Stuart kings and their advisers in particular were interested in the possibilities of drainage as a means of increasing their own wealth and that of the country. It is not surprising therefore that there was renewed drainage activity at this time, concentrating upon the peatlands.

Three main areas were affected by this seventeenth century drainage activity:- Hatfield Chase, the Ancholme valley and the Fenland. The method adopted was for a group of "Adventurers" or "Undertakers" to advance the money necessary for improvement, on the promise of a share in the lands when they had been drained. An engineering expert directed the works and also received a share of the improved land as payment. The engineers employed were often Dutchmen who had gained experience in their own country; of these, Vermuyden was the most famous. But engineering problems were not the only difficulties encountered. Since large-scale works were necessary for the drainage of peatland, it was necessary for each scheme to cover a large area, if not the whole level. But an Act of Parliament of 1585 had stipulated that before drainage could be undertaken a majority of those owning or using the land must approve the scheme[21].

(21) L.E. Harris. Vermuyden and the Fens. 1953. p.68

Little attention was in fact paid to the views of the commoners, but owners had to be treated with more respect. It was necessary to persuade them that the improvements to be derived from drainage were such that the smaller areas of land left to them after the adventurers had taken their share would still be worth more than the original unimproved acreage. Naturally, it was not easy to obtain the necessary agreement, and it is not surprising that in the two largest areas drained by adventurers most of the land belonged to one landlord, the Crown in Hatfield Chase, and the Earl of Bedford in the Great or Bedford Level of the Fens. In the Ancholme valley and in the northern part of the Fenland, the owners were also the adventurers, so they were in the position to reap the benefit from all the land improved.

The methods of improvement adopted in all these areas were similar. New straight channels were cut for the main rivers across the peat in order to increase the gradient and speed of run-off, and a number of straight drains flowed into these. Banks confined the river waters, except in places where washes existed to receive excess flood waters, and thus prevent their covering the whole level. In Hatfield Chase in 1627, the Don was confined to one channel flowing northwards into the Aire, while in 1633 the Dutch river carried its waters eastwards into the Ouse at Goole. In the Great Level, the

Old Bedford river was cut in 1637 and the New Bedford river in 1649; these cut off the great loop of the Ouse. In the Ancholme valley, the New River Ancholme was cut in 1637 and a sluice placed at its lower end[22]. In the northern Fenland, various main drains were cut, e.g. the South Forty Foot Drain in the late 1630s. The changes brought by these works were considerable. Summer floods no longer occurred, and winter floods were much reduced. Reliable summer pasture and fields of corn and rape replaced the old meres and reeds.[23]

The drainage which was achieved brought some profit to the landowners and adventurers. But in many areas there was strong opposition on the part of the commoners, who, whenever the opportunity arose, did their best to destroy the works and restore the peatland to its old condition.[24] The unsettled political conditions gave the commoners scope for their protests, and frequently the adventurers were not compensated for the damage done. It seems likely therefore that at least for some years the adventurers did not benefit from their outlay. A realisation of this may have discouraged the development of similar schemes of improvement in other marshland areas. One of the most remarkable aspects of this

(22) A. Straw. The Ancholme Levels North of Brigg. East Midland Geographer, June 1955.

(23) J. Thirsk, op. cit. H.C. Darby, op. cit. pp. 83-91.

(24) E.g. in N. Fenland, see H.C. Darby, op. cit., p.62

period of drainage activity is the limited area of the country which it affected, only eastern England from the Fenland north to the Humber and Ouse. The marshlands elsewhere remained almost untouched. It may have been that these would have been drained later if the unsettled political conditions had not made adventuring uneconomic and turned men's attention to other matters. This is suggested by the fact that in Somerset, James I claimed rights in King's Sedgemoor in 1610, with the intention of draining the area[25]. In 1630, Vermuyden bought the king's share of 4,000 acres there, obviously expecting that at some future occasion he would have a chance to drain it. But no improvement was in fact made for another 150 years. This may explain why some areas were not draine d by adventurers but it hardly accounts for their geographical distribution. It may be that the lands chosen first were those closest to main routes from London, which made them better known than more distant marshlands. Again, however, detailed local studies are necessary before a greater understanding of the factors involved can be expected.

After about 1650, there was little further large-scale drainage for another century. This may have been the result of the rather greater concern shown for the rights of

(25) L.E. Harris, Vermuyden and the Fens, 1953.

commoners under the Protectorate(26), a tradition which was continued when Charles II was restored to the throne in 1660. The schemes started earlier frequently deteriorated, either through lack of attention, or through peat shrinkage. The land reclaimed in the Ancholme valley was reported to be flooded again in 1724 as a result of neglect(27). In the Great Level, peat shrinkage was serious, and waterlogging and flooding returned. To meet this, the device used to drain the peatlands of the Netherlands was adopted, i.e. windmills raising water to the level of the main drains. Each windmill and the drains leading to it belonged to the local landlord or group of landlords, while the main drains continued to be the responsibility of the Bedford Level Corporation, or, in other parts of the Fenland, of the local Courts of Sewers. A few improvements were made by these bodies, e.g. a new channel was cut for the Nene from Guyhirne to Peterborough in 1728(28). But taken as a whole, the maintenance of some of the peat fens in a reasonably well-drained condition at this time was the work of private individuals rather than of official bodies.

In most marshland areas outside the Fenland, the Courts

(26) Harris suggests this when discussing the proposed drainage of King's Sedgemoor in 1656, op. cit pp. 120-121.

(27) A. Straw, op. cit.

(28) H.C. Darby, op. cit. p.139

of Sewers reigned supreme at this time. These courts had first been established in 1532, but there is little indication of their activity prior to the late sixteenth century, and it was during the seventeenth and eighteenth centuries that they became really effective instruments of control. Their main function was to maintain the status quo, and their influence was therefore towards keeping the marshlands in their medieval state. Nevertheless, just as in the Fenlands it was small private schemes that were bringing about or maintaining improved drainage, so in the other marshland areas it is possible that small private improvements were being made, but went largely unrecorded. The Court of Sewers would be merely concerned to see that such improvements did not damage other lands. Until local records of this period are studied in more detail, it is impossible to know how much drainage activity of this type took place in the apparently uneventful period between 1650 and 1750.

Such private activity of this period of which we have details was concerned with reclaiming saltmarsh areas along the coast, or small peat areas. In 1692, Martin Mere in Lancashire was drained by Thomas Fleetwood(29); between 1732 and 1737 part of the marshes along the lower Dee were

(29) R.K. Gresswell. The Sandy Shores of South Lancashire, 1953, pp. 50 - 51. R. Millward. Lancashire (The Making of the English Landscape) 1955 p.52

embanked and the river diverted by a private owner[30]; additions were made to Canvey Island (originally embanked in 1622) in 1662[31]. In such areas the question of common rights evidently did not arise.

About the middle of the eighteenth century, therefore, it would have been possible to divide the marshlands into three main groups. First, there were the siltlands reclaimed principally in medieval times which provided both good arable land and rich pasture. Second, there were the improved peatlands of the Fenland, Hatfield Chase, and the Ancholme valley, where much land had degenerated and was again under pasture, but some was still ploughed and grew rape and oats. Third, there were the rest of the peatlands, still largely in an undrained state.

The fifty years between about 1760 and 1810 was probably the greatest period of drainage activity in this country. It was concerned with the second and third classes of marshland distinguished above. The improvements were mainly organised through private Acts of Parliament. A group of landowners co-operated to obtain an Act, which sanctioned specific works of drainage and appointed Commissioners to supervise them. The money for the capital outlay was obtained by an acre tax

(30) E.J. Howell, Land Utilisation Survey Memoir, North Wales 1946, p.208.

(31) B.E. Cracknell, op. cit.

on all lands that were expected to benefit. The improved land remained in the possession of the owners, and this encouraged the landlords to look with greater favour on these schemes than they had on the earlier ones of the adventurers. In addition, by the eighteenth century the enclosure movement had led to the division of some marshlands and the extinction of common rights, while others were enclosed and drained at the same time and under the same Act. The opposition of commoners to drainage was thereby eliminated, and the impetus towards improvement increased. A further factor favoured the drainage activity of this period. The margin between the value of the medieval type of peatland products and that of the potential arable products widened during the latter part of the eighteenth century, owing on the one hand to the greater demand for arable products from the growing centres of industry, and on the other to the increased use of coal and salt-water fish and better fodder for cattle. Thus while the prices obtainable for arable crops increased[32] the value of peatland products probably declined. Economic conditions therefore favoured a policy of draining the marshlands in order to convert them into producers of the more valuable arable products. Climatic conditions may also have encouraged drainage activity at this time. A series of dry years was

(32) W. Smith. An Economic Geography of Great Britain, 2nd Ed. 1951. p.47

followed in the 1760s by a series of wet years which resulted in the peatlands being flooded in summer as well as in winter[33] Drainage improvements became necessary to ensure even the old limited uses.

Private Acts of Parliament were most important for the drainage of the more extensive marshlands, e.g. the lands alongside the Witham (1762); the Ancholme valley (1767), the lower Dee (1778) and King's Sedgemoor (1791). Some smaller marshland areas had combined drainage and enclosure acts, e.g. the lower Glaslyn valley (1807). Other areas were drained without recourse to Parliamentary sanction, which was possible when the proposed works were within the estate of one landlord only and did not interfere with any other persons land. In the Broadland area of Norfolk many windmills were erected between 1762 and 1782[34] by private drainers. Almost all the peat marshlands were drained during the period by one or other of these methods. The engineering methods used differed little from those adopted by the seventeenth century engineers. Straight channels were cut to carry the water rapidly to the river or sea, sluices prevented a reversal of flow at high tides, and banks controlled the floodwaters.

(33) H.C. Darby, op. cit., p.147

(34) W. Marshall. The Rural Economy of Norfolk 1782.

Just as the eighteenth century in the Fenland had been occupied by efforts to maintain and improve the seventeenth century works, so the nineteenth century was spent in the newly drained peatlands in endeavouring to improve the late eighteenth century drainage works. Improvements were necessary in most areas, partly because the initial works were skimped through shortage of capital, partly because peat-shrinkage occurred, and partly because an increase in the underdraining of clayland led to demands for deeper ditches into which the tile drains could empty. In some areas, a reasonably satisfactory drainage was obtained, e.g. in the Ancholme valley. In others the problems were so great and the amount of capital available so small that winter flooding and waterlogging were still frequent, e.g. in the Somerset Levels (35). The division of many marshland areas between several drainage authorities also made it difficult to obtain a completely efficient drainage.

The story of the draining of the marshlands will probably be completed in the twentieth century. A great improvement was possible after the multitude of drainage authorities was brought under the few major Catchment Boards in 1930, reconstituted as River Boards with wider functions in 1948. In addition, Government aid in recent years had made possible

(35) T. Stuart-Menteath. L.U.S. Report on Somerset p.23

certain major works which could never have been financed out of drainage taxes. In Somerset, several new drains have been cut, e.g. the Huntspill River, and others improved, e.g. the River Kenn system south of Clevedon. The waterways and banks near Goole have been improved since the 1947 floods, and in the Fenland a catchwater canal is planned to relieve the pressure on the Ouse. Other smaller areas will no doubt have their turn later. Nevertheless, so long as the eustatic rise in sea-level continues, the drainage of the marshlands can never by regarded as complete.

The evidence of the stages in marshland drainage, therefore, while far from complete, is sufficient to suggest the probable pattern. Early small-scale reclamation of silt marshland was followed by large-scale schemes of peatland reclamation in the early seventeenth century, while the rest of the peatlands were dealt with in the late eighteenth and early nineteenth centuries.

The geographer, no less than the economic historian, is interested in the times when drainage and reclamation took place. He is especially concerned with local differences in development, which may even now show their mark in the geography of the marshlands. In this thesis, attention will be drawn to differences of drainage history between the three Yorkshire areas, and between these areas and other marshlands. This approach should pin-point some of the significant factors which have influenced reclamation activity. Some of these factors will be geographical, others will not be strictly so, but all contribute in the end to the local geography.

In addition, the geographer shares with the drainage engineer an interest in the details of the drainage systems evolved. These systems are normally adapted to, and bring to light, details of the physical geography. They also reflect in some measure facets of the life at the time of their construction, for example by the choice of route for a new drain. Again, not all the factors which influenced the details of a scheme of drainage were strictly geographical, but all will be considered so far as possible in view of their geographical results.

Over and above these two shared interests in the time and details of development, the geographer is concerned with the results of change or the lack of change, and the geographical pattern which evolves. Thus descriptive accounts of the marshlands at various dates will form an important part of this work. Each of the three regions will be considered separately with these three aspects in view.

There are few published accounts of the Yorkshire marshlands, and only two authors have made useful original contributions to their understanding. S.G.E. Lythe studied the Holderness marshlands in the 1930s and produced three articles on the region[36]. Although one of these was published in "Geography", Lythe's outlook was essentially that of an economic historian. His two articles in the Yorkshire Archaeological Journal provide useful supplementary information on the organisation and functions of the medieval Commissions of Sewers and the later Court of Sewers. The other author is Col. P. Saltmarshe, whose family owns an estate at Metham in the Vale of York. He was a keen local historian, and contributed a number of articles on Howdenshire to the East Yorkshire Archaeological Society Transactions. Two of these, on the banks and drainage of Howdenshire[37] have proved valuable in the preparation of section II of this thesis. These two authors, however, illuminate only a small portion of the evolution of the Yorkshire marshlands.

(36) Drainage and Reclamation in Holderness and the River Hull Valley, 1760 - 1880. Geography XXIII 1938, pp. 237 - 247. The Court of Sewers for the East Parts of the East Riding. Y.A.J. 1939 pp. 11 - 24. The Organisation of Drainage and Embankment in Medieval Holderness. Y.A.J. 1939 pp. 282 - 295.

(37) The River Banks of Howdenshire, their Construction and Maintenance in Ancient Days. E.R.A.S. XXIII 1920. The Ancient Drainage of Howdenshire E.R.A.S., XXIII 1920.

SECTION II

H O L D E R N E S S

CHAPTER II

THE PHYSICAL SETTING

The region east of the Yorkshire Wolds is generally known as Holderness. Strictly speaking, this name should be applied only to the part east of the river Hull, the area of the old Holderness wapentake. But the part between the river and the 50 ft. contour line at the foot of the Wolds is in many ways so similar that it is convenient to include it under the same name. Throughout this region, excess of surface water has had a potent influence on all aspects of life, and is one of the major features drawing together these 350 square miles into a single unit.

Holderness is enclosed on the landward side by the chalk outcrop of the Yorkshire Wolds. This has a S.S.E. - N.N.W. strike in the south, but swings round to an approximately W - E strike in the north, a result of the Cleveland dome. The chalk dip slope rises from beneath the deposits of Holderness to an escarpment facing north and west. In late Tertiary and early Pleistocene times, the sea lapped the foot of the Wolds dip-slope, where a cliff was cut into the chalk. This cliff, now buried by boulder-clay, still marks the boundary between the two contrasted regions of the Wolds and Holderness.

The highest parts of the Wolds probably remained ice-free during late glacial times. But at various periods both

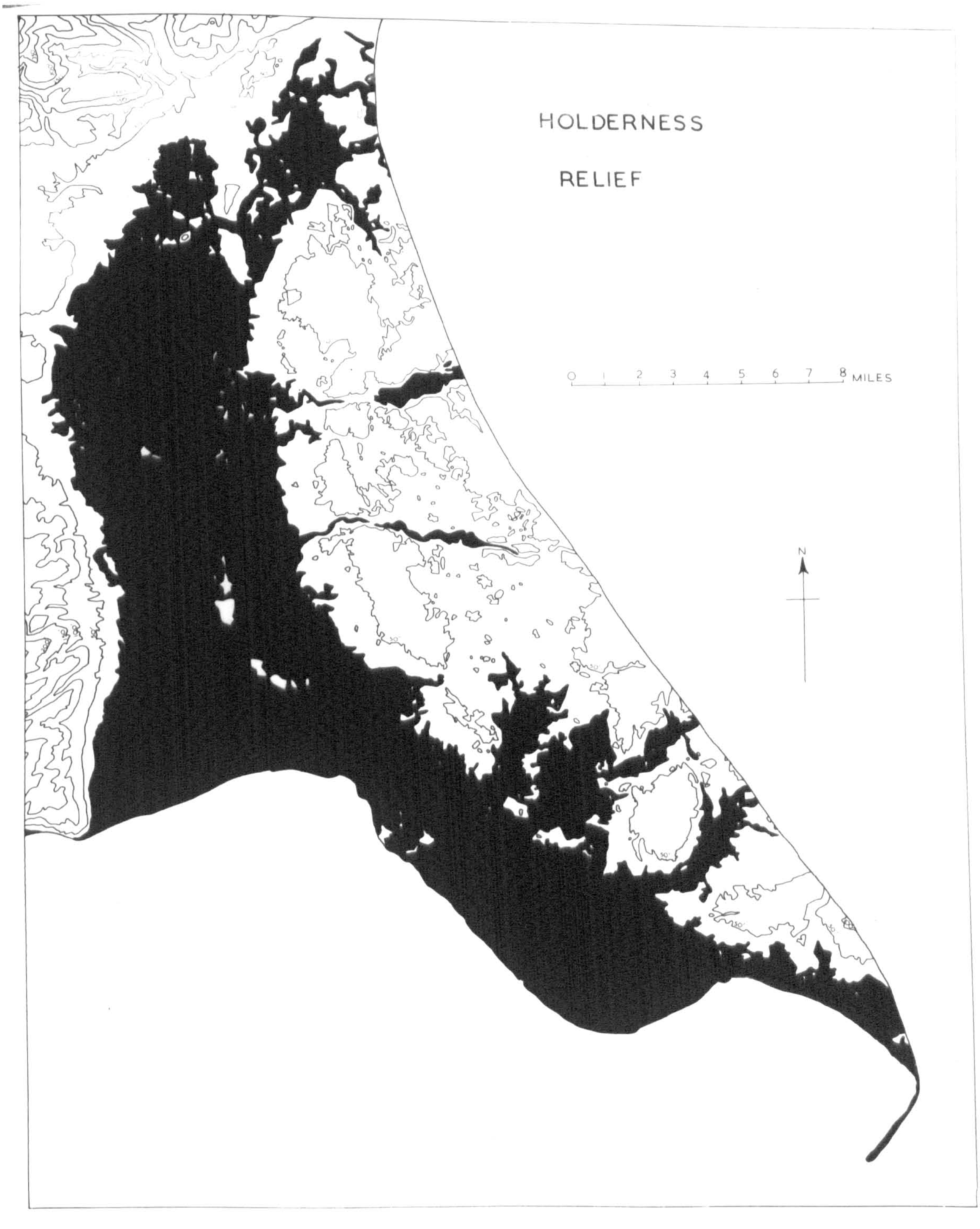


Fig.2

Scandinavian and Lake District Ice entered the bay of Holderness, and there left deposits of boulder-clay and gravel on the previously drowned chalk surface. Thus the end of the Pleistocene period revealed a new land surface, hummocky, and rising eastward where the dumping had been greatest. The depth of glacial deposit ranges from a few feet near the pre-glacial cliff to an estimated 200 feet along parts of the present coastline.(1)

The present drainage of the area began to develop as the ice retreated for the last time. De Boer records a series of glacier lakes and overflows along the dip slope of the Wolds, which carried the meltwater to the Market Weighton gap and eventually into Lake Humber(2) Remnants of these overflows are now dry. Later ice-retreat stages are probably marked by similar features, but it is not easy to produce evidence for these as the channels would have been cut into the less resistant glacial deposits.(3) It is difficult to distinguish channels formed in this way from the normal irregularities of surface of these deposits.

(1) The drift cover reaches about 200 feet O.D. on the Wolds dip slope, except at the two extremities where it reaches over 300 ft. O.D.

(2) G. de Boer. A System of Glacier Lakes in the Yorkshire Wolds. Proc. Yorks. Geol. Soc. Vol XXV. 1944. These may be features of a late interglacial period.

(3) H. Valentin. Young Morainic Topography in Holderness. Nature Vol. 172, 14th Nov. 1953. He distinguishes eight recessional stages.

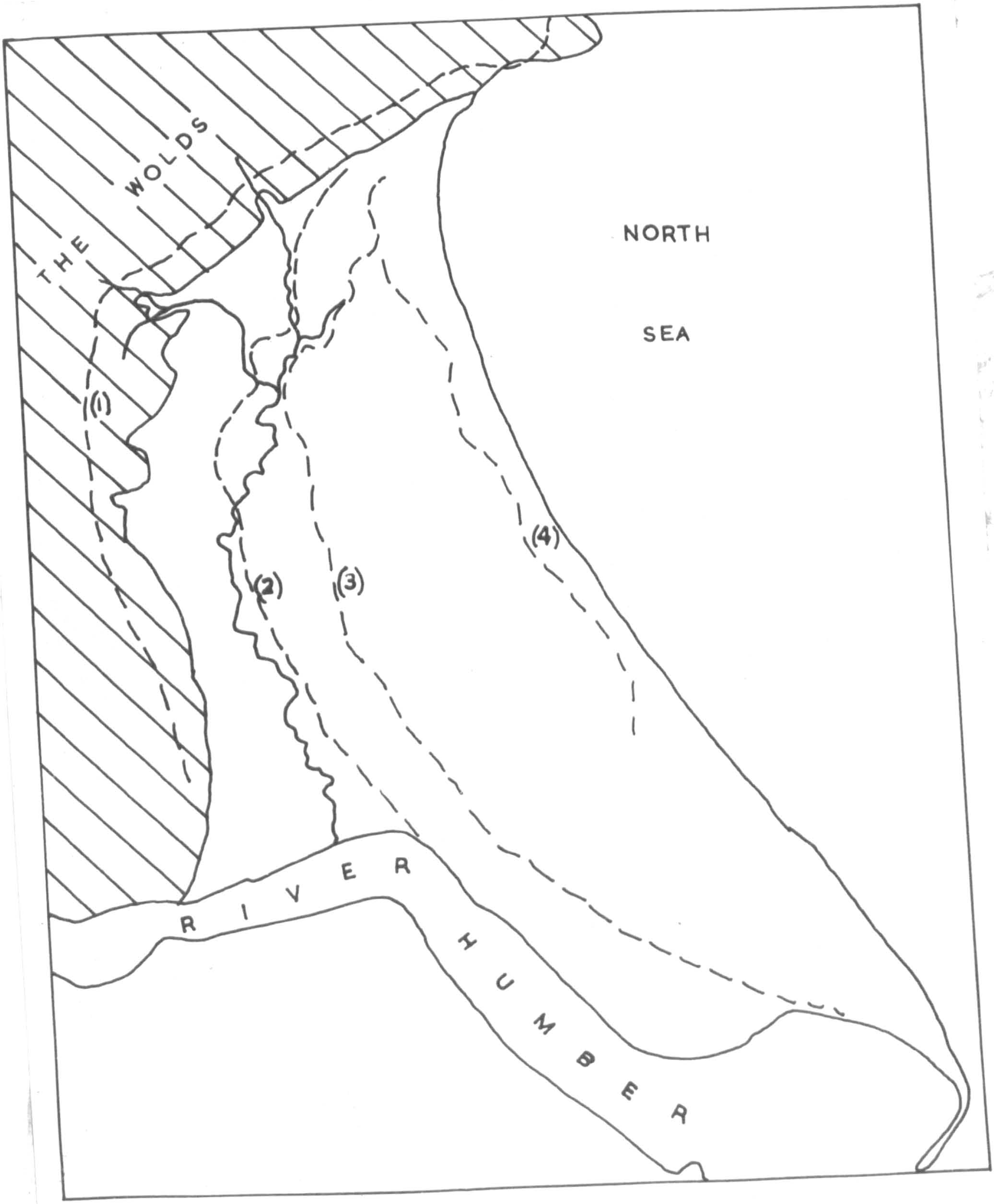


Fig.3. Probable major still-stands in the retreat of the ice-sheet from Holderness.

Nevertheless, it seems likely that the valley of the Hull originated as the channel of a pro-glacial stream, and the trend of the valley is continued by the Humber in the section of its course between Paull and Cleethorpes (Fig. 3). Immediately to the east is a line of clay and gravel mounds which may represent the moraine deposited at that time. Roughly parallel to the Hull valley are other alluvial stretches which may indicate later retreat stages.(Fig. 4). The river Hull continued to flow from north to south along the major pro-glacial channel; from the west and north it was fed by the dip-slope streams of the Wolds, rising in powerful springs near the junction of chalk and drift; from the east it was joined by several westward flowing streams that rose on the higher drift to the east, and followed well-marked valleys. The main boulder-clay area was otherwise poorly drained, so that marshes and meres must have been common.

The post-glacial geological history of the region has not been studied in detail. Nevertheless, a few details about the alluvial deposits are available, and it is possible to assume certain trends from the accounts of similar areas in Lincolnshire(4) and the Fens(5). The outlines of the

(4) The Post-Glacial Deposits of the Lincolnshire Coast. H.H. Swinnerton. Q.J.G.S. 1931. Vol. LXXXVII pp.360-375

(5) Studies in the Post-Glacial History of British Vegetation. H. Godwin. Part IV. Post-Glacial Changes of Relative Land and Sea-Level in the English Fenland. Phil. Trans. of the Royal Soc. B. Vol. 230, 1941.

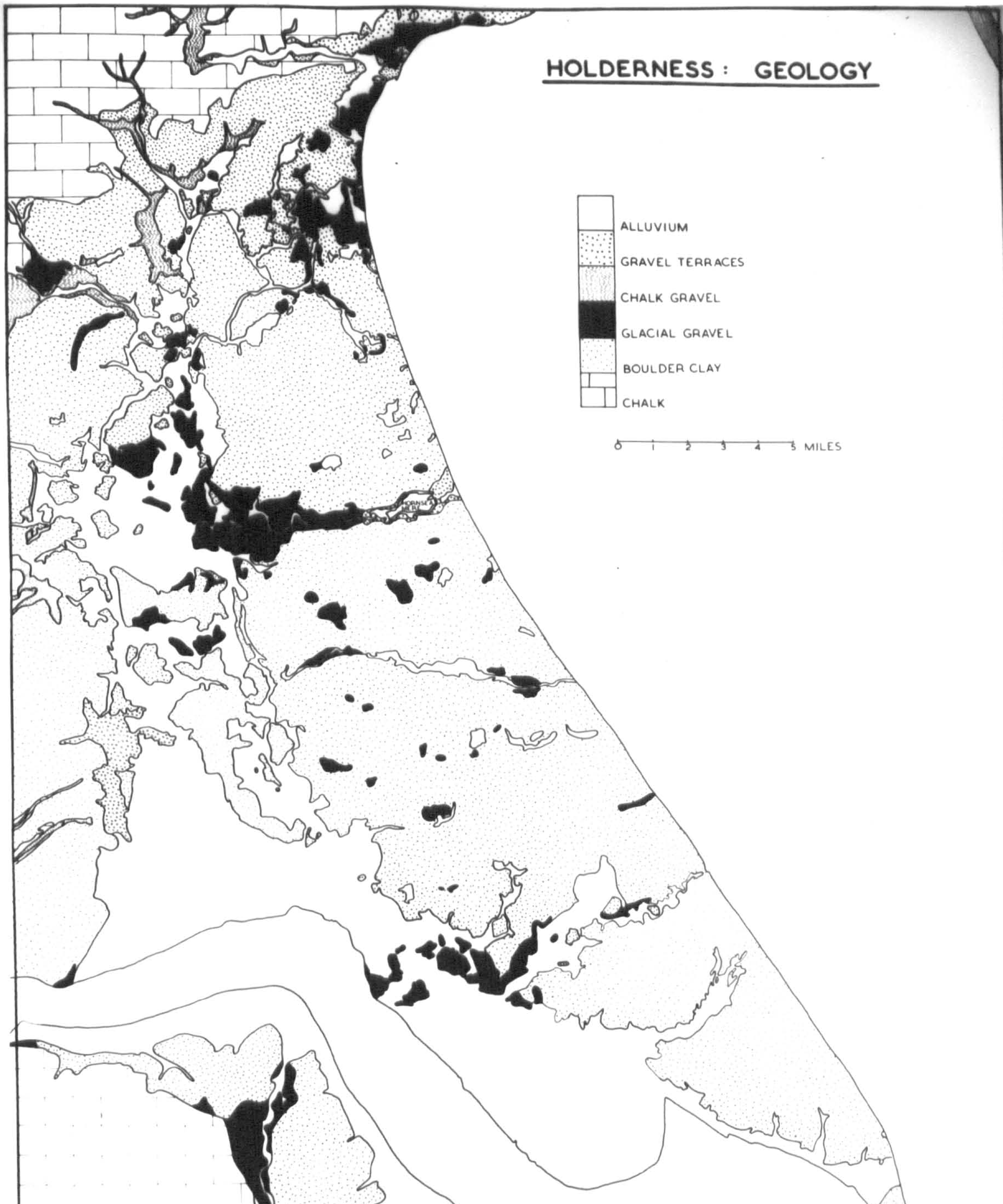

HOLDERNESS : GEOLOGY
ALLUVIUM
GRAVEL TERRACES
CHALK GRAVEL
GLACIAL GRAVEL
BOULDER CLAY
CHALK
0 1 2 3 4 5 MILES

Fig.4

changes which took place were doubtless similar, although local details may vary.

During the period immediately following the retreat of the ice, sea-level was lower than at present (Godwin suggests that it was about 200 ft. lower). The boulder clay land surface probably reached east as far as the Dogger Bank. The Humber would have been a narrow fresh-water stream which possibly flowed south-south-east through Lincolnshire, between ~~a~~ similar dip slope and glacial drift areas as the Hull separates in Yorkshire, to some outlet further south. At this time the young river Hull appears to have cut right through the boulder-clay which probably originally floored the valley, for certain borings in the valley reveal peat resting directly on chalk.(6)

As the ice-sheets melted, so the sea-level rose relative to the land. The coastline retreated west towards its present position. From 5,000 to 2,000 B.C. an encroaching sea was combined with an increased rainfall. Waterlogging occurred in the Fens at this time, and probably also in the lower parts of Holderness. The vegetation growing on the boulder-clay surface decayed in the stagnant water and peat formed. A peat bed varying in thickness from a few inches to about two feet and resting on the drift surface appears to exist throughout the alluvial lands of Holderness and the

(6) Water Supply from Underground Sources. E. Yorks. & Lincs. Part II.

Lincolnshire marshes, although its present depth below the surface varies with the undulations of the underlying drift surface. The following section of a boring along the Humber shore west of the river Hull is given by C. Reid.(7)

Water	5 feet
Slake and sand	25 feet
Black peat	2 feet
Strong stony clay (i.e. boulder-clay)	

Hawkshaw(8) gives the following account of the alluvium at Albert Dock, Hull. "Before the commencement of the excavations, the Hessle clay, peat, and overlying silt were met with in succession on the foreshore, the level of the top of the peat bed at the west end of the area being about 3 feet above the level of low water, and its thickness from 3 to 4 feet. Eastwards the bed followed the undulations of the clay without much variation in general level for half a mile..... The peat rested directly on the Hessle clay, into which roots penetrated to a distance of 5 to 6 feet....."

There is unfortunately no evidence from bores of the depths of peat or silt in the upper part of the Hull valley.

(7) C. Reid. Memoirs of the Geological Survey. The Geology of Holderness, 1885.

(8) J.C. Hawkshaw. Notes on the Peat and Underlying Beds observed in the construction of Albert Dock, Hull. Q.J.G.S. Vol. XXVII p.237.

Three bores were put down in Burton Pidsea "Dodders", near the head of one of the valleys draining direct to the Humber. Of these, two did not reach boulder-clay, while the third showed a small thickness of vegetable remains mixed with shells on top of the drift. The following is the detailed section:-

Brown clay	5 feet 6 Inches
Black silt	3 " 6 "
Grey silt	2 " 6 "
Sand and pebbles, shells and decayed vegetation	1 foot
Grey clay	1 foot
Boulder clay.	

As the sea-level continued to rise, the peat near the Humber was covered by mud or silt, known locally as warp. As much as 40 feet of silt were laid down. The greatest thicknesses are recorded towards the mouth of the Humber, e.g. at Ottringham Marsh and Grimsby, while round the mouth of the Hull, thicknesses of 20 to 30 feet are usual. The Burton Pidsea bores indicated that the silts are far from homogeneous; the colour varies from black to grey, and the consistency from sand to mud. But so far as their influence on human geography is concerned, they may be regarded as one unit.

In Lincolnshire, Swinnerton considers that the silt was deposited in water "at least as sheltered as the Wash is today".[9] He postulates some type of barrier between the marshes and the open sea, and finds the remains of it in the off-shore banks of the present day. Steers[10] and de Boer[11] suggest that this barrier was formed by a southward extension of the boulder-clay land of Holderness. The Admiralty charts of the area and the postulated location of the coastline at that date support this suggestion (Fig.5).

If such a barrier existed, the Lincolnshire marshes, and the valleys of the Humber and Hull and their various tributaries would have been occupied by a branching lagoon. Similar conditions in the Fens and the Broads[12] indicate the likely features of this lagoon. Marine silts, penetrating the several breaches in the barrier, would be deposited at the seaward end, while towards the extremities of the branches fresh-water ooze and peat formation would be likely. The lack of bores in the upper part of the Hull

(9) Op. cit.

(10) J.A. Steers. The Coastline of England and Wales, 1946.

(11) G. de Boer. The District round Hull: Its Geographical physique. In Studies in Education, Vol. I No. 5, 1951, University College of Hull.

(12) J.N. Jennings. The Origin of the Broads. R.G.S. Research Memoir No. 2, 1952.

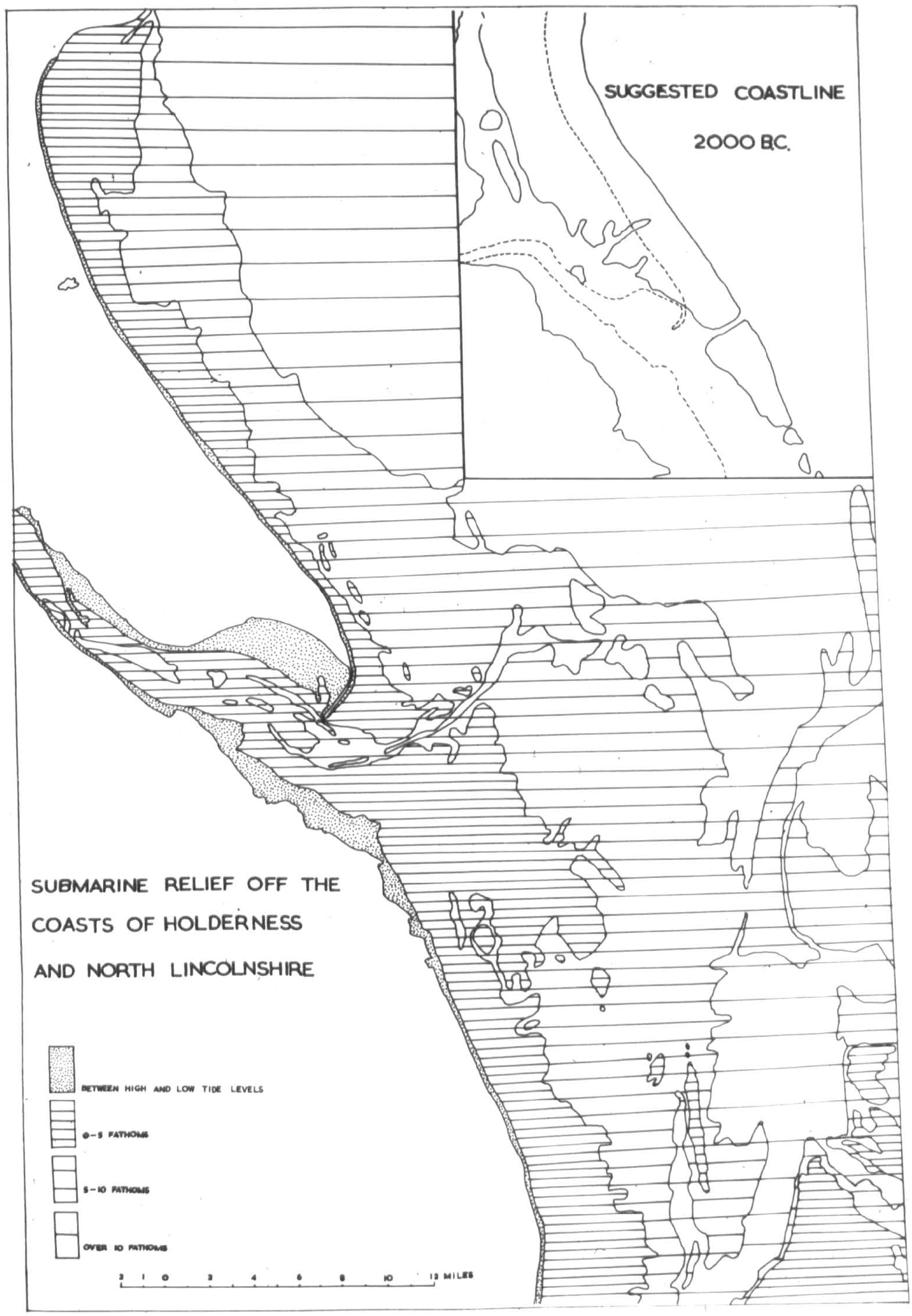

SUGGESTED COASTLINE
2000 B.C.
SUBMARINE RELIEF OFF THE
COASTS OF HOLDERNESS
AND NORTH LINCOLNSHIRE
BETWEEN HIGH AND LOW TIDE LEVELS
0–5 FATHOMS
5–10 FATHOMS
OVER 10 FATHOMS
2 1 0 2 4 6 8 10 12 MILES

Fig.5

valley which might corroborate this is unfortunate. Nevertheless, there is no doubt that peat is fairly extensive in the upper valley. Many of the soils are black; the Geological Survey 6-inch maps record peat in a few isolated patches; and some of the early drainage reports mention peat and decayed tree stumps. In 1816, Bower referred to "ground of a moory quality"(13), and Chapman in 1796 described the carrs on the west side of the river as "mostly moorland or black bog to a given depth"(14)

Both Godwin and Swinnerton find evidence for a relative fall in sea-level from 2,000 B.C. to about 500 B.C. The change was sufficient to allow Bronze Age salt-works for the evaporation of sea-water to be situated below the present high-tide level at Ingoldmells in Lincolnshire. In the Fens, this was the period when the rivers cut channels through the peat (old runs, etc.). The lagoon may have been reduced to the Humber estuary only, while the Hull re-established channels for itself through the peats or silts.

Godwin alone records next a minor rise and fall in sea-level, the peak coming about the time of the birth of Christ. He also suggests a colder, wetter climate. The

(13) Report of A. Bower to the Trustees of the Holderness Drainage, May 1816.

(14) The Report of Mr. Chapman respecting the Drainage of the low grounds on the west side of the River Hull, 1796.

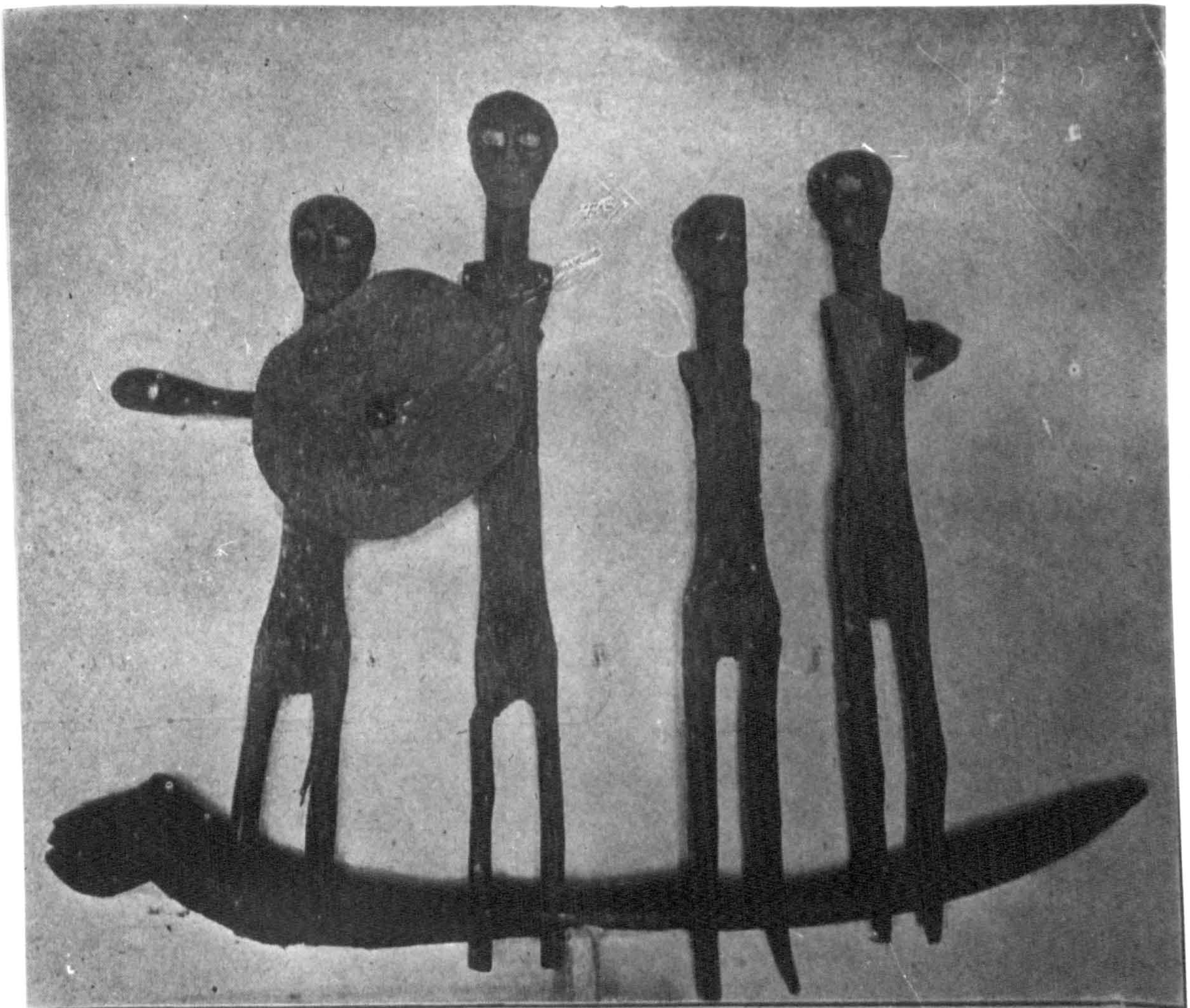
evidence for this episode is small in the Fens, and apparently non-existent in Lincolnshire. If it affected Yorkshire, it would have been a time of greater marshiness in the Hull valley.

Godwin and Swinnerton both postulate a slow rise in sea-level from the minimum of 500 A.D. to the present day. At the same time, coastal erosion was steadily reducing the barrier which sheltered the Humber lagoon. Swinnerton suggests that the last traces of the barrier finally disappeared during the thirteenth century, in that way accounting for the sudden spate of floods in Lincolnshire that are recorded in the documents of the thirteenth and fourteenth centuries.(15) The Humber must have found an outlet into the North Sea across the barrier long before this, however, and the changes in Holderness in historic times are related to changes in this outlet rather than to the disappearance of the barrier.

Many of the sections through the alluvial deposits reveal a distinctive surface layer of brown clay. In the Burton Pidsea bores, the average thickness of this clay was 5 feet. In the Burton Pidsea area too, some indication of the date of origin of this clay is given by the discovery of the Roos images(16) immediately below it. The images

(15) Swinnerton, op. cit.

(16) T. Sheppard. The Lost Towns of the Yorkshire Coast, 1912.



THE PRE-VIKING IMAGES FROM ROOS-CARRS.

Fig.6. Reproduced from Sheppard.

consisted of carved wooden figures attached to a boat, and have been tentatively dated as pre-Viking (Fig. 6). If this dating is correct, it suggests that probably until Roman times at least this valley was an arm of the Humber, and that the brown clay was deposited in relatively recent times. Godwin records a similar clay in the Somerset Levels, which he considers to be the downwash from the higher land when it was first cleared and cultivated by the Anglo-Saxon settlers.(17) It seems probable that the brown clay of Holderness had the same origin.

The extent of the Humber was reduced between about the sixth and twelfth centuries partly by this filling in of the tributary valleys with brown clay downwash, and partly by silting along the Holderness shore, which was probably sheltered by a proto-Spurn Head. During the thirteenth and fourteenth centuries, there were extensive losses by erosion along this shore, but silting began again in the seventeenth century (details of those changes are given in later chapters). Throughout this period, the Holderness coast has continued to lose an average of two yards a year to the North Sea. There is now little doubt that it is the material removed from this coast which provides the silt or warp that accumulates in the Humber(18)

(17) H. Godwin. Phil. Trans. B 1948. p.275 et seq.

(18) H.C. Versey. The Humber Warp. Proc. Leeds Phil. & Lit. Soc. Scientific Section, Vol. III, Part IX. pp. 553-556.

It is believed that the coarser deposits form Spurn Head, while the smaller particles are carried in suspension either into the Humber or into the Wash. These smaller particles consist for the most part of fine sand, and the silt deposits of Holderness are very similar to those of the Fens.

The alternation of erosion and deposition in the Humber can best be explained by changes in the degree of protection from storm waves provided by Spurn Head. It is believed that the original spit grew until it was breached by a storm and converted into an island. The island may then have migrated across the Humber, leaving the silt coast unprotected. The description of Ravensetodd in the thirteenth century suggests that it was on such an island: ".... 40 years ago and more (that is, about 1235) by the casting up of the sea, sand and stones accumulated, on which accumulation William de Fortibus, then Earl of Albemarl, began to build a certain town which is called Ravenesodd; and it is an island; the sea surrounds it".[19] After the breach, a new spit probably grew slowly and 'Ravenseres pourne' was mentioned in 1399.[20] But it was not until the seventeenth century that the spit became

(19) Hundred Rolls Vol. I p.292. Inquisition taken in 1274 - 1276.

(20) A.H. Smith. The Place-Names of the East Riding of Yorkshire. English Place-Name Society Vol. XIV. 1937. p. 17.

sufficiently long to enable silt to accumulate once again along the Holderness shore.

The physical evolution of Holderness gave rise to four main types of land-surface within the region, of which three provided problems of drainage which have powerfully influenced the history of their occupation and use. The four types are:-

(1) Gravel mounds of fluvio-glacial origin which provide scattered well-drained sites.

(2) The boulder-clay lands, including some fairly dry areas where slopes are adequate to carry off surface drainage, but also numerous marshes and meres in the hollows.

(3) The silt lands along the Humber littoral, which are lowlying but, owing to their proximity to the Humber, not excessively difficult to drain. Their greatest need has been adequate defences against high water in the Humber and Hull.

(4) The peat lands, which occupy principally the upper part of the Hull valley, and which were very difficult to drain.

Fig. 7 shows the approximate distribution of these four types of land. As there is no accurate means of drawing a boundary between silt and peat, the peat distribution has been plotted on the basis of the distribution of "carrs".

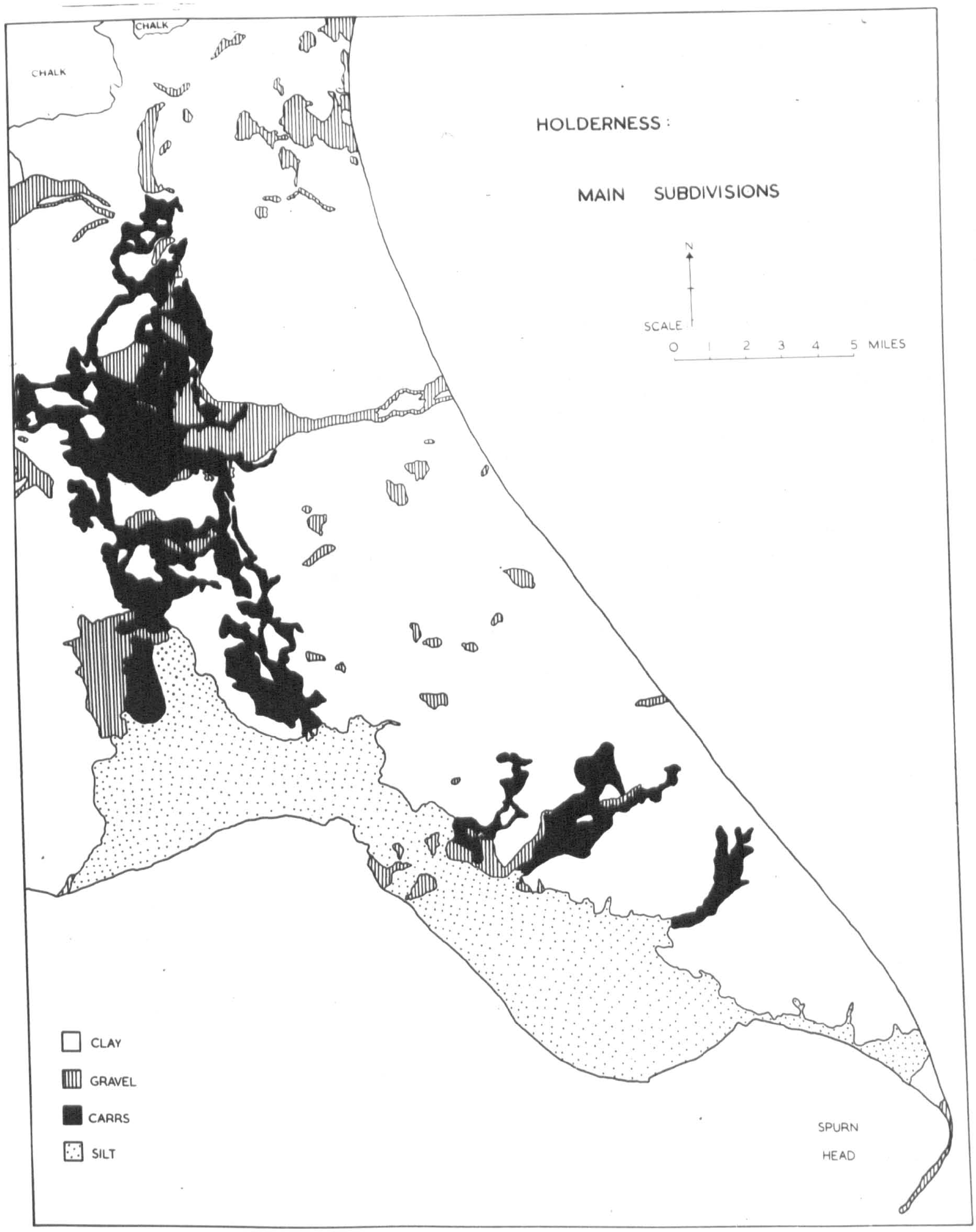

CHALK
CHALK
HOLDERNESS :
MAIN SUBDIVISIONS
N
SCALE
0 1 2 3 4 5 MILES
CLAY
GRAVEL
CARRS
SILT
SPURN
HEAD

Fig.7.

This term has been used since Danish times to describe poorly-drained land which could only be used for pasture for a few weeks in summer. The carrs were probably chiefly peat-covered, with an intermixture of brown clay downwash and oozes.

The main channel carrying water off these lands is the river Hull, which rises in springs near the angle of the Wolds. That section of the chalk is particularly well supplied with springs. Green estimated that all the chalk dip-slope springs together provide an average of at least 96 million gallons of water a day.(21) Practically all of this used to flow into the river Hull, although now about 22 million gallons a day are removed by waterworks and private wells. The chalk springs provide most of the water in the Hull, and fortunately for the lowlands the flow is relatively constant. The storage action of the chalk is such that the greatest flow is usually in spring ~~or~~ and early summer, while the minimum flow is usually in the autumn. The streams joining the Hull from the east have contrasting regimes. Owing to the clay subsoil, they carry large volumes of water after storms or snow, while in summer they are frequently dry.

All this water flows into a valley with a very small gradient; the river falls only 7 feet between Emmotland and

(21) C. Green. The Water Resources of the Yorkshire Chalk. Journal of the British Waterworks Assoc. Feb. 1950.

the Humber, a distance of approximately 22 miles. A winding and braided course was therefore normal before man carried out improvements. In addition, the large tidal range of the Humber, amounting to 19 feet at ordinary spring tides at the mouth of the Hull, affected the river probably as far upstream as Emmotland,[22] and ponded back the fresh water at high tide. Silt carried into the lower part of the river by these tidal invasions has built up the bed of the river, and in parts there is a slight, scarcely perceptible fall in level away from its banks.

Holderness cannot have provided attractive conditions to early man. The variety and scope, if not the size, of the problems it presented to those who would reclaim and drain were as great as those of any other low-lying area of England.

(22) Hempholme Lock is now the limit.

Chapter III Early Holderness.

The differences between the various physical regions of Holderness, and between them and the Wolds, are accentuated and thrown into relief by the varying reactions of early man. Sir Cyril Fox and others have emphasised how early man favoured the drier and more open parts of Britain.(1) As time progressed the heavier clay soils became colonised, leaving until last the draining and settling of marshlands. Holderness epitomises this sequence. Early man avoided the clays, and settled rather on the adjacent chalk hills and on the scattered patches of gravel. Later settlers of early historic times were probably responsible for clearing the woodland from the boulder-clay areas. The silt lands came next, most of these being at least partially reclaimed between about 800 and 1200 A.D. The peat tracts remained unimproved until relatively recent times.

In immediate post-Glacial times, Paleolithic peoples may have appeared in Holderness, for their implements have been found in the Kelsey Hill glacial gravels, part of the main moraine east of the Hull.(2) But the first true colonisers of the district, Mesolithic peoples with a Maglemose culture, moved in as the climate ameliorated, and

(1) Sir Cyril Fox. The Personality of Britain.

(2) F. & H.W. Elgee. The Archaeology of Yorkshire, 1933. p.26

the tundra changed to dry forest. During the Boreal period (7,500 to 5,500 B.C.) the rainfall was relatively low. On the clay, pine - birch forest probably developed but the chalk and gravels must have had only a light cover of grasses and heath vegetation with some scattered trees. Marshland and meres were restricted to the deeper hollows in the drift, while the Hull valley was probably forested like the rest of the clay area. The low sea-level meant that much of the bed of the present North Sea was then dry land, and similar conditions must have extended from Holderness as far as North Germany and Jutland.

The Maglemose people were fishers and hunters who lived on raft-like structures in shallow water. Various implements belonging to them have been found in Holderness in the thin layers of silt underneath the peat in the old meres. For example, where the sea cliffs cut across the old Whitow Mere, antler harpoons and flint implements have been found in the silt.(3) No doubt the Maglemose peoples fished in this mere, and dropped or threw the implements into it, perhaps some time about 6,000 B.C. The numbers of these people must have been small, and they no doubt roamed over clay, gravel and chalk lands alike in their hunting excursions. The Wolds must have been very bleak and barren

(3) H.E. and M. Godwin. British Maglemose Harpoon Sites. Antiquity, 1933. pp. 36-48.

at this time.

When moister, milder conditions prevailed during the Atlantic period (5,500 to 3,000 B.C.), a light open type of forest probably spread over the chalk, but the descendents of the Maglemose peoples still continued to live on the lowland. Marshes and meres became more extensive at this time, and peat began to accumulate in the meres. A Maglemose lake-dwelling of this period was revealed by excavations into the peat at Ulrome in north Holderness. "At a depth of 10 feet there lay a platform, 60 by 90 feet, of tree trunks resting on a thick layer of brushwood, beneath which was a deposit of sand and gravel merging horizontally into peat not more than 2 feet thick. Originally this deposit formed the bed of a shallow mere above the surface of which the log platform had been raised by means of the brushwood, and secured by poles fixed to the logs and driven into the lake bed. From either end of the platform a narrow causeway led to the shore".(4) It is assumed that this description means that peat occurred actually below the platform, in which case this dwelling must be considerably later in date than that in Star Carr (Chapter 11) and the implements found in Whitow Mere. The bones found round the dwelling suggest the animals then inhabiting Holderness - red deer, wolves,

(4) Elgee, op. cit. p.40

boars, beavers, foxes and others. Bones of horses, pigs, goats, sheep and oxen also occur, which suggest that these people from time to time raided the domesticated flocks of their more advanced neighbours. This in itself is evidence of the relatively late date of the Ulrome dwelling.

The neighbours whose flocks were raided must have been the Neolithic peoples, who were settled on the Wolds by about 3,000 B.C. They were principally pastoralists, although they also engaged in hunting. It was their pastoral interests which led them to occupy the chalk lands, for the woodland there was probably relatively open, and pasture therefore more abundant. The clays of Holderness were probably by that time covered with dense oak forest, and were avoided by the Neolithic peoples. They may, however, have had hunting excursions into Holderness, which could explain the flint axes discovered in such places as Cranswick Carr[5], Cottingham and Beverley[6] and Garton[7]. On the other hand, these axes may be of later date.[8]

In early Bronze Age times, Beaker peoples moved into the Wolds from North Germany and Denmark.[9] They seem to have mingled with the earlier Neolithic inhabitants, and out of this union evolved the Food Vessel culture. Both Beaker and Food Vessel peoples were still largely dependent

(5) Ibid p.47 (6) Ibid p.48 (7) Ibid p.46 (8) Ibid p.59
(9) Ibid p.59.

on flint implements; bronze was known but was rare. They were still predominantly pastoralists, but must have grown some cereals, for sickles occur among their relics.[10] The continued pastoral emphasis and dependence on flint implements confined these peoples to the Wolds like their predecessors. Archaeological evidence suggests that they were more numerous than the Neolithic inhabitants of the Wolds, but in spite of this they did not spread into Holderness. A stone-axe of beaker type has been found at Burstwick, one of the gravel capped hills which may have had a more open forest cover, and which may have supported an outlying settlement. But probably Holderness was visited principally for hunting and to obtain oakwood for coffins[11] and the axe may have been dropped then. At this date, there was therefore a marked contrast between the relatively closely settled Wolds and the almost empty Holderness, a contrast greater than in any succeeding period.

The next influx of peoples helped to redress the balance. Late Bronze Age peoples, probably related to the lake-dwellers of Switzerland[12], came across the North Sea. They settled in Holderness, leaving the Wolds in the possession of the earlier occupants. The new settlers had plenty of powerful

(10) Ibid. p.65   (11) Ibid. pp.64 & 65   (12) Ibid. p.102

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(10) Ibid. p.65 (11) Ibid. pp.64 & 65 (12) Ibid. p.102

bronze axes, which they may have used to clear trees, but they still showed a preference for areas of gravelly soil and more open woodland. Groups of rough log huts probably appeared on the gravel hills, surrounded by patches of land sown with cereals, and other patches where primitive sheep and cattle grazed. Late Bronze Age finds are particularly numerous on the gravel hills of Holderness, e.g. Bilton, Sproatley, Skirlaugh.(13)

Others of the newcomers, however, preferred to set their dwellings, not in dry forest clearings, but on platforms in the meres or marshes. Six of these Bronze Age lake-dwellings have been found, of which the best-known is near Ulrome. This is on the same site as the Neolithic lake-dwelling previously described, but two feet above it.(14) The pottery found suggests that the site was occupied continuously from its construction (between 1,000 and 700 B.C. until during the Roman period. Five of the six dwellings discovered are in north Holderness, where gravels are widespread, which suggests that even when they lived over water, the late Bronze Age peoples preferred to be near easily cleared light soils where they could grow their crops. In addition, these people probably fished in the meres and hunted in the still-extensive forests.

(13) Ibid. p.92 (14) Ibid. p.103

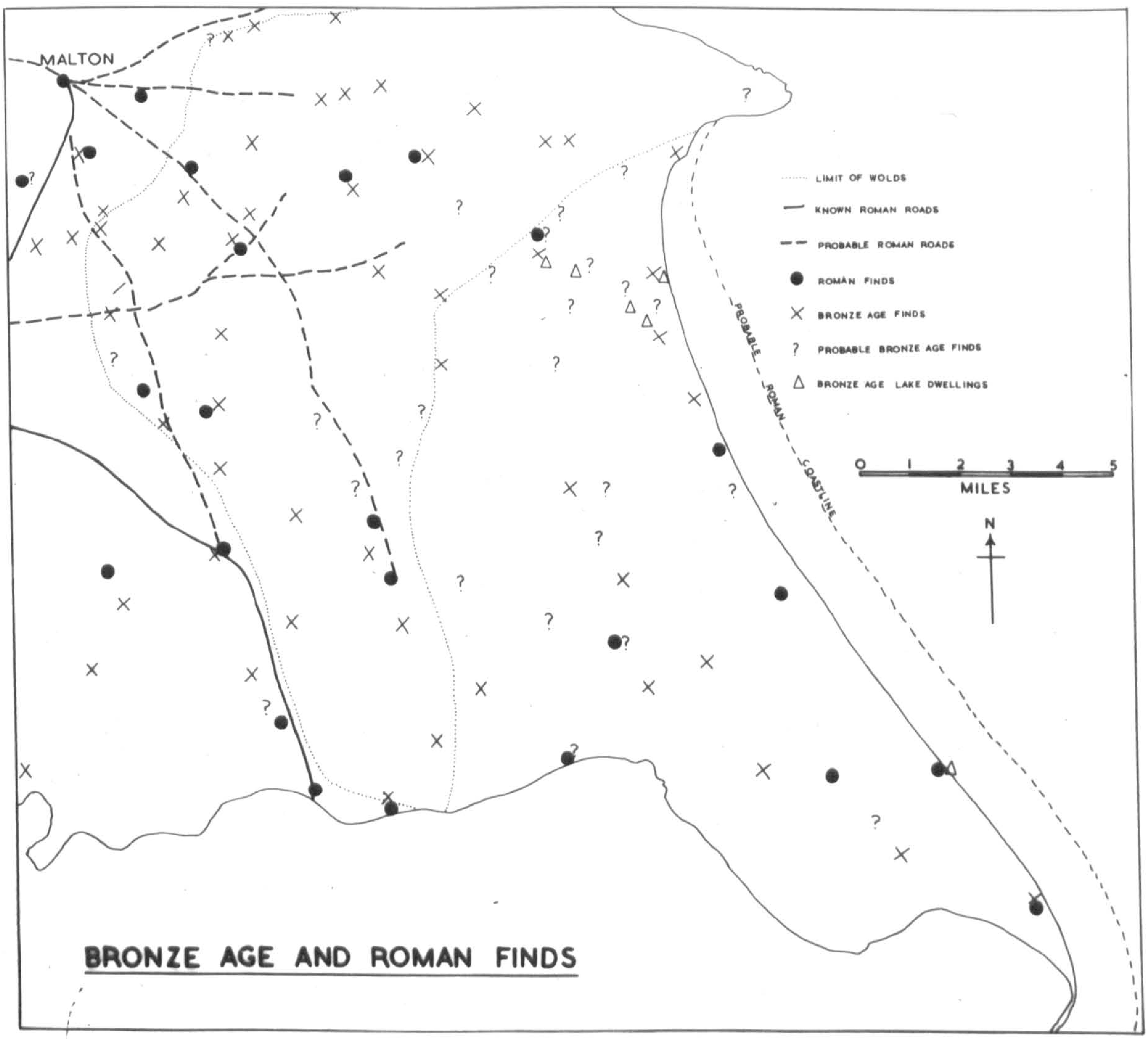

Fig.8. The location of finds in Holderness suggests location of settlement on the morainic mounds.

The late Bronze Age culture survived in Holderness until the Roman era. But in the meantime, the still more-favoured chalk Wolds received a fresh invasion. The invaders were Iron Age people of the La Tène culture who appear to have come from the Marne valley in the third century B.C.(15) The Yorkshire Wolds became the main British centre of this culture, but as in previous instances, there seems to have been little tendency to spread downhill into Holderness. The invaders no doubt found it most convenient to use lands already cleared, and in addition, by this time the Hull valley marshes must have formed a very effective barrier between the Wolds and the gravel and clay lands. However, there appears to have been some trade between the peoples of the Wolds and those of Holderness, for La Tène objects have been found at Ulrome and Rise.(16)

When the Romans entered the region, they gave the name Parisi to the La Tène peoples of the Wolds, with whom they came into contact more than the peoples of Holderness. A number of Roman roads were constructed across the Wolds (Fig. 8), but there were none in Holderness, because it was remote and probably still so closely-wooded as to repel the Romans. Such Roman remains as have come to light in Holderness indicate Roman influence on the inhabitants

(15) Ibid. p.212 (16) Ibid. p.111

rather than Roman settlement. Roman coins and pottery have been found at Hornsea, Aldborough, Withernsea and Easington, on dry sites (now near the coast) which were no doubt settled by the Bronze Age peoples. Roman villas have been traced at Bishop Burton, Etton and Harpham, all close to the junction of the Wolds and the lowland and perhaps representing a downhill movement of settlement and forest clearing. Taken on the whole, however, the Roman influence was slight, and the La Tène culture of the Wolds and the late Bronze Age culture of parts of Holderness survived with few modifications until the next wave of invaders. The Wolds probably continued to have a denser population and to be more extensively cleared and used than Holderness. This is the last period during which the Wolds and Holderness formed two distinct cultural units, although already the Roman influence had led to the development of common features in both areas.

The Germanic invaders of the fifth century A.D. gave rise to a marked change of emphasis, for they settled with equal facility on the clays and on the chalk. They were less restricted in their choice of settlement sites than the earlier peoples for they brought with them the mould-board plough, capable of turning over heavier land. Those who came to East Yorkshire, according to Bede, were Angles from Schleswig. They left behind them a land not unlike Holderness, with similar morainic hills and marshy hollows. They appear to have made their first settlements on the drier sites, probably those already cleared by the Bronze Age settlers. "ing" names, believed to indicate early settlement, are found chiefly on the morainic hills of Holderness, e.g. Keyingham, Ottringham and Patrington occur on the outer string of morainic hills where it faces the Humber. In time the Anglian peoples spread outwards from these centres and placed new villages in clearings in the oakwoods. In the early years the Angles must either have absorbed or driven away all the earlier settlers.

In their expansion of settlement, the Angles occupied much of the gravel and clay areas, although many patches of uncleared forest probably continued to separate cultivated fields, and many meres and swamps remained in the hollows. The Hull valley was probably almost completely waterlogged, for there had been a further depression in the level of the land since Roman times.(17) At the upper end there were fresh-water meres and swamps in which peat was accumulating; at the southern end, silt from the Humber was being deposited to form areas of salt-marsh. The Keyingham and Winestead valleys must have been similar. Fig. 9 summarises the physical conditions prior

(17) Suggested by evidence from the comparable area of the Fens. H.E. Godwin. Phil. Trans. 1941 Fig.21. The lake-dwelling at Ulrome, occupied until early Roman times, is now 4 feet below the surface. Elgee, op. cit. p.102.

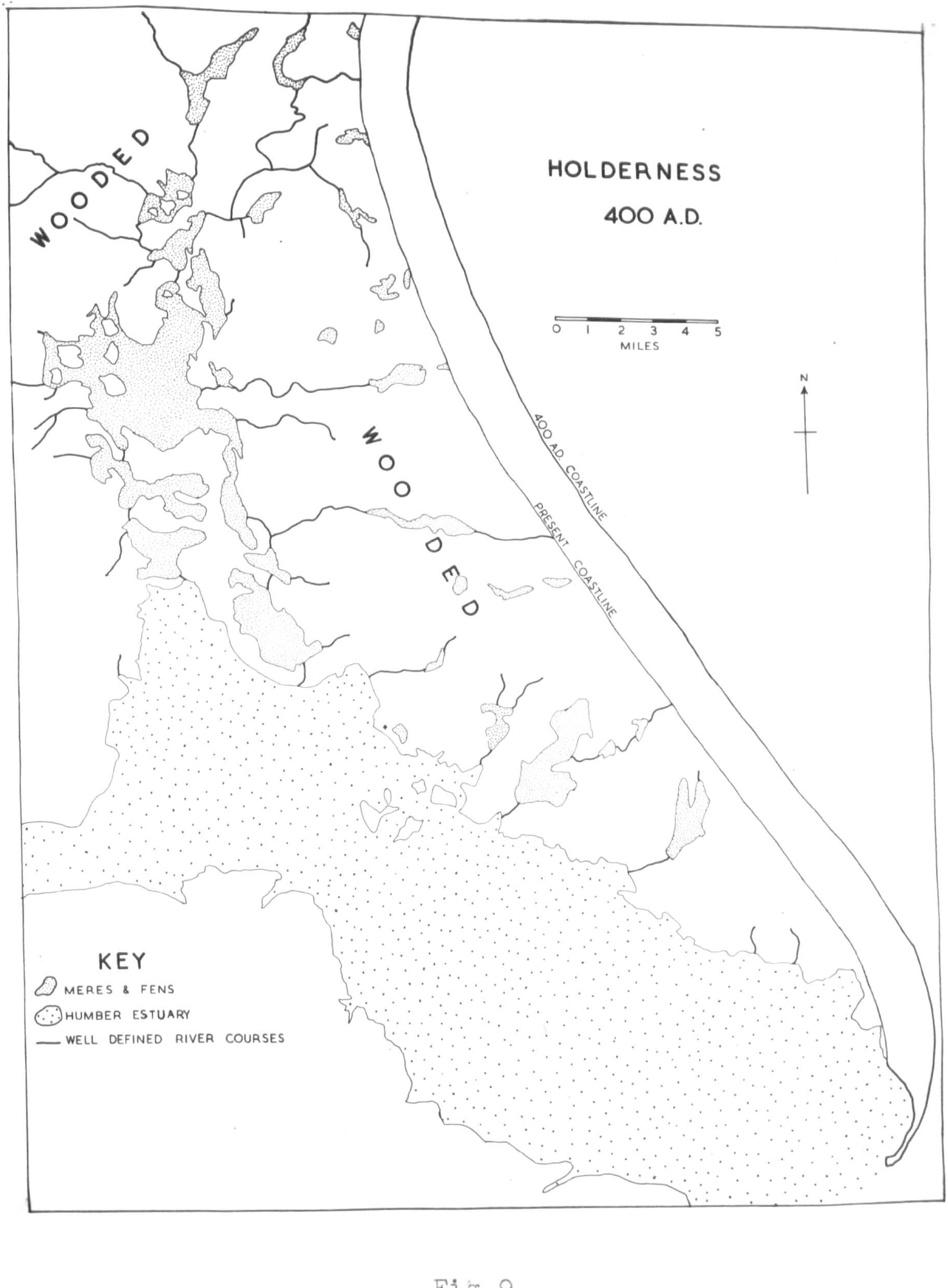
HOLDERNESS
400 A.D.
0 1 2 3 4 5
MILES
N
WOODED
WOODED
400 AD. COASTLINE
PRESENT COASTLINE
KEY
MERES & FENS
HUMBER ESTUARY
WELL DEFINED RIVER COURSES

Fig.9

to the arrival of the Angles. In view of these conditions, it is not surprising that the expansion of settlement at this time was directed towards clearing the forests on the clay rather than reclaiming marshes and swamps.

When the Danes began to raid the coast of Britain about the middle of the ninth century, Holderness was especially open to attack and when raiding was displaced by active settlement, the area became part of the Danelaw. The large numbers of Anglian settlers already in the district, however, limited the scope for Danish settlement. In north Holderness the newcomers appear to have been sufficiently strong in numbers to give rise to a number of Danish village-names.(Fig. 10) North-east of Hull there is another small concentration of Danish names. Elsewhere, scattered names may indicate new hamlets clearing patches of forest between the older Anglian village lands. But these areas were not sufficient for the needs of the Danes, so they turned their attention to the marshy areas ignored by the Angles. There appears to have been some regression of sea-level by this time[18] which made the alluvial lands easier to use. Considerable areas of silt land along the Humber were covered only at spring tides, if at all, and there the Danes were able to establish some hamlets, e.g. Tharlesthorpe. Some of this land may have been

(18) Godwin, op. cit. Fig. 21.

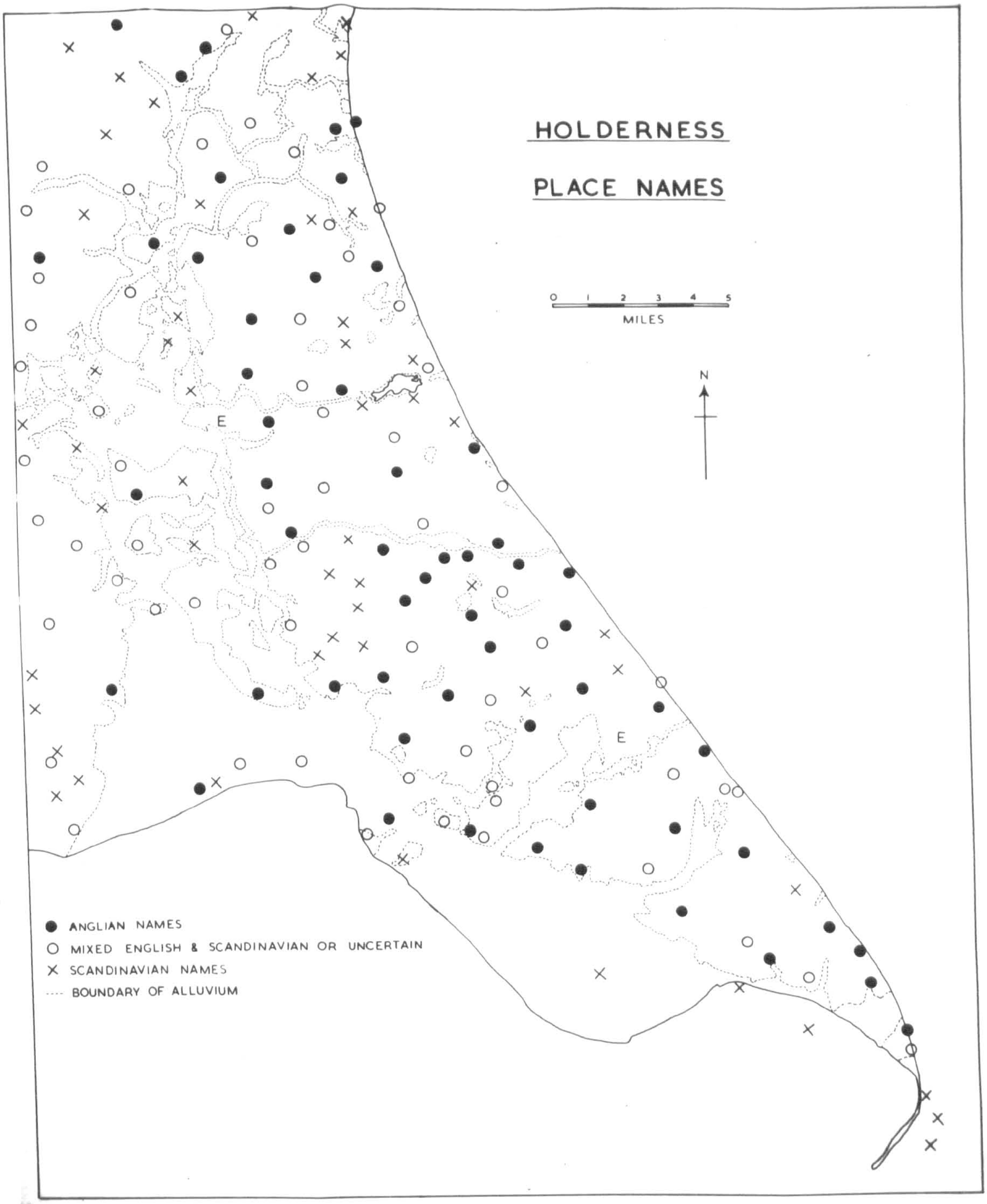

Fig.10. The juxtaposition of Anglian andScandinavian names, shown separately in Fig11, brings out more clearly the areas of Scandinavian(i.e.Danish)predominance.
E.-early, pre-Anglian names.

DISTRIBUTION OF ENGLISH NAMES

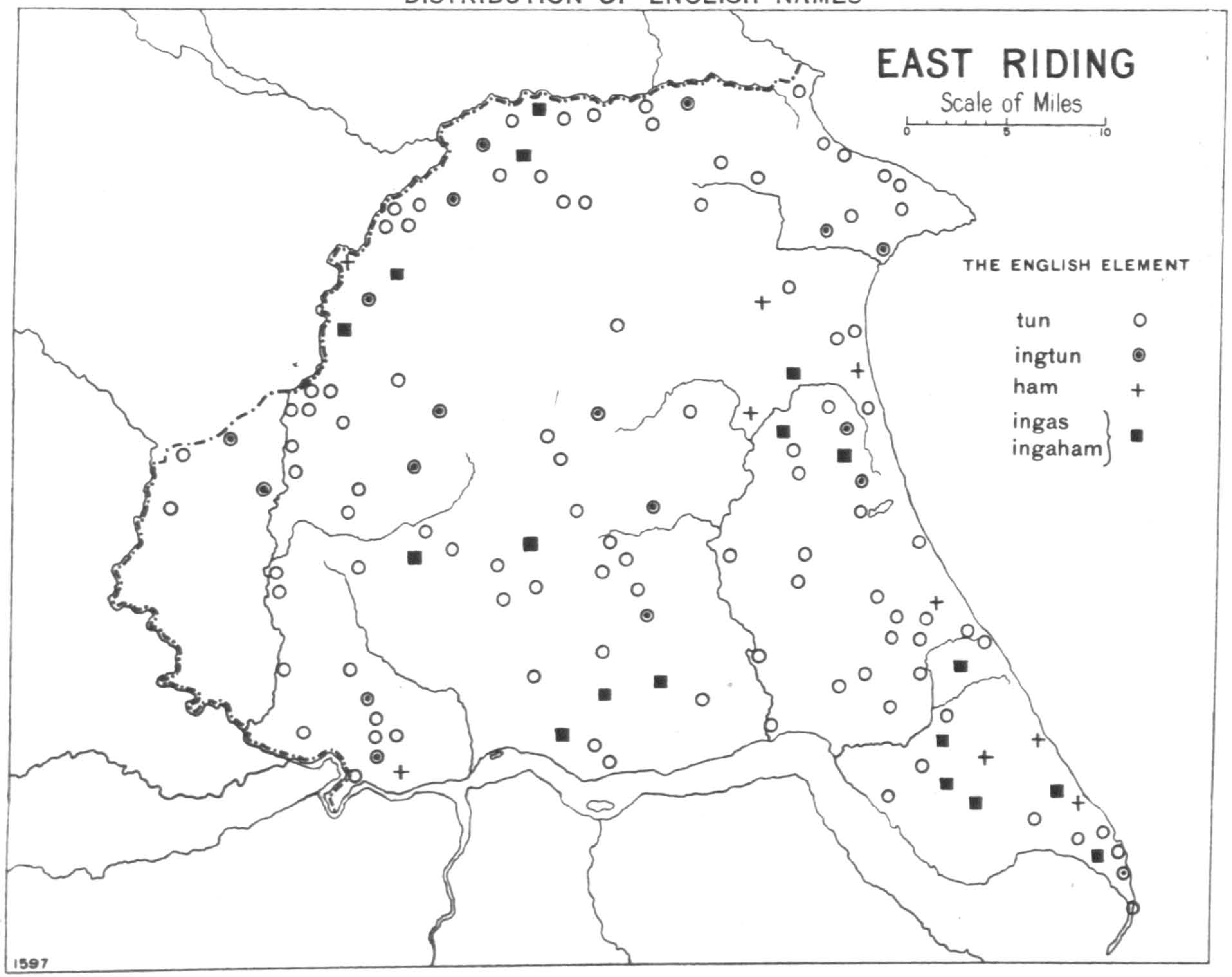

Fig.11a

Figs.11a,b,c,and d,are reproduced from Smith,
"The Place-Names of the East Riding of Yorkshire.

DISTRIBUTION OF SCANDINAVIAN NAMES: þorp, by, tun.

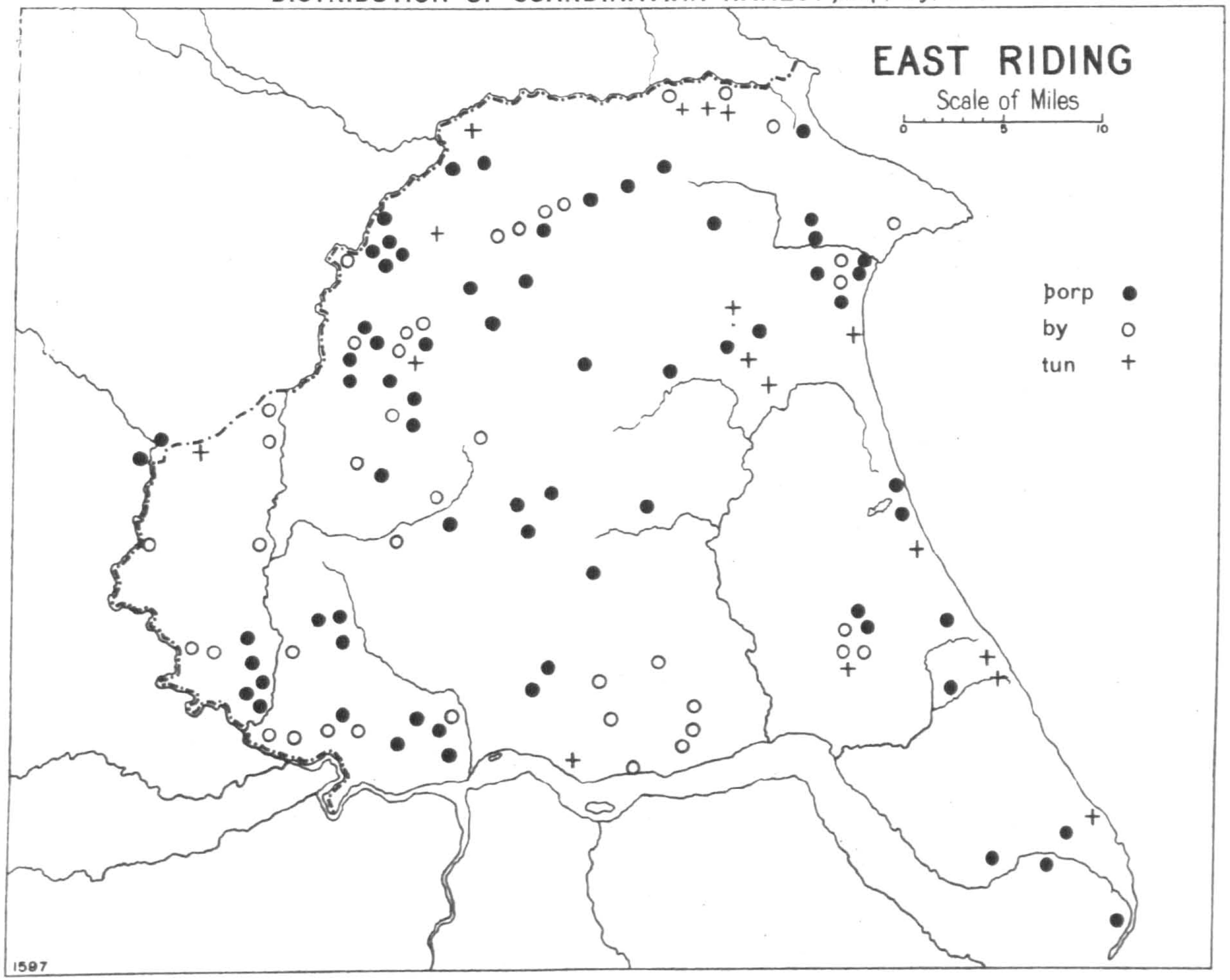

Fig.11b

TOPOGRAPHICAL NAMES: WOODLAND

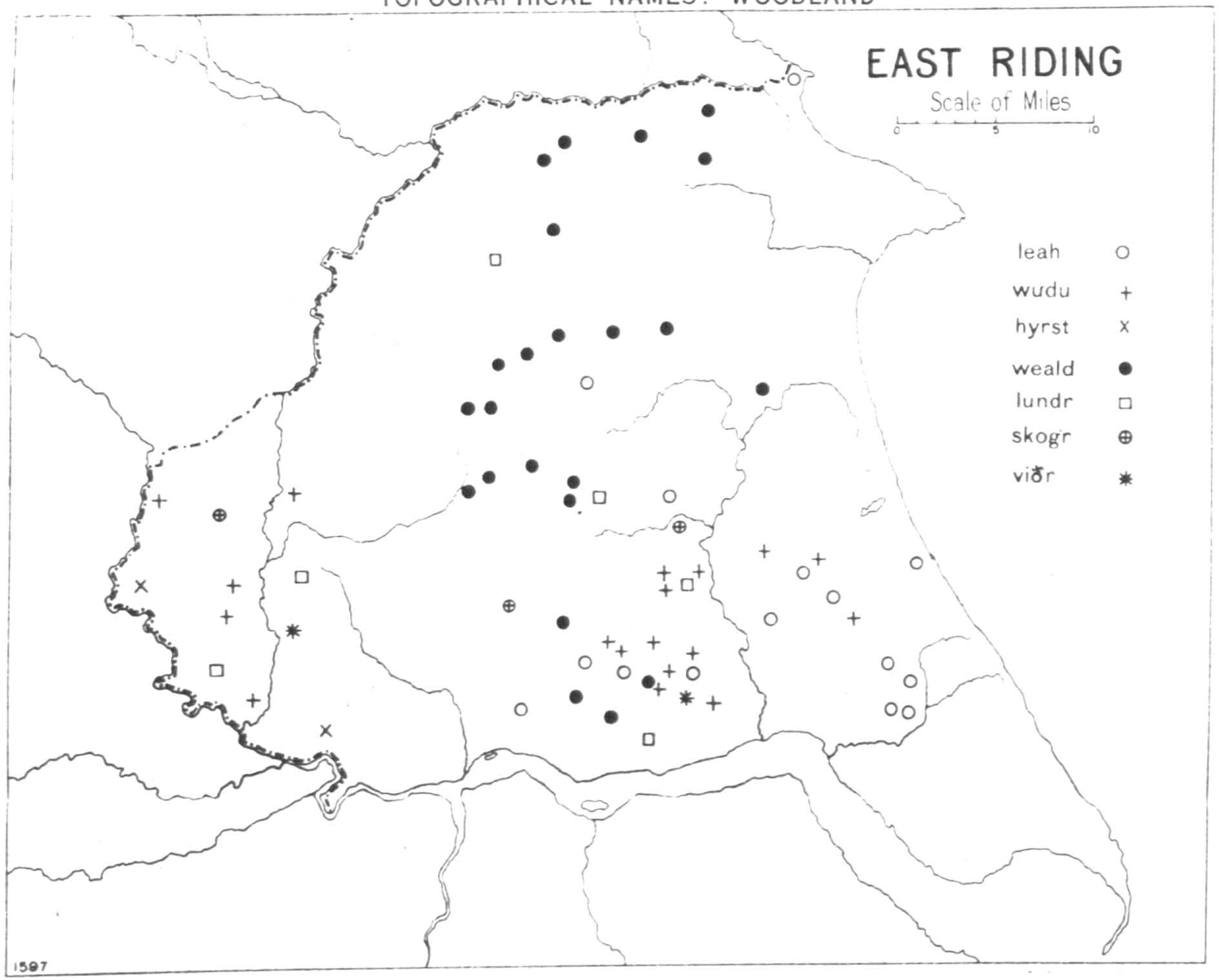

Fig.11c

TOPOGRAPHICAL NAMES: MARSHLAND

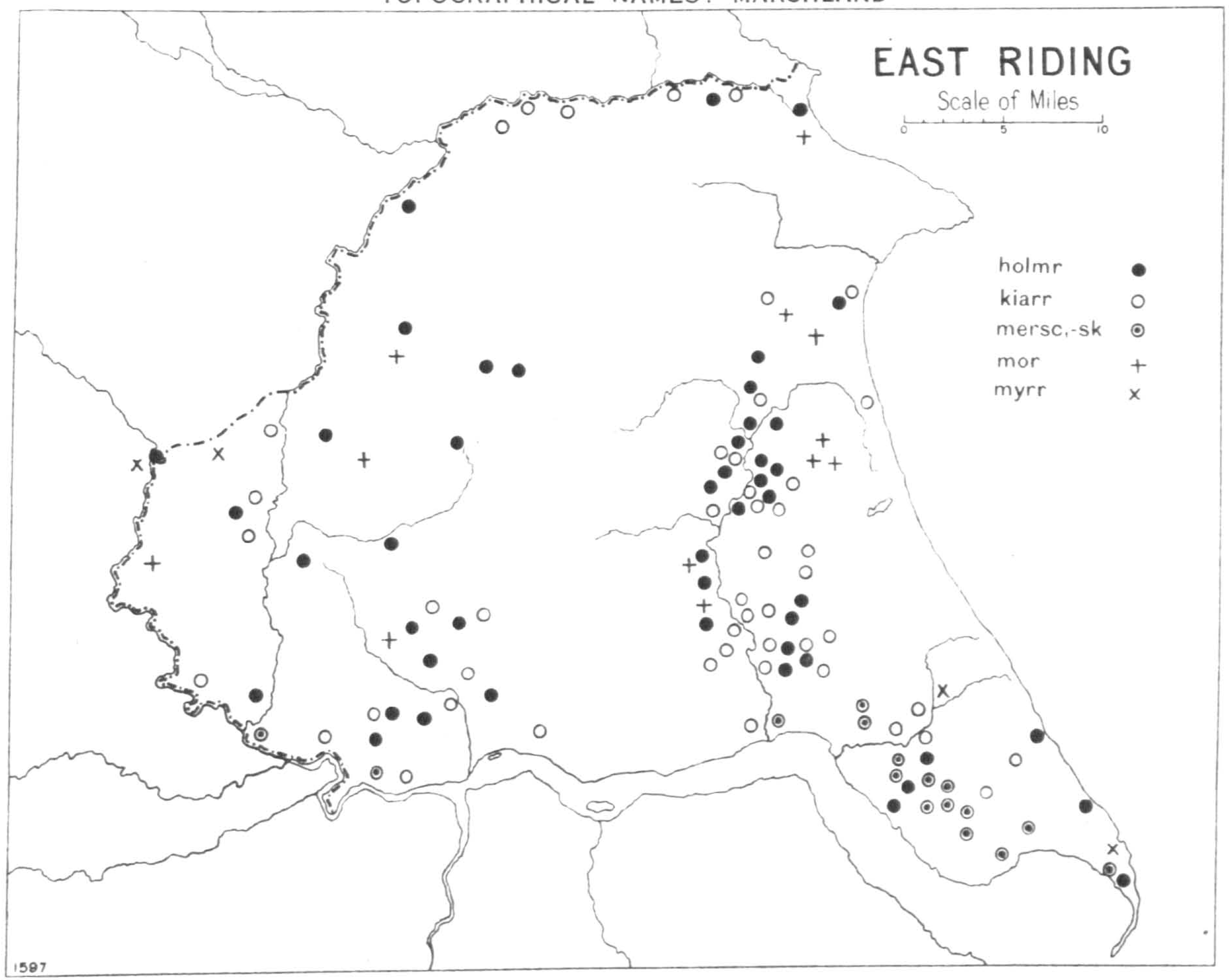

Fig.11d.

cultivated, but probably much remained as rich pasture. In the Hull valley, the small boulder-clay islands rising above the meres and marshes were occupied. Nearly all of these bear Danish names (Fig. 10). The islands themselves were probably most valued for pasture. The true peat areas probably dried out for a few weeks each year {by this date}, but it is doubtful whether they were yet exploited to any extent.

The settling of the Danes on the silts and near the peats marks the true beginning of man's interest in and attempts to improve the marshlands. It is therefore of interest to note the probable pattern of drainage at this time (Fig. 12) before human interference. The natural watercourses can be traced in the upland areas by the strips of alluvium. When they reached the Hull valley, the streams may have flowed into an almost continuous stretch of water for much of the year. But in dry seasons they followed winding and poorly-defined channels across the carrs, either to the Hull valley, or, in the case of the Lambwath, to the Old Fleet and the Humber. These dry season courses can be distinguished on air photographs. Attempts to improve the peatlands required the confining of the streams to these channels, or the cutting of new direct courses. On the other hand, on the silts embankments

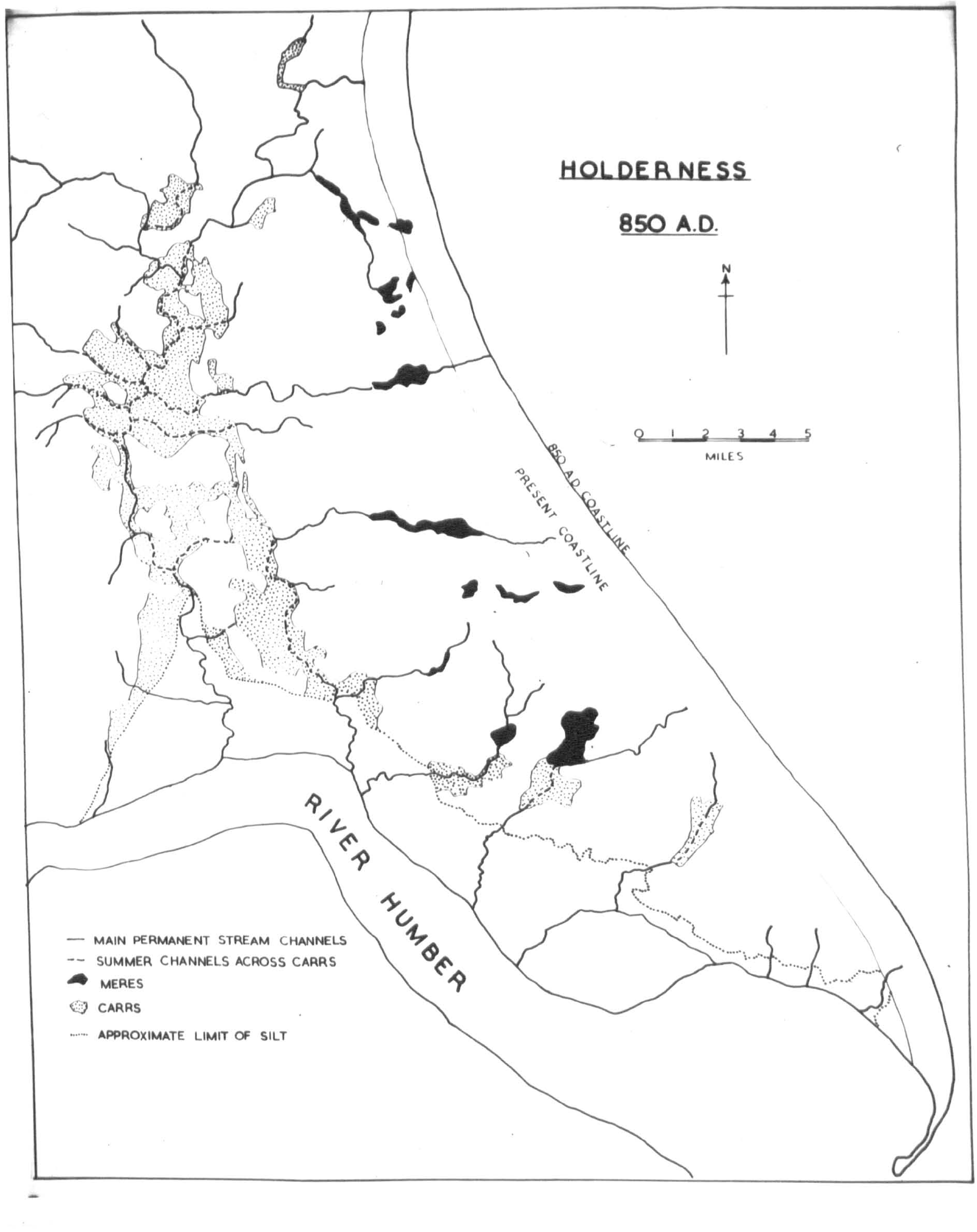
HOLDERNESS
850 A.D.
N
0 1 2 3 4 5
MILES
850 A.D. COASTLINE
PRESENT COASTLINE
RIVER HUMBER
MAIN PERMANENT STREAM CHANNELS
SUMMER CHANNELS ACROSS CARRS
MERES
CARRS
APPROXIMATE LIMIT OF SILT

Fig.12

were needed to keep out the waters of the occasional high tides. The latter task was the easier of the two, and it seems likely that the Danes built some embankments along the Humber, although there is no direct evidence to this effect. Settlement on the silts would have been very precarious without this form of protection.

We are almost as much in the dark in attempting to assess the extent to which the Danes embanked the rivers, altered their courses, and cut new drains. The evidence suggests that they made two types of alteration, neither directly aimed at draining the marshes, but both having a limited effect on their condition. First, they appear to have cut some boundary ditches between the townships; second, in at least one case they diverted a stream for the purpose of driving a water-mill.

So far as possible, the Angles and the Danes appear to have used natural features such as streams as the boundaries to their townships. Nearly all the major streams of Holderness were followed by township boundaries before the amalgamations of civil parishes in the nineteenth and twentieth centuries. Where no such convenient natural boundary existed, some artificial boundary was needed. On the higher land, a line of trees or boundary stones wase used. In the peat areas, the long period of the year during which the land was waterlogged made it difficult to establish any boundary, and many such areas

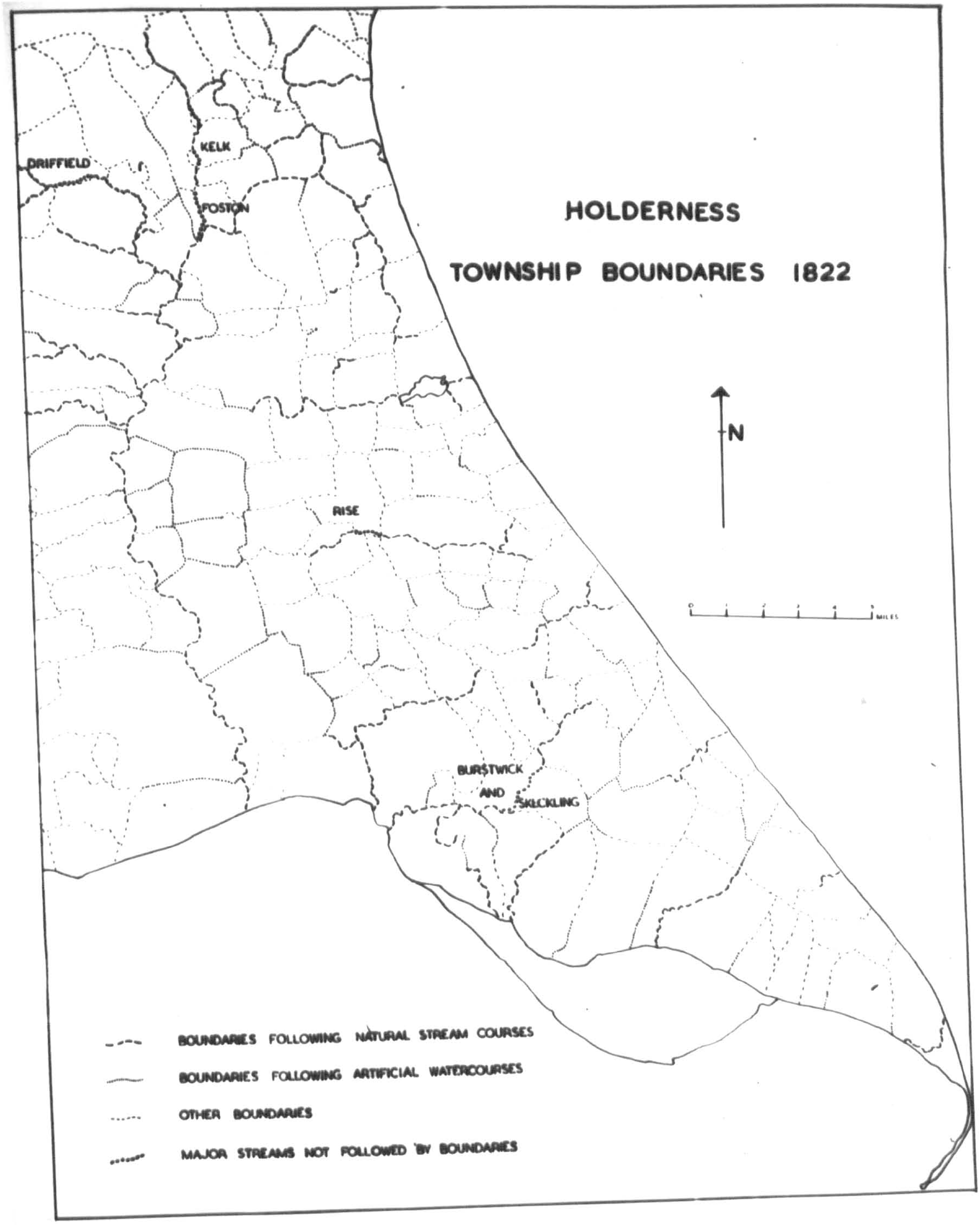

Fig.13. The boundaries are those shown on Greenwood's map of Yorkshire,1822.Boundaries following artificial watercourses are of two kinds:-

a) Those that had a fence-ditch cut along them at the time of their establishment,the ditch later being adopted as a main drain.

b) Those that run through the carrs were often later in origin. The carrs were common to twoor more townships until the drain was cut,when it was adopted as a suitable boundary.

It is often not possible to distinguish these two types.

probably remained common to the adjacent townships at this date. But on the silts in particular, and some boulder-clay areas, it was found quite simple to dig a ditch which became filled with water for much of the year, and thereby acted as a good boundary. We learn of the existence of such fence-ditches in Danish Holderness from a 1033 charter giving the boundaries of Patrington: "These are the land-boundaries of Patrington: First it commences at the pit, and so along the dike to the stone; .... and so along the ditch to the west of Thorpe to the hollow ditch....."(19). It would soon be discovered that these fence ditches had further uses for carrying the water off the land. In later years, many were enlarged to become major drains.

The diversion to drive a water-mill was in the north of Holderness. The Kelk Beck, which used to join the Driffield Beck just south of Wansford, was diverted to join the Old Howe near North Frodingham. (Fig. 14). The present physical geography gives evidence of the diversion. The Beck leaves an area of alluvium, which continues towards Wansford, to cut through a ridge of boulder-clay and gravel. According to the geological map, no alluvium borders this stretch of the valley. On the ground, too, it is apparent

(19) W. Farrer. Early Yorkshire Charters 1914. Vol. I p.26

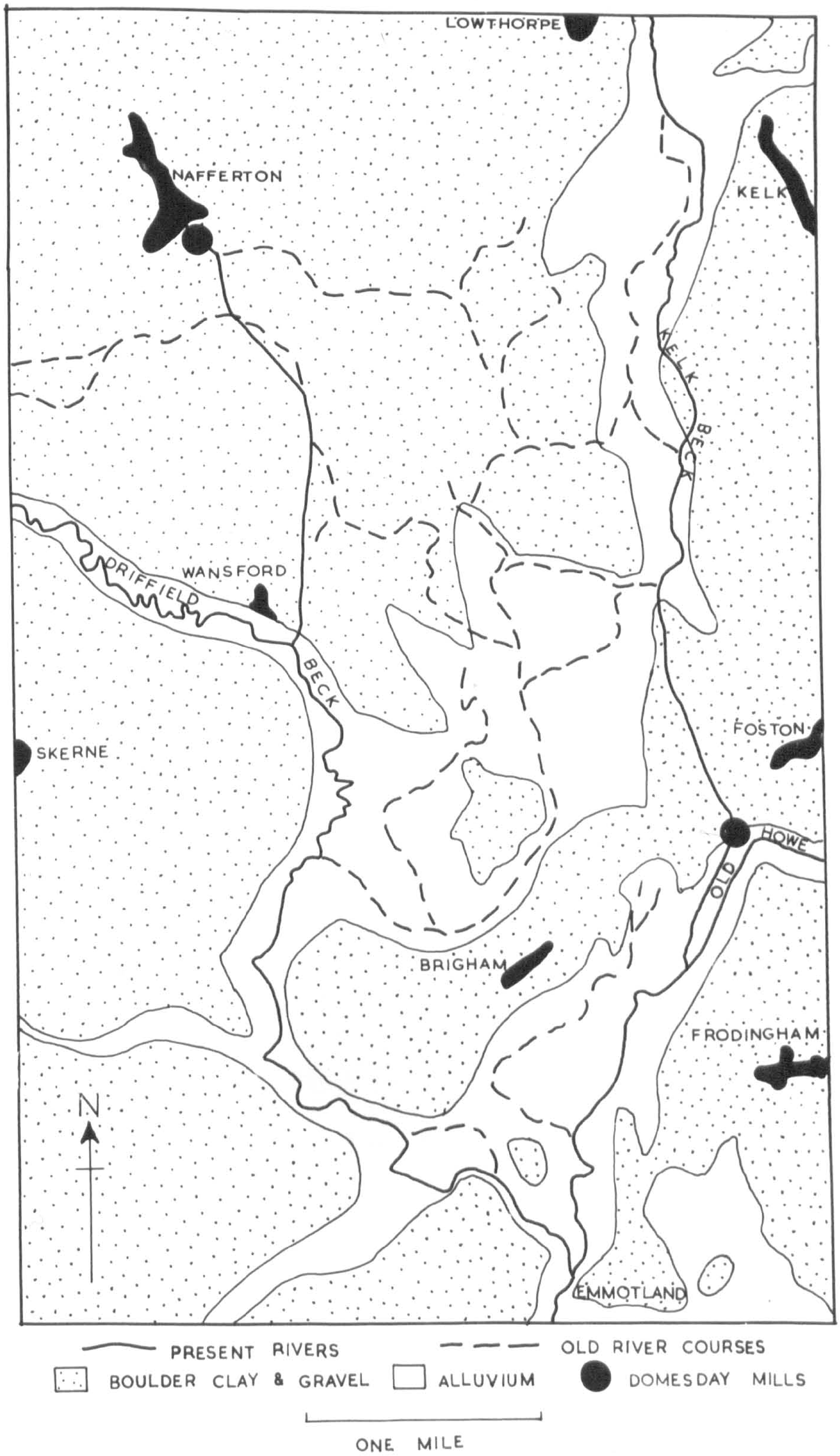

Fig.14. The Wansford-Foston area.

that the river here crosses a marked ridge, albeit the lowest part of the ridge. The relatively meendering course of the stream seems to contradict artificial diversion, but the weight of evidence is in its favour.

If we assume that the lower section of the Kelk Beck is artificial, there are two pieces of evidence which suggest that the diversion was early. In the first place, the Domesday book records a mill in Foston in 1086. The other mills mentioned in Domesday are all located on streams rising from chalk springs (Fig. 15). The Foston mill could have been on the Old Howe or the diverted Kelk Beck, the only two streams which touch the township. The Old Howe is a boulder-clay stream of small gradient and irregular flow, and would seem quite unsuitable for driving a watermill. The Kelk Beck rises in a chalk dip-slope spring at Kilham; although it loses some of its force in crossing the carrs north of Foston, it does not lose the regular abundant flow, and would be much more suited to driving a water-mill than the Old Howe. In fact, there are frequent references throughout later records to the beck at Foston driving a watermill. Thus it seems likely that the Domesday mill was on the Kelk Beck, and that the beck must have been diverted by this date. The devastation which followed the Norman conquest makes it unlikely that the diversion was made between 1066 and 1086, and we must therefore assume that

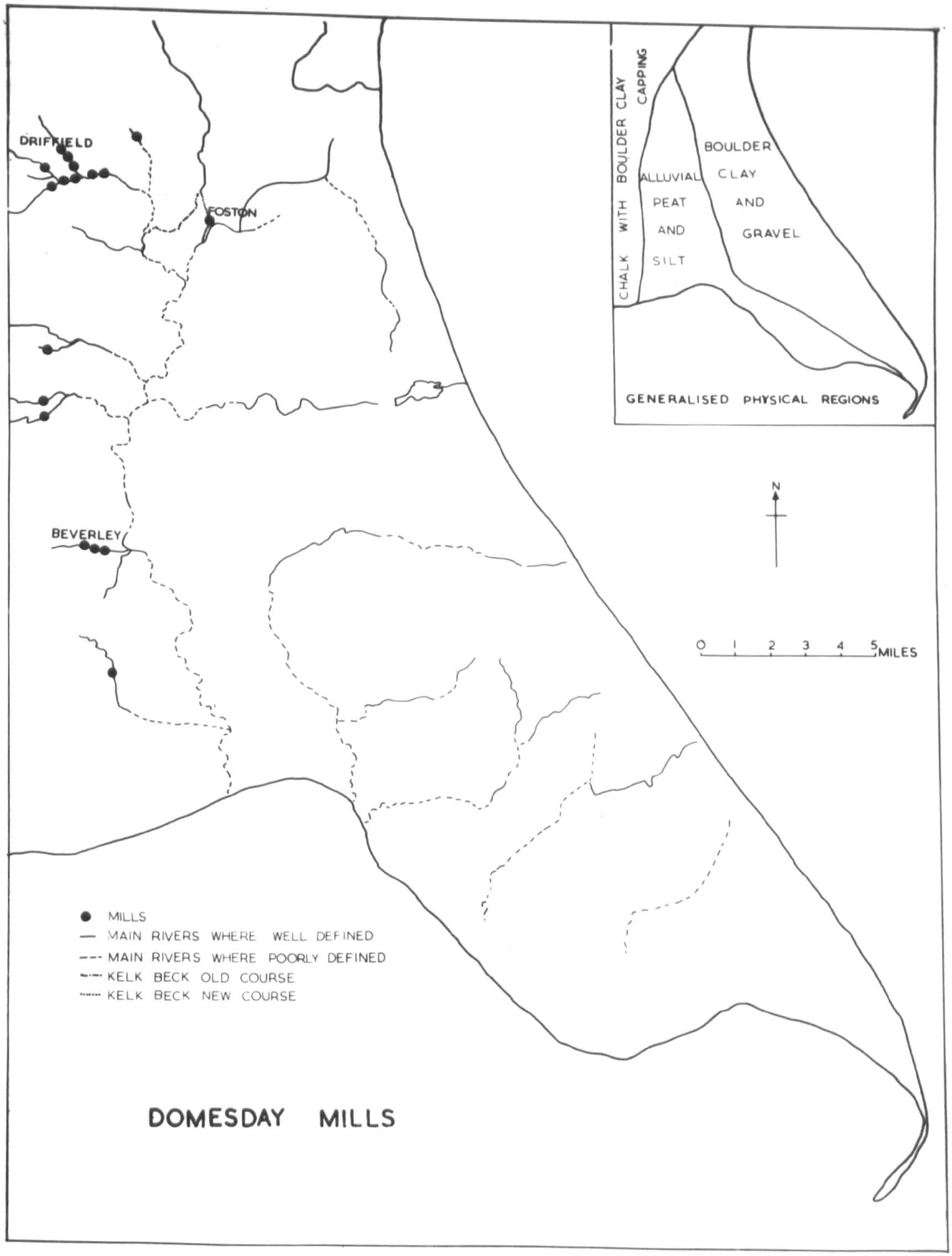
DRIFFIELD
FOSTON
BEVERLEY
CHALK WITH BOULDER CLAY CAPPING
ALLUVIAL PEAT AND SILT
BOULDER CLAY AND GRAVEL
GENERALISED PHYSICAL REGIONS
N
0 1 2 3 4 5 MILES
MILLS
MAIN RIVERS WHERE WELL DEFINED
MAIN RIVERS WHERE POORLY DEFINED
KELK BECK OLD COURSE
KELK BECK NEW COURSE
DOMESDAY MILLS

Fig. 15

it was earlier and Danish in origin.

The location of the Foston parish boundary suggests the same conclusion. This is one of the few exceptions to the rule that the main rivers are followed by township boundaries. In this case, Foston owns both banks of the Beck, and the Foston-Brigham boundary follows White Dike, probably one of the enlarged fence-ditches mentioned previously. This suggests, to say the least, that the Kelk Beck through Foston lands is an unusual stretch of river. Most township boundaries probably became stable during the early years of Danish rule, which suggests that at this date the Kelk Beck did not cross Foston lands. On the other hand, only part of the old course is followed by a township boundary, i.e. between Brigham and Wansford.

The evidence, although not complete, is strong enough to suggest that the Danes diverted the Kelk Beck some time during the tenth century, in order to drive a water-mill for their settlement at Foston. The task must have been considerable, and that they were able to carry it through suggests that the Danes had more skill in water-engineering than has previously been suspected. It is at least possible, therefore, that they carried out further works in the district, although there is no direct evidence. The Danish name "Scurf dike" or "Skaith dike" occurs several times in the district e.g. in Cranswick and Rotsea, and in Meaux. These dikes may also date from the tenth century, but Danish was a living language in Holderness long after the Conquest, and the names may well have been applied to the dikes later. Nevertheless, at last man had reached the peat-lands in his efforts to improve.

The pre-Conquest history of Holderness shows clearly the effects of physical geography in encouraging or retarding reclamation and settlement. The relatively easily reclaimed gravels were settled first; the clay lands were cleared and settled when the Angles introduced the mould-board plough; the silts were beginning to come into use by 1066 through the adoption of embankments and fence ditches; only the difficult peats were still almost untouched. The reclamation of the marshlands of East Yorkshire was effected mainly during the succeeding centuries when the documentary material available for the study of this process is relatively abundant. It is possible therefore to trace the story and elucidate the factors involved, whereas the details of the earlier process of clearing the forest from the clay and gravel lands are obscure.

Chapter IV. Medieval Holderness 1066-1532

The period following the Norman Conquest saw intensive drainage and reclamation activity in Holderness. The most spectacular advances were made in the siltlands, but the peatlands and the already settled boulder clay also benefitted. Evidence of this activity is not so full as could be wished, but it is sufficient to illustrate the type of changes which were taking place. The clay, peat and siltlands will be considered separately for clarity, although some of the problems were common to all three.

The Claylands. The process of reclaiming and improving the claylands had been going on for many hundreds of years before 1066. Domesday Book reveals a closely settled area with a large proportion of the land already reclaimed and in use. There was a certain amount of waste in Holderness in 1086, but on nothing like the scale found in the Vale of York. The unimproved areas consisted of woodland or meres and swamps in the hollows. There were probably also considerable stretches of pasture, known as "moor", e.g. Brandesburton Moor. In Medieval times, assarting of pasture land must have been common, but it was not usually a spectacular or large change and seems to have escaped documentary reference.(1) Of more concern here are

(1) A more detailed examination might reveal references.

improvements in field drainage and the reclamation of meres and swamps.

The numerous small streams which wound their way across the hummocky surface of Holderness, and the fence ditches, were the natural recipients of the field drainage. Probably most of the water found its way into these along the open-field furrows. During this period there seems to have been an awakening to the fact that unless the streams were efficient in carrying away the water the land would suffer. Consequently the practice developed of improving them and scouring them at intervals. For example, the Earl's Dike in north Holderness was produced by the deepening and straightening of an old stream.[2] An inquisition of 1367[3] reveals that by that date many of the streams were regarded as common sewers and required to be kept at a certain width. No doubt these requirements were frequently not fulfilled, nevertheless they may have led to some improvement in the productivity of the fields.

We may deduce that meres were common in medieval Holderness from several sets of evidence. Hollows filled

(2) This improvement was made by the Earls of Albemarle before 1185.

(3) Printed in G. Poulson, History of the Seignory of Holderness, 1845-49 Vol. I pp. 119-132.

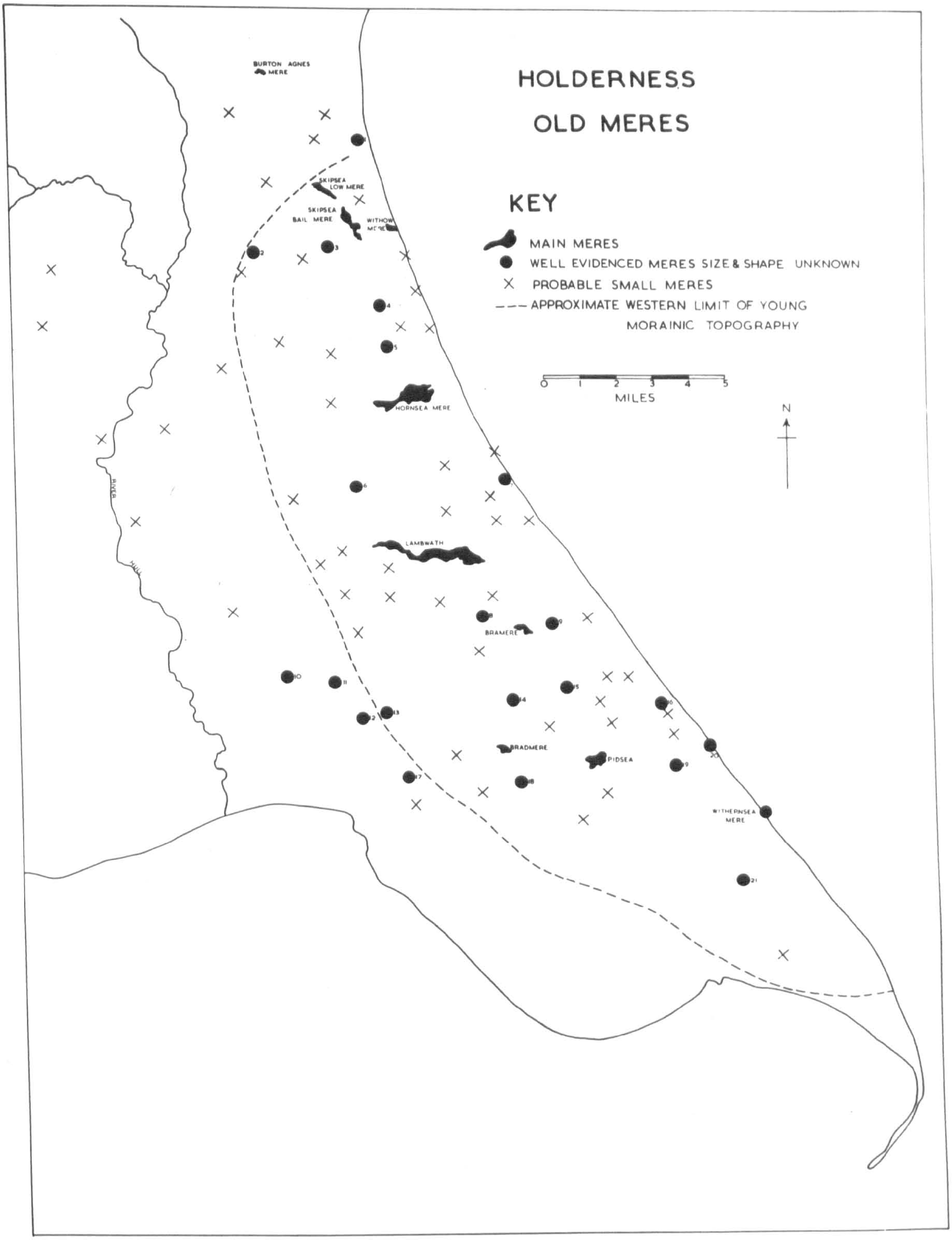

Fig.16. The main meres and well-evidenced meres have at least two types of evidence pointing to their existence. The probable small meres have only one type of evidence to support them, in most cases either geology or place-names. P.T.O. for key to numbers.

with silt are marked on the geological maps,[4] and a number of fields retain names in "mere" or "mar"[5]. That at least some of these meres survived into medieval times is suggested by some references in medieval documents. In 1260, William de Fortibus, Earl of Albemarle, was described as the owner of "four meres and a half, to wit, Lambwath, Skipse, Fwitthouker and Wythornse meres, and a moiety of Piddese mere with fishery through the whole. The other moiety is of the Lord William de Ros with fishery through the whole."[6] Fig. 16 shows some of the meres which may have existed in early medieval times. It is unlikely that many of the larger meres were drained during the medieval period, for (as the above quotation hints) they had some value as fisheries.[7] Fish formed an important part of the diet at a time when days of abstinence were frequent and meat relatively rare. But on the other hand, many of the smaller hollows may have been drained by the improvements in the streams mentioned above. These smaller

(4) Probably only the largest are shown. See C. Reid, Memoirs of the Geological Survey, the Geology of Holderness, 1885.

(5) Shown on O.S. 1st Edition 6" sheets of the area, and the Tithe Maps of the 1840s.

(6) Yorkshire Inquisitions I. Y.A.S.R.S. XII. Fwitthouker can be identified as Whitow Mere in Skipsea, also known as White Hole Carr.

(7) In 1260, "the take of eels" from Withernsea Mere was valued at 6s.8d., and that from Skipsea and Whitow Meres at 10s. In comparison, arable land was worth 4d an acre.

hollows held useless swamps rather than valuable meres, and the disappearance of these would be encouraged. One large mere, the Lambwath, may have disappeared during this period as a result of drainage operations lower down the valley (see pp. 83-85)

The clayland, then, was an area where the easier and more spectacular first stages of reclamation had taken place long previously, leaving to this period only small-scale and more difficult additional improvements.

The Peatlands. Although the Danish settlers of the ninth and tenth centuries probably occupied and made use of many of the boulder-clay islands in the upper Hull valley, it seems likely thatthe peatlands themselves were still in their natural state in 1066. They must have been almost continuously waterlogged and overgrown with a tangle of fen vegetation that would make movement across them exceptionally difficult. The three main routes across the Hull valley used points at which firm land closely approached the river on both banks, at Hull Bridge (north east of Beverley), North Frodingham and Hempholme-Rotsea. The first two used causeways and bridges(8); the latter route approached along an esker and crossed the river by a ferry(9).

(8) Hull Bridge, see Yorkshire Inquisitions I (1287). Y.A.S.R.S. Frodingham Bridge, see C.T. Flower, Public Works in Medieval Law Vol. 2, Seldon Soc. Vol. 40, 1923 CCXIV.

(9) Flower, op. cit. CCXIII (1362).

During the medieval period there was some slight improvement in conditions in the carrs. Various methods were employed. Improvements were almost always carried out by an individual landowner or a monastic community. The success obtained by improvements to the streams acøross the drift may have encouraged interest in the drainage of the carrs, and some small drains may have been cut by individual landowners. For example, Edward III instructed his bailiff in Burstwick in 1340 "that he should cause his demesne lands meadows and pastures and likewise the lands of his tenants within that manor to be drained, which had been drowned by the overflowing of water; and to make a certain trench there, whereby the water might pass away."(10) But larger-scale works were required in the peatlands than on the clay, and most of the medieval improvements of drainage can be attributed to the monks of the Cistercian Abbey of Meaux and the Canons of the Augustinian Priory of Bridlington.

Although new watercourses were initiated as private works, sometime after construction they assumed a public character by being recognised as public drains by the various commissions of sewers appointed for the district. The earlier commissions "de wallis, fossis et seweris" were concerned only with the Humber bank, but a commission of 1367

(10) W. Dugdale, History of Imbanking and Draining, 2nd ed. p.117.

dealt specifically with the drains[11]. It is possible that the 1367 inquisition[12] was the first occasion on which the drainage of the area was seen as a whole. The earlier commissions were directed to follow the local custom, but we are given no indication as to what this was. In 1397 came the first instruction to act "according to the law and custom of this realm, and the custom of Romney Marsh"[13]. Thus, from that date, the commissioners had the aid of a jury of 24 men to decide defects and responsibility, and joint responsibility was assumed for major works which concerned large areas.

Commissions for the area or parts of the area were fairly frequent after 1367, but they were only temporary expedients for enforcing upkeep and repair when this became essential. In 1428 it was realised that more permanent control was needed, and an Act of Parliament appointed the commissions for a fixed time and legalised their powers to tax land for the upkeep of major works. What were more or less permanent commissions were therefore responsible for the draining of the area until the 1532 Act which set up the permanent Courts of Sewers.

Fig. 17 shows the drains recognised by the 1367

(11) W. Dugdale, op. cit.

(12) Poulson, op. cit.

(13) W. Dugdale, op. cit.

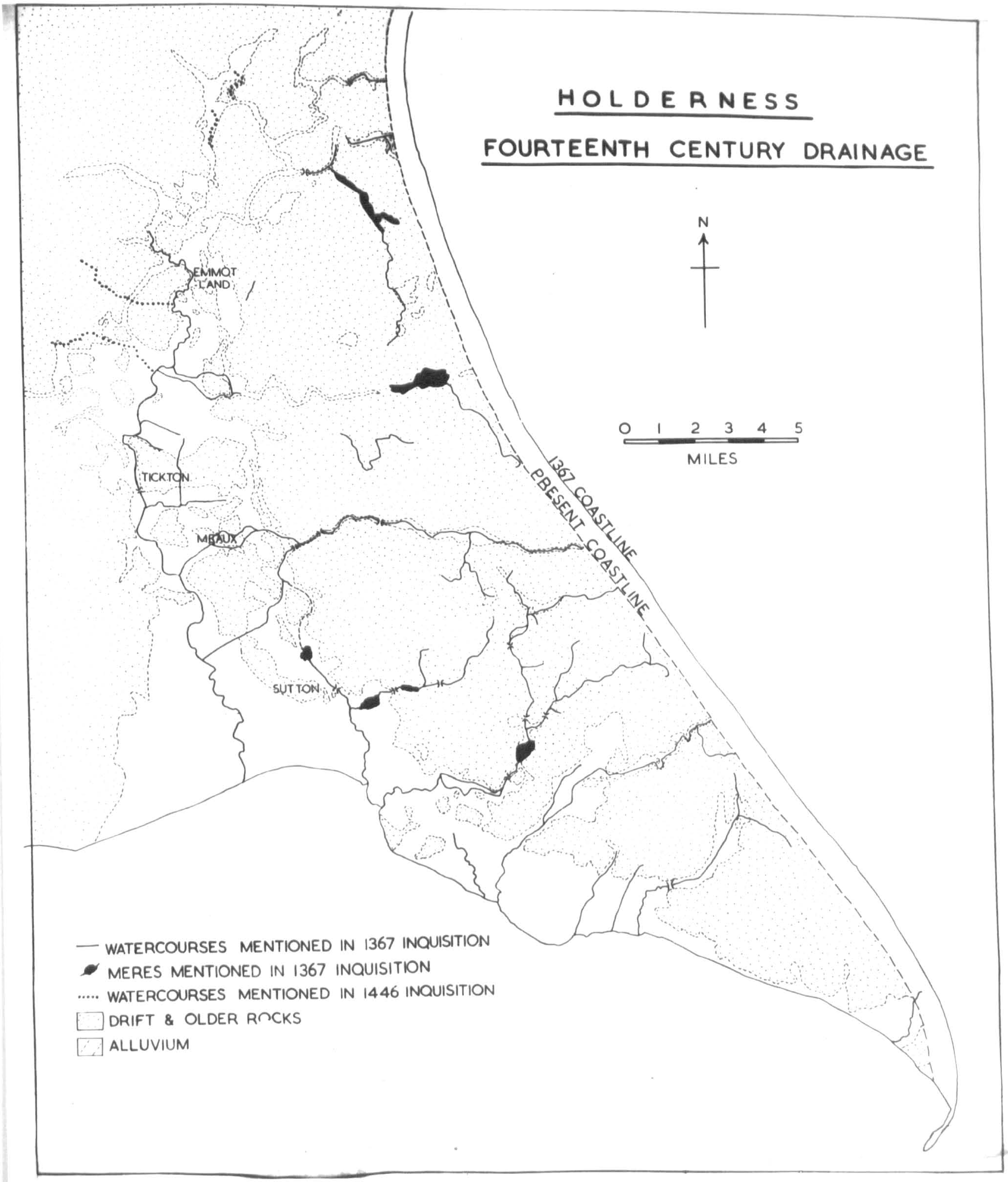

Fig.17. the pecked line represents a course mentioned in the Meaux Chronicle but not in the Inquisition. Many other watercourses must also have been omitted from the Inquisition, as is suggested by the isolated stretches of stream in the north.

inquisition for the wapentake of Holderness, and a 1446 inquisition for parts of Bainton Beacon(14). Unfortunately the inquisitions have a number of limitations:- a) The descriptions of the drains are very general, usually of the type "a sewer from A. to B.", so that it is difficult to be certain of the detailed course. b) Not all the places mentioned can be identified, although the field-names extracted from Tithe Maps have proved useful in locating some obscure place-names. c) The transcriber must have had difficulty in reading the original, and leaves gaps in his manuscript. He also seems to have spelt other names incorrectly. The general pattern which emerges from a study of these inquisitions, however, is probably fairly accurate for the carrlands of the Hull valley. A comparison of Fig. 17 and Fig. 12 suggests that there had been considerable changes in the drainage pattern of this area by the end of the fourteenth century.

The valley may be divided into three parts for detailed consideration: north of Emmotland (= river confluence) which stands at the junction of the Driffield and Frodingham Becks; between Emmotland and the large boulder-clay island of Tickton and Routh; and between that island and Sutton.

The section north of Emmotland already showed the

(14) In E.R.R.O.

imprint of the Danes. The inquisitions show no additional changes in the area, but since details are so scanty this cannot be taken as evidence that there was no medieval drainage activity. It is possible that some drains such as the large White dike may have been cut or enlarged at this time, although there are no records of this activity. Between Emmotland and Tickton lie the most extensive of the peatlands. The inquisitions revealed there a few unconnected new watercourses. Most of these were cut by either the canons of Bridlington or the monks of Meaux. An area near the Islands of Burshill and Hallytreeholme was given to the canons of Bridlington bythe ancestors of John of Oketon some time before 1272. John's confirmation of this grant included the right "to make a trench in the said marsh, between his part and theirs, but it is to be made in their part ....."(15). It is not clear whether this was a drain or merely a boundary ditch, but the latter seems most likely. That some drainage of this area can be attributed to the canons, however, seems likely from a later grant by Thomas de Bristil. He gave "a certain small piece of his land to make a fosse; namely which lies on the north side of the vill of Bristhil, next to the fosse called

(15) T.W. Lancaster. Abstract of the Charters and other Documents contained in the Chartulary of the Priory of Bridlington. 1912, p.305

Thorholmdik, and extends from the place called Landsik as far as the head of the fosse of Witheland towards Bristil, and contains in length 13 perches and 14 feet in width"[16]

Between 1210 and 1220, the monks of Meaux were granted the right to cut a dike 20 feet wide between Brandesburton and Heigholme, apparently principally for navigation purposes.[17] Between 1249 and 1269 they also cut a dike in Skerne on the west side of the valley[18] for the same reason. In both cases the dikes provided a means of communication between granges of the abbey situated near the margins of the valley and the river Hull. The products of the granges could in this way be carried relatively easily to the main house. But although these cuts were made for navigation purposes, they must also have functioned as drainage channels. The other two shorter dikes shown just north of Tickton were probably enlarged boundary ditches.

(16) Ibid. p. 306

(17) Chronica Monasterii de Melsa. Rerum Britannicarum Medii Aevi Scriptores. Vol. I p.365. "Praescripto autem Herbertus de Sancto Quintino concessit nobis ut faceremus unum fossatum XX pedum in latitudine pro divisa in marisco quod est inter Burtonem et Hayholmum, videlicet ab Arnhow usque in Hullum, et ut terram faceremus ex utraque parte fossati; ita tamen quod nos aquam intra dictum fossatum liberam ad nostrum proprium usum haberemus, tam ad piscandum quam ad portandum ea quae necessaria sunt nobis, et ad caetera aisiamenta nostra".

(18) Ibid. Vol. II p.110

In the middle section of the carrs, therefore, there were some marked changes in medieval times, but in the section of the valley between Tickton and Sutton the changes were on a larger scale. Fuller details of the dates and methods employed are also available. Much of the change in this southern section was the work of the monks of Meaux, whose abbey stood on an island in the midst of the marshes, and the Meaux Chronicle gives details of the works. Other drains were cut by the nuns of Swine nunnery and the Lords of the Manor of Sutton; again we learn of these principally through the Chronicle.

Fig. 18 shows in detail some of the works carried out by the monks in this area. Their greatest concern was with the lower course of the Lambwath, below the point where it leaves its well-defined valley in the clay at Benningholme. The Chronicle explains how, before the monks cut their new drains, the stream flowed south to Fairholme and Waġne carrs(19). Between 1210 and 1220, the monks made an agreement with the free tenants of Arnold, Rowton and Benningholme, and with the nuns of Swine, which gave them the right to cut a dike from the Lambwath between Arnold and

(19) Ibid. Vol. I p.356 "ipsa aqua, quae currit de Lambwath inter Est Benyngholmum et West Benyngholmum, per grangiam ipsarum monialum de Fayrholmo totaliter descendebat ad mariscum de Waghna".

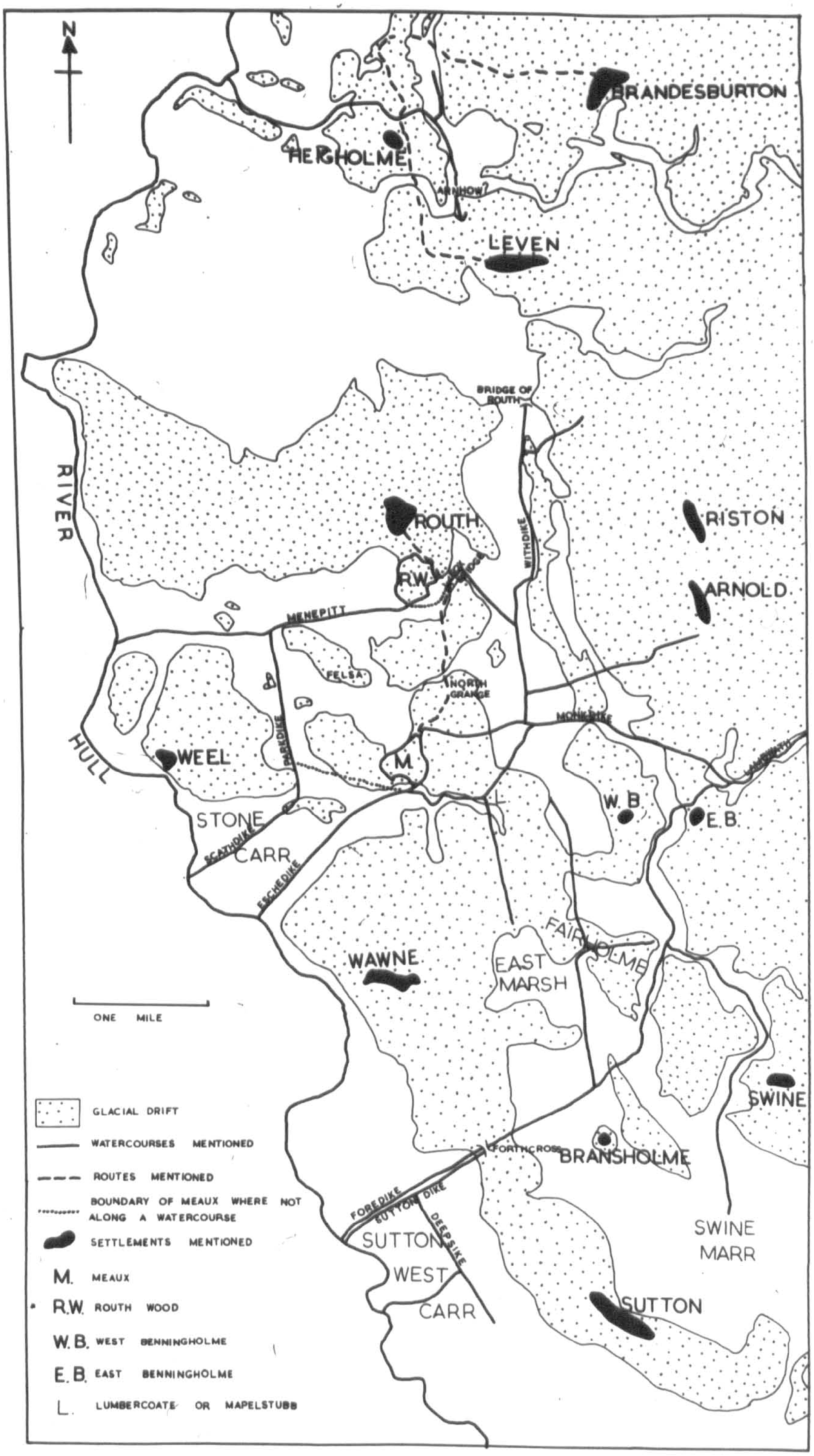

Fig.18. The Medieval drains near Meaux Abbey, according to the Chronicle of the Abbey.

Benningholme to their abbey at Meaux. The aim of this alteration was obviously not improved drainage, for by diverting the stream through their land they were increasing the liability to waterlogging. The intention was rather to provide first, a navigable channel, and second, power for the watermills of the abbey. The agreement specified that the monks could have vessels on the 20 ft. wide dike, and could use either bank for towing[20], and there was to be an equal division of water between the old and new channels.[21] The new dike, known as Monkdike, linked up with the earlier constructed Withdike (1197-1210) and part of the waters flowed through the abbey buildings themselves. Between the abbey and the river Hull, the monks had previously constructed Eschedike for navigation purposes[22]. Monkdike joined this and no doubt made it more useful in dry seasons. A watermill was originally situated close to the abbey itself, but the Chronicle records that this went out of use owing to the failure of the water supply[23]. The water probably preferred

(20) Melsa Vol. I p. 354

(21) Ibid. p. 354. The monks paid the nuns of Swine 20 marks for this right.

(22) Ibid. p.160 1160 - 1132.

(23) Ibid. Vol. II p.82. "unde et accidit ut ipsum molendinum infra abbatiam postea ob defectum aquarum ad nihilum deveniret."

the lower course to the south of the abbey lands. Thus, between 1249 and 1269, a new mill was built near the junction of Eschedike with the Hull so that "aquae praedictae, per dictum Eschedyk descendentes, alibi quam per dicta molendina super Hullo declinare non valerent" (24). The Chronicler tells us that by the time he was writing (early fifteenth century), no land water was coming down the channel in summer. Therefore water from the Hull had to be allowed to run back into Eschedike, leading to its silting and a considerable expense in regular removal of this silt. A sluice or clow had been fixed at the mouth of Eschedike by the fifteenth century to control the inflow of Hull water.(25)

This northern outlet for the Lambwath was constructed therefore for purposes other than drainage. But it seems likely that before long it developed valuable drainage functions as a result of its great size. Certainly it was regarded as a major drain by 1367(26) and it seems to have led to the disappearance of Lambwath mere between 1260 and 1400(27).

(24) Ibid. p.83

(25) Ibid. p.83

(26) The monks were required to repair Monkdike. Ibid Vol. III p.165.

(27) Yorkshire Inquisitions I, Y.A.S.R.S. XII. The 1260 inquisition shows the mere in existence. The report by William Wendover that by his time the stream did not flow in summer must suggest the disappearance of this reservoir by then.

The southern branch of the Lambwath was reported in 1210 - 1220 to pass from Waione marsh through Forthdike into the Hull, but Forthdike was cut between 1221 and 1235. This may indicate that the new dike followed an older one, perhaps a fence dike in view of the fact that Forthdike followed the Wawne - Sutton boundary. Forthdike was to be 16 feet wide and 6 feet deep, and again appears to have been constructed at least partly for navigational purposes. For example, the Chronicle states, concerning the bridges that the monks were to have over the dike for reaching their land in Sutton on the south side, "Qui pontes ita in altum erigerentur ut naviculae sine rostris subtus eos transire possent"(28). Parallel to Forthdike on the south side, Sayer of Sutton agreed to cut a 10 ft. ditch which was probably intended to act as a drain for the land in Sutton West Carr. Forthdike was also used by the monks to drive a mill, and a clow was made at the junction with the Hull "ad recipiendam aquam de Hullo, et alteram ad superius caput stagni ipsius ad aquam de Hullo retinendam, ne in mariscos, turbarias vel prata de Waghna vel de Suttona ad nocumentum excederet."(29) Thus the drainage function of this dike was recognised, even if it were not the main reason for its construction.

(28) Melsa Vol. I p.409

(29) Ibid. p.410

The Chronicle gives less information about the other dikes, only mentioning their existence. Probably Menepitt, Parkdike and Scathdike were originally boundary ditches; Parkdike was in existence when the monks received the land of Melsa in 1150. The dike from the field of Arnold to Withdike was probably for drainage only, and so too were the dikes in Sutton West Carr. Between 1249 and 1269, Sayer of Sutton gave the monks the northern part of West Carr to hold in severalty, with the right to use the land as they wished, and to impound any animals which wandered onto their land from the adjoining common pasture.(30) A dike was cut round the land, which was used for pasture and came to be known as Magnusdale. The dike was neglected after a while, so that Sutton flocks depastured there as on the Suttonlands. The dike had to be recut between 1372 and 1396 so that the monks could once again enforce their claimto several pasture.

Taken as a whole, therefore, it would appear that most of the watercourses across the peatlands were cut for purposes other than drainage. The importance of providing navigable channels was very great when few other means of crossing the carrs were available. It was Meaux abbey which had the greatest need of contact with the margins

(30). Ibid. Vol. II p.85

of the valley at various points for it had developed an exchange economy, and needed to be able to transport the products of its various granges to the mother house. Other communities were more self-sufficient and therefore had less need for such links. The influence of navigation interests was such as to give rise to an approximately east - west pattern of artificial watercourses, linking the margins of the valley as directly as possible with the Hull. This is not the direction which would have been chosen were drainage the main interest. These straight wide channels, however, inevitably had an influence on drainage by carrying the water off the carrs more rapidly, and in time they came to be regarded as more important for their drainage function than as navigable channels. The indirect and unplanned effect of these watercourses on the carrs may have been to dry them out for several weeks in the year. Thus during Medieval times more and more uses were probably found for the peatlands. They probably provided peat, reeds, fish andwild fowl in all parts, but in the parts belonging to Meaux abbey, and in adjacent areas which benefitted from their watercourses and their example, they also became important sources of summer pasture. Meaux, like all Cistercian foundations, was interested in large-scale sheep farming, and the monks found the carrs provided suitable summer pasture for the sheep. They also owned many strips in the open-fields of surrounding villages, and probably pastured their sheep there most of the year, but drove them to the carrs in summer[31].

The monks did not have a completely free hand in the carrs, for in theory at least all these lands were allocated to a township. Outside Meaux itself, the abbey's right to pasture sheep in the carrs came with gifts of land in the open fields of the townships. Probably the abbey's policy awakened the villagers to the possibilities inherent in the carrs, and they increased their stock there too. As a result, there must have developed a tendency to overstock the pastures, a problem solved by the institution of stinting. A stint was the fixed number of livestock allowed to be kept on the pasture of a township in proportion to the amount of arable land held. The Chronicle gives two accounts of stints. Between 1221 and 1235, Wawne pasture was stinted at 15 cattle or horses, 20 sheep and 2 pigs (or 8 sheep) for each bovate in Wawne fields[32]. In 1269 or 1270, it was decided that each bovate in Sutton should be allowed 20 cattle or horses, 100 sheep, 4 pigs and 10 birds on the pasture, while each cottager might have 4 cattle or horses, 30 sheep,

(31) For further details see P.B. Atkinson, Medieval Farming in East Yorkshire, to be published by the East Yorkshire Local History Society in the near future.

(32) Melsa Vol. I p.310

2 pigs and 5 birds.[33] The higher ratio of sheep in the second stint may represent an increase in the importance of sheep. There is no doubt that by this time Meaux abbey was keeping a very large flock of sheep in this area; Miss Atkinson considers that there may have been as many as 2,000.

This area where the carrs were extensively exploited seems, however, to have been the exception. The southern carrs dried out more quickly than those further north, especially after the monks cut their watercourses. Elsewhere the peatlands must have remained desolate watery wastes for most of the year.

<u>The Siltlands.</u> In 1086 the claylands were fairly completely occupied, and the peatlands almost empty and unused. The siltlands would appear to have been in a class between the other two. In addition to the place-name evidence, which suggests some earlier settlement, the Domesday Book records the existence in 1086 of the silt hamlets of Tharlesthorpe, Drypool, Marfleet, Myton and Southcotes. But the 200 years following the conquest was probably the greatest period of reclamation in the region.

The Humber coastline has changed so greatly in the intervening years that it is difficult to know what was the extent of siltland in medieval times. In Fig. 19 it

(33) Ibid. Vol. II p.141

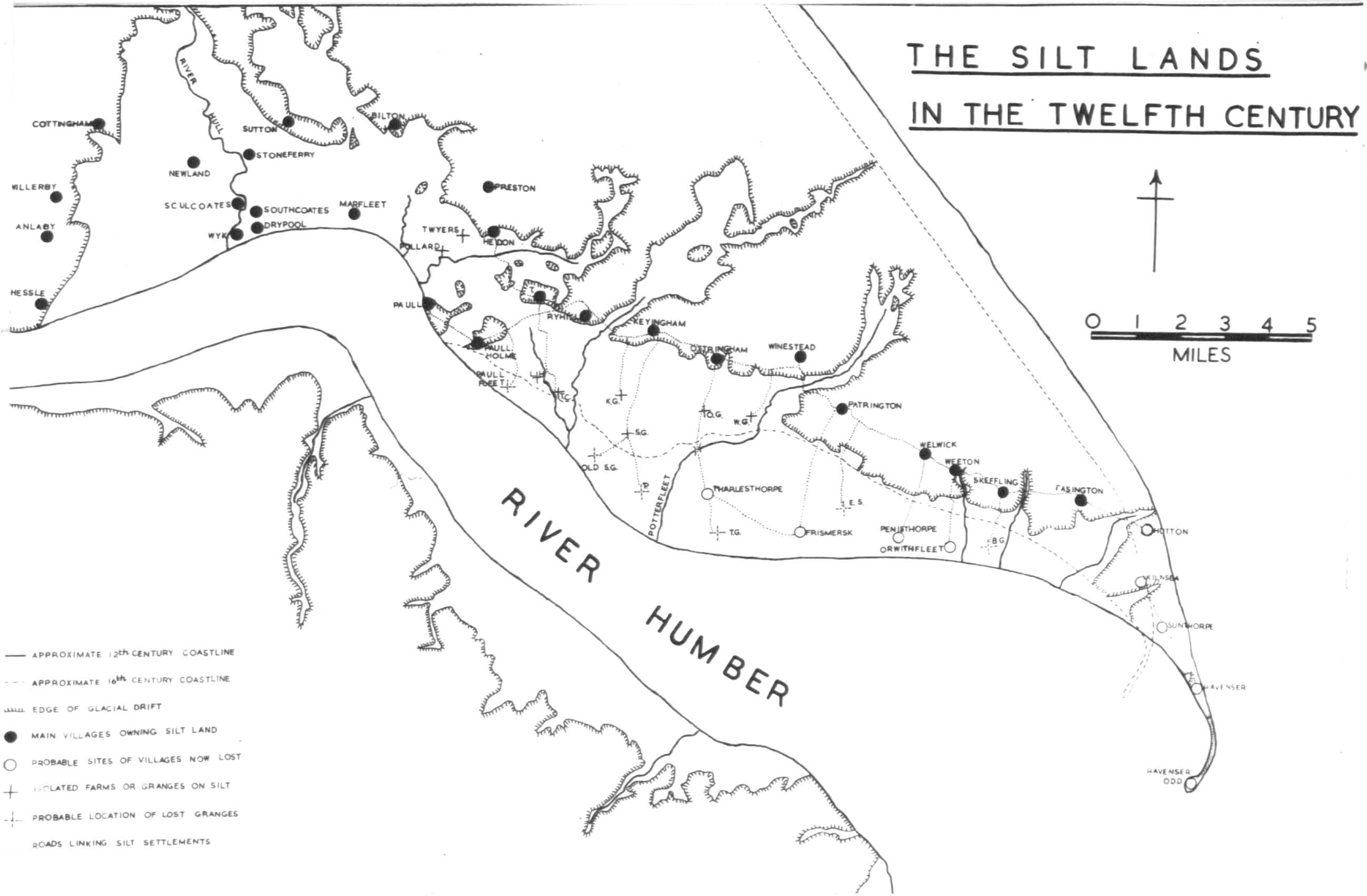

Fig.19
L.H.-Little Humber;T.C.-Thorneycrofts;K.G.-Keyingham Grange;S.G.-Salthaugh Grange;P.-Pethyland;O.G.-Ottringham Grange;W.G.-Winestead Grange;T.G.-Tharlesthorpe Grange; E.S.-East Somerte;B.G.-Burstall Garth.

has been shown as relatively similar to the present coastline, for it seems that at both dates the conditions influencing silting were similar. The name Sunk Island is also suggestive; it is derived from the old sand-bank which was known as Sunk lands, which surely indicates that the medieval reclaimed silt land extended that far. It would appear that Danish and Medieval settlement on and reclamation of the silt coincided with a period when Spurn Head was long, and allowed silt to accumulate in its shelter. Saltmarsh vegetation grew on this and raised the level further until only high spring tides covered the area.

The Danish settlements on the silts which are recorded in the Domesday Book were mostly hamlets or small villages, probably offshoots from nearby larger settlements on the same pattern as the villages of the Lincolnshire marshes. Other similar hamlets, such as Frismarsh, may have been in existence by 1086, but escaped mention through being included under the parent settlement. These villages or hamlets were no doubt situated on the higher parts of the silt, and gradually enclosed and reclaimed areas of saltmarsh round them. In the years following 1086, a new type of settlement joined in this reclamation, granges or large isolated farms. Under this system, the land belonged to an individual or religious community, and was cultivated or cared for by unfree labour or lay brethren.

The field system differed from that of the villages in that the arable was not divided into strips. Instead a system of rectangular enclosed fields developed much earlier than in the open-field villages, and this gives some clue to the location of the granges.

The granges of the Humberside area belonged to two main owners; first, the abbey of Meaux, which held Salthaugh, Ottringham and Tharlesthorpe Granges and land in Frismarsh, Orwithfleet and Pensthorpe; second, the Earls of Albemarle, Lords of Holderness, who held Little Humber and Keyingham Granges. Some land in Ottringham belonged to Bridlington Priory, and at Burstall Garth there was a Benedictine cell. It is not known who owned and developed Winestead Grange, Thorney Crofts, Pollard and Twyers.

The procedure in reclamation must have been, first, to build an embankment round an area of saltmarsh. The land would then probably be used for pasture for several years, after which it might be turned over to arable. The streams would probably continue to follow their natural channels to the Humber, but to improve the drainage of the intervening stretches a number of field drains would need to be cut.

Some inquisitions of the thirteenth and fourteenth centuries reveal the use to which the siltlands were then being put;

Little Humber	460 acres arable	102½ acres meadow	pasture for 30 oxen and 100 sheep
Keyingham Marsh	459 " "	226 acres meadow	pasture for 22 oxen and ----sheep
Salthaugh	234 " "	53 acres meadow	no figures
Tharlesthorpe	250 " "	166 acres meadow	" "
" (later)	321 " "	100 acres meadow	152 acres pasture.

These figures suggest that it was the arable proportion of the land which was most valued. Little Humber had a fallow every alternate year, and Keyingham Marsh one year in three.(34) Yet the following comparable figures for some villages on the boulder clay suggest that meadow was more important on the silts than further inland:

Rowton	152 acres arable	29 acres meadow
Routh	150 " "	33 " "
Ridgemont	240 " "	102½ " "

The meadow no doubt proved an important source of winter feed, and was particularly valuable in the monks' pastoral economy.

The inquisitions also suggest that both the arable land

(34) Yorkshire Inquisitions I. Y.A.S.R.S. XII. Melsa, op. cit, appendix VI.

and the meadow land on the silt were valued more highly than that on the glacial drift. The inquisitions quoted in the Meaux Chronicle appendix VI give the following values:-

Arable.	Silt areas:-	Tharlesthorpe and Salthaugh 4s 6d. per acre, Frismarsh 4s., Drypool 2s 6d.
	Clay areas:-	Grimston and Hornsea Burton 2s., Ottringham 2s.
Meadow.	Silt areas:-	Tharlesthorpe and Salthaugh 4s 6d., Ottringham and Withfleet 4s.
	Clay areas:-	No details.

The 1260 inquisition gives the following values:-

Arable.	Silt areas:-	Little Humber 12d. per acre, Keyingham Marsh 4d.
	Clay areas:-	Kilnsea 5d., Easington 5d., Cleton 4d., Withernsea 4d.
Meadow.	Silt areas:-	Little Humber 9d., Keyingham Marsh 9d.,
	Clay areas:-	Cleton 8d., Skeffling 8d., Withernsea 8d Easington 6d., Kilnsea 10d.

Although these figures are not entirely consistent, they suggest that the siltlands were more highly valued than the claylands. This is not surprising, for the silt contained a higher proportion of particles of fine sand and must have proved easier to plough than the stickier boulder-clays. If the silt resembled the present Warplands, it would also have been extremely fertile.

The siltlands around the lower Hull had a rather different development. The settlement there was essentially in hamlets, of which several grew up in the medieval period e.g. Newland(35), Sculcoates(36), and Stoneferry(37). The development of the area was linked with the use of the navigable waterway provided by the river Hull(38), and the growth of the port of Kingston-upon-Hull. The monks of Meaux originally held Wyk, the site of the town. This was on the east side of the old river Hull. Later (Frost suggests that it was during the great storm of 1256) the old course was abandoned in favour of Sayer Creek to the east. This was perhaps an old drain cut by Sayer, Lord of Sutton. In 1299 the port of Wyk was granted a charter by Edward I and became known as Kingston-upon-Hull(39).

The growth of the town of Hull brought with it a problem that must have troubled many of the silt settlements. Where was it to obtain a supply of fresh water? The water of the river Hull was polluted by the salt water which flowed up it twice a day. It was therefore decided to carry water

(35) First mentioned in Melsa, op. cit. 1150 - 60

(36) First mentioned in the 12th century as a personal name.

(37) First mentioned in a 1349 inquisition post mortem.

(38) But the navigable water-way to Beverley was only 24ft. wide until 1297. C. Frost, Notices relative to the Early History of the Town and Port of Hull, 1827, Ch.VII, p.130

(39) For the history of the growth of the port, see G. de Boer, The Growth of Kingston-upon-Hull. Geography 1946.

along a dike from springs at the foot of the Wolds to the west. There were already a number of dikes cut principally for drainage purposes across the land west of the Hull, e.g. the Meaux Chronicle tells how William de Stuteville and Benedictus de Soulcoates made a great drain across Cottingham marsh between 1160 and 1182(40). The new fresh-water dike followed an old drainage channel for part of the way(41). The construction of this dike gave rise to two main complaints; first, it led to flooding of the lands along its course and complaints by the townships of Anlaby, Swanland, Hessle and Ferriby which owned these lands, e.g. in 1412(42); second, the people of Hessle complained that they lost the benefit of the fresh-water which had apparently previously flowed that way, and without the scour of this water, their haven was becoming silted up(43). Nevertheless, Hull continued to draw its water along Julian dike from the springs of Anlaby and Haltemprice, and even now, one of the city waterworks is situated there. The pattern of drainage of this part of Holderness is revealed by a map in the British Museum, about

(40) Melsa, Vol. I p.168. This is probably the drain now known as Setting Dike.

(41) Dugdale, op.cit. 3 Henry IV (1402)

(42) Ibid.

(43) Inquisition, 50 Ed. III (1376). From manuscript notes on Hull Water-Supply in Wilson-Barkworth Collection, Hull City Reference Library.

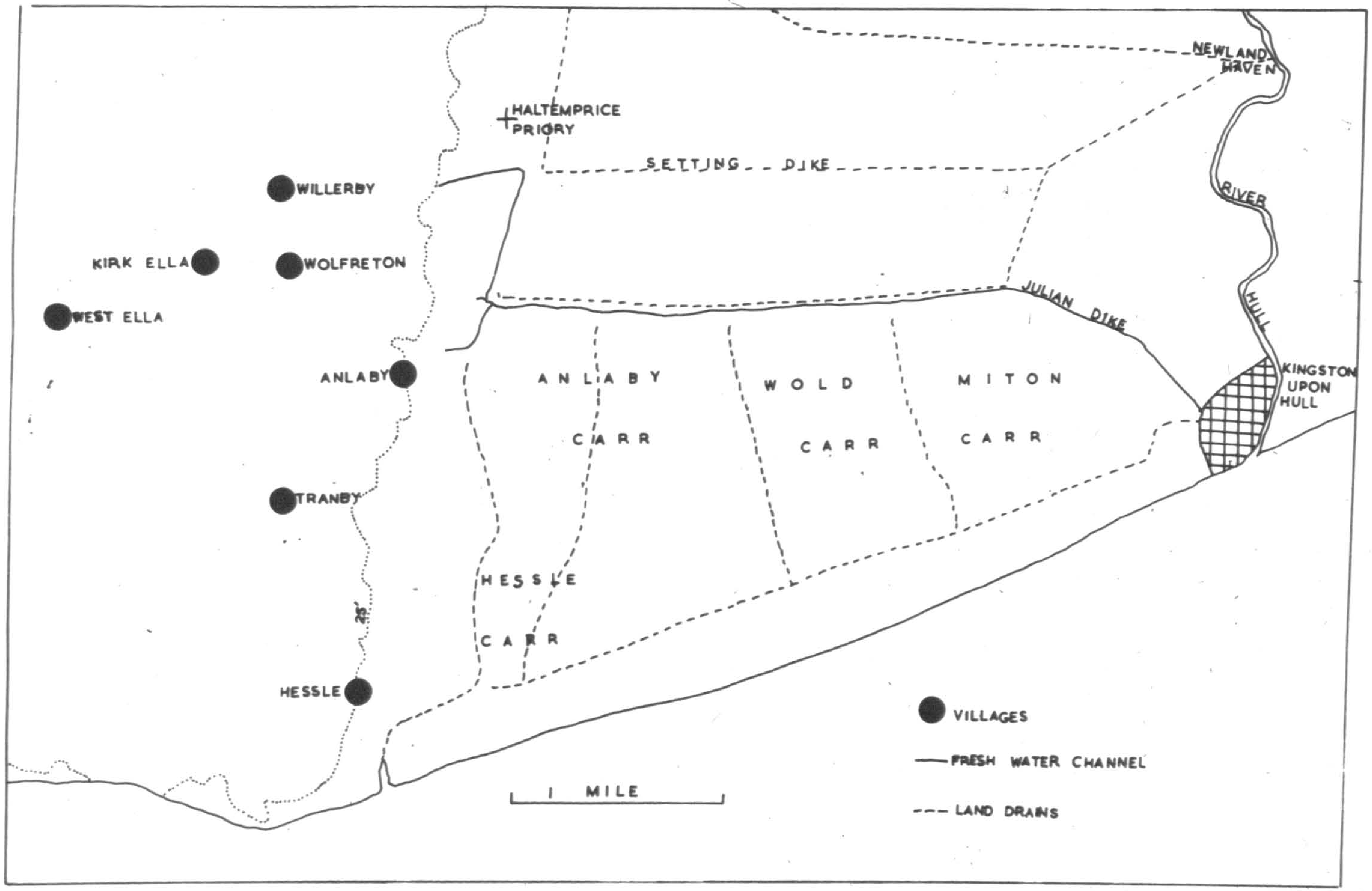

Fig.20. Hull's water-supply.Julian Dike and the land drains of Hullshire about 1500.

fifteenth century in date. Fig. 20 is based on this.

The earlier medieval period, then, was essentially one of reclamation of the siltlands. Following this came a period when much of the land was lost. The writer of the Meaux Chronicle attributes the beginning of the losses to the great flood of 1265[44]. In that year, the Humber waters flooded as far inland as Cottingham, and the abbey lost land at Myton, Salthaugh, and Orwithfleet.

The flooding and the loss of land which followed suggest some major change in the estuary. A great tidal surge no doubt developed in 1256, similar to that on Feb. 1st 1953. This storm surge probably breached Spurn Head near its junction with Holderness, and subsequent tidal scour must have enlarged this breach. Various contemporary records illustrate the change. Meaux abbey owned property in Ravenser and Ravenser Odd, and from the description of these in the Chronicle, it is clear that whereas Ravenser (or Old Ravenser as it was sometimes called) was on the mainland of Holderness, Odd was at the tip of Spurn Head: "Ipsa autem villa de Ravensere Odd ...... in ultimis finibus de Holdernesse, inter aquas maris et Humbriae consistens, a firma terra per

(44) Melsa, Vol. II p.91. "Post ipsam vero inundationem, per processum temporis, postea actum est quod ipsae terrae nostrae prope Humbriam de Tharlesthorpia, Orwythfleet et Saltaghe, per inundationem ipsius Humbriae paulatim decreverunt".

spatium unius milliaris et amplius distabat. Ad cujus aditum ab antiquo de Ald Ravensere via patebat arenosa, lapidibus rotundis et flavis conspersa, ab altitudine VXX parumpter exalta, latitudinem quantum arcus VXX jacere potest VXX habens, redundationes maris ab ejus parte orientali et reverberationes Humbriae a parte occidentali mirabiliter tolerabat" (45). This description probably refers to conditions before 1256. In 1275, it was said that Odd was built 40 years earlier, i.e.before the storm, although it was then (1275) an island.(46) The migration of the shingle led to the chapel of Ravenser Odd being washed away between 1349 and 1353, while between 1356 and 1367 the whole town was lost: "Hiis autem diebus, tota villa de Ravensere Odd ...... per fluctus Humbriae et inundationes magni maris totaliter annullabatur." (47)

As the shingle migrated, the reclaimed silt-lands along the lower Humber were exposed to attacking waves with a greater fetch, and it is also possible that the tidal range was increased. In 1357, the King was informed "that the tides in the river Humber and Hull did then rise higher by four feet than they were wont to do." (48) In order to strengthen and improve the Humber banks against the floods,

(45) Melsa, Vol. III p.120. (1356-1367)

(46) Hundred Rolls, Vol. I p.292

(47) Melsa, Vol. III. p.120

(48) Dugdale, op. cit.

many commissions were appointed from 1285 onwards. The 1295 patent states: "The King, being informed that both his own lands and the lands of divers of his good subjects were being drowned, for want of repairing certain banks in Holderness, on which the violence of the river Humber had made sundry breaches, assigned Thomas de Normanville to take a view of them and see them speedily amended".(49) The greatest losses of land were between Paull and Ravensere. The land west of Paull was more protected owing to the change in orientation of the Humber, but there was some flooding(50) and this section of coast was included in the area whose banks were improved by commissioners. Between 1353 and 1356, the abbey grange at Tharlesthorpe was so badly attacked that new defenses had to be made. The monks tried to organise a concerted effort to build new banks on the part of all those whose lands were threatened, but each person was too anxious to protect his own land, and left the monks to attempt to defend their advanced position for themselves.(51) There was therefore for a time a double system of defense, the outer bank repaired by the monks, and the new inner bank built by others. Between 1372 and 1396, more land was lost, and the monks decided to move the grange buildings to new

(49) Ibid.

(50) The Meaux Chronicle records the loss of 6 acres at Drypool. Melsa, Vol. III p. 284.

(51) Ibid, p.102

sites in their lands in Keyingham and Ottringham. By 1399, the abbey lands in Tharlesthorpe had been completely lost. Between 1372, and 1396, Salthaugh grange was flooded as a result of two breaches in the banks. These were repaired, but the salt water ruined the land for a long time.(52)

There are fewer details of losses of land held by others in the area. In 1344, Frismarsh (or Frismersk) petitioned the king for a reduction in their assessment for lay subsidies, on account of their losses of land.(53) This was granted. The loss of land appears to have been greatest during the fourteenth century, probably at the time when the shingle had migrated sufficiently to expose the silts to the attacking waves direct from the North Sea. But losses continued until well into the sixteenth century. Tharlesthorpe was still mentioned in 1449 and 1544, although the references were probably only to small remaining portions of the village lands; the same applies to references to Frismersk in 1544 and Penisthorpe in 1547.(54) During the same period, Sunthorpe disappeared by normal coastal erosion; it was last mentioned in 1609.(55) Fig. 19 shows the furthest limit of

(52) Ibid. p.183

(53) Dugdale, op. cit.

(54) All in Feet of Fines, Y.A.S.R.S.

(55) Feet of Fines.

loss of land, although this coastline was probably not attained until after 1532. It can be plotted fairly accurately from the 1:25,000 O.S. sheets and the Tithe Maps, according to the distribution of field-names and patterns. New fields are often called "Growths" or "Groves", and the dividing line is frequently marked by a drain known as "Pent Drain".

The three different types of land in Holderness must therefore have shown rather more striking differences to the casual observer in medieval times than they do today. The claylands were an area of compact villages, open fields, a few woods, meres and sluggish streams; the siltlands had more isolated farms (the granges) with some hamlets or villages, few trees and a pattern of dikes and banks; the peatlands were waterlogged tangles of fen vegetation crossed by a few ditches and navigable channels, with here and there sheep and cattle depasturing in summer. A further indication of the comparative values of these different types of land is provided by the 1297 Lay Subsidy, the details of which survive for the wapentakes of Holderness and Dickering.(56) These details have been plotted in Fig. 21. The township boundaries are taken from Greenwood's map of Yorkshire, 1822, the earliest map of the county on which they are shown; in some cases, the combining of figures in the subsidy has meant

(56) Y.A.S.R.S.XVI. (1894) ed. W. Brown

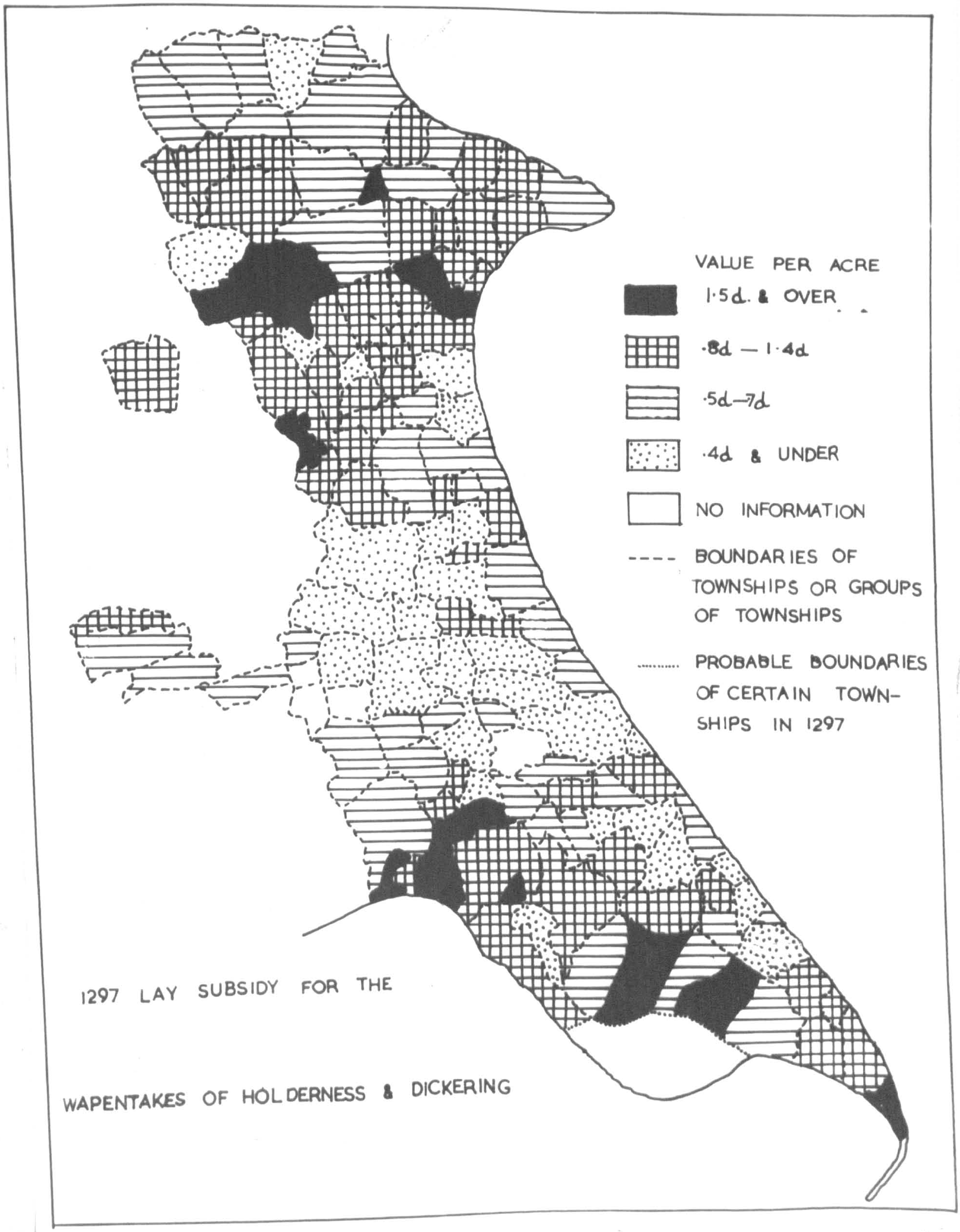
VALUE PER ACRE
1·5d. & OVER
·8d — 1·4d
·5d–7d
·4d & UNDER
NO INFORMATION
BOUNDARIES OF TOWNSHIPS OR GROUPS OF TOWNSHIPS
PROBABLE BOUNDARIES OF CERTAIN TOWNSHIPS IN 1297
1297 LAY SUBSIDY FOR THE
WAPENTAKES OF HOLDERNESS & DICKERING

Fig. 21

that two or more townships have been combined on the map. The figures for township areas were taken from the 1841 census returns, and the coastal townships have had added to this figure the probably area lost since 1297. Figures for Frismersk, Tharlesthorpe etc. could not be plotted, as the area of these townships is not known.(57)

The map reveals:-

a) The high value of several of the silt settlements.

b) The high value of a zone of clay and gravel land in the north between the Wolds and Holderness proper.

c) The low value of a group of townships in middle Holderness, mostly along the river Hull and the Lambwath. Some of these include carrs, which would lower the average value, and in others the value may be lowered by the exclusion of monastic holdings.

d) The equal or greater value of parts of the driftless Wolds compared with the clay lands of Holderness.

This suggests that the general rating of value of land was: silt, some clay and gravels, chalk and most clays, peat.

The reclamation work of the 150 years following the conquest had contributed greatly to this grading. As a period of reclamation activity, it was not to be matched for another 550 years. This period of activity appears to have come to

(57) The Frismersk assessment was greater than that for any other local township except Ravenser Odd and Hedon, both ports.

an end between about 1300 and 1350, just as in other parts of the country. The lack of further reclamation of silt land after this date appears in this case to be most closely linked with changes in the Humber, and subsequent loss of land. All attention was diverted to the endeavour to retain the land already reclaimed rather than to take in further areas. In the peatlands, improvement seems to have been chiefly an indirect result of the cutting of navigation channels, and once a system had been evolved which met the navigation requirements of Meaux abbey, there was little incentive to extend it. There is no direct indication of the influence of the Black Death on reclamation, although it is clear from the Meaux Chronicle that it affected the area badly. The abbey appears to have lost its zeal for improvement about that time, and we may assume a connection with the decline in reclamation.

There may have been some small improvements undertaken between 1350 and 1532, for the later records of the Court of Sewers reveal a number of drains whose date of origin we do not know, and which may well have been cut during this period. Very few records concerning drainage in later medieval times have survived. In 1386, however, a Commission was appointed "to enquire relative to a certain ditch newly made, impeding at Rosse and Burton Pydese the course of divers brooks", a small indication of the type of activity which was probably taking place. This seems to have been a period of slow transformation, therefore, between the medieval conditions described in this chapter, and the seventeenth century conditions considered in Chapter V.

Chapter V. The Peatlands of the Hull Valley. 1532 - 1760

The Court of Sewers. The year 1532 marked a change in drainage administration. In that year the Court of Sewers was established, and this was to remain responsible for the drainage for at least part of the district for another four centuries. The Commissioners were appointed for a set period of time, at first three years, but extended to ten years in 1571(1). The Hull valley and Holderness had two Courts and two sets of Commissioners. Most of the region was under the jurisdiction of the Court of Sewers for the East Parts of the East Riding of Yorkshire(2), leaving only a few square miles near Hull under the separate Court for Hullshire. The creation of a separate authority for such a small area was probably the result of conflicting interests there between land drainage and water-supply to the city.

The Courts for the East and West parts of the Riding seem to have had close contact prior to 1686 and apparently acted at times as one body. The 1660 pains for both areas are written into one book, and the earliest extant minute-book contains details relating to both. But the Wolds form a

(1) S. & B. Webb, English Local Government: Statutory Authorities for Special Purposes. pp. 13-106, The Court of Sewers.

(2) For details of organisation, see S.G.E. Lythe, The Court of Sewers for the East Parts of the East Riding, Y.A.J. 1939 pp. 11-24.

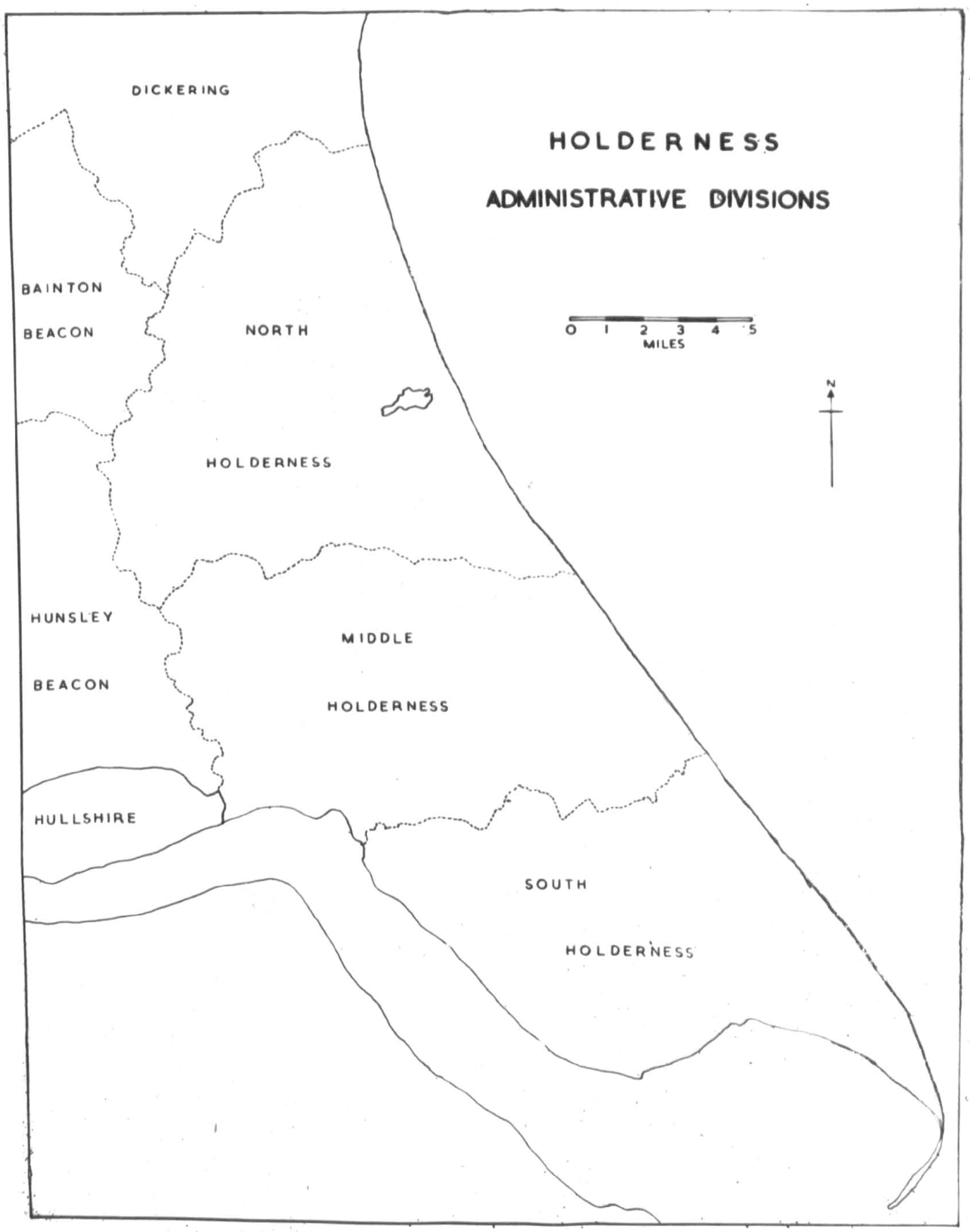

Fig. 22. The Divisions under the Courts of Sewers. Hullshire had its own Court, while the other bailiwicks acted as drainage regions under the Court for the East Parts of East Yorkshire.

distinct barrier between the two areas and it was no doubt this which encouraged separation into the two parts. Most of the Commissioners for the East Parts were appointed from among the Landowners of that part of the County.

To assist the commissioners, the sheriff of the County was required to nominate a jury of 24 men out of each bailiwick (hundred) which came under the jurisdiction of the Court. This jury was to decide what works the Court was responsible for, to lay pains for repair and upkeep, and to inspect the works at set times. These inspections were normally carried out at Lammas (May 1st) and Michaelmas (September 29th). The Court for the East Parts included six bailiwicks within its area, in each of which a jury existed. The bailiwicks are shown in Fig. 22. The juries reported defaults to the Commissioners, who normally amerced the defaulter to the extent of the cost of the necessary work.

The Court of Sewers was therefore principally concerned with seeing that the responsible individuals carried out the works necessary for the maintenance of the drainage of the countryside. Upkeep of old works was their responsibility, not the creation of new works. The Court for the East Parts of the East Riding stuck less strictly to the letter of the law than many other Courts, which resulted in making drainage at this period more interesting than it might have been. The formula adopted to enable new works to be undertaken appears to have been: conditions have deteriorated and only new works can maintain drainage as it was. Nevertheless the limitation undoubtedly restricted the Court's activity and therefore encouraged considerable private efforts after 1660.

The Court inherited the power exercised by the local commissions since 1397 to impose taxes for the repair or improvement of a bank or drain which benefitted a wide area. The rampier or barrier at Sandle Meer, which prevented the salt-water entering the level along Keyingham Fleet was repaired in 1622 by a tax on the whole level.[3] When Drypool banks were breached in 1648, the level behind contributed to their repair.[4] Foredike clow was repaired by a tax on the lands draining towards it in 1716.[5] In practice, therefore, many of the main drains and banks were communal responsibilities.

The two permenent Court of Sewers of Holderness came into existence in 1532, but until about 1620 there are very few records of their activities. From about 1620 to 1660, there are sufficient records to give a general picture of events. In 1660, the first minute book starts, the pains were written into a book, and other records become abundant. The question arises as to whether the abundance of material

(3) Sewers 2. E.R.R.O.

(4) Ibid.

(5) Sewers 3.

reflects the amount of activity. This seems likely to have been the case. It seems inevitable that the activity of adventurers in the Fens, Hatfield Chase and the Ancholme valley should have had some repercussions in East Yorkshire, and the activity after 1660 may represent the awakening of the area to the possibilities of improvement. The year 1660 appears to mark a turning point between an earlier period of relative inactivity and a later period of optimism and reorganisation.

The records which have survived for the period prior to 1660 reveal, first, the general neglect of drainage works, and second, minor local attempts at improvement.

In 1602, the North Holderness jury complained that the banks on the Wolds side of the river Hull were "lyinge downe and not repairyd as hertofore they have ben"(6). But neglect is more clearly revealed by two disputes concerning the lower part of the Hull valley. The first was in the Hullshire division. Julian dike, which had been constructed in 1402, was revealed by pains and an Inquisition of 1597(7), to be in such a bad state of decay that "ye inhabitants of kingston-upon-hull had no swete water coming or running to ye town but onely by boats or lighters to ye excessive charges of thinhabitants". The reasons given for this state of affairs

(6) A Survey of the drounded Ground adjoyning to Hull Water, 1602. Sewers 2.

(7) Kingston-upon-Hull Corporation Records.

were that cattle were allowed to break down the banks and pollute the water; , that several drains of water from the surrounding land had been diverted into the dike; and that the spring water itself had been diverted into other courses. Such a state of affairs could not have developed in one year only, and the inspections and pains must have been allowed to lapse for several years. If this was allowed to happen to the vital dike supplying water to the town of Hull, we may imagine that neglect was common elsewhere.

The second dispute concerned the east side of the valley, in the area of Drypool. During the Civil War, Hull was a Royalist centre and two blockhouses and other defenses were built on the east side of the river and troops stationed there. A Drypool petition to the Court of Sewers in 1646(8) tells how these troops played havoc with the banks. The commanders Sir Thomas Glemham and Sir John Hotham "frequently issued out both by day and night and broke and cutt upp a great pte of ye wood worke of the Jetties and footbankes for fiering, and other occasions and in like manner tooke and carried away a great quantity of timber and planke pvided in store for ye said repaires ..... the bankes were cutt in three severall places, whereby the petitioners meadows and groundes were quite spoyled .....". In March 1646 a storm

(8) Sewers 2. Bundle relating to Drypool c.1647

broke down the banks and much of the low land on the east side of the river was flooded. Stoneferry "was drowned by the force of ye waters for the time of twenty-six weeks"(9) In the upper part of the valley this would not have been abnormal, but Stoneferry and Drypool were silt settlements unaccustomed to much flooding. Drypool blamed the royalist troops, but the other townships considered that neglect had contributed to the disaster. Therefore although the money for the immediate repair of the bank was obtained by a tax of 3s per acre on the flooded land, the money was to be repaid "out of the Lordship of Drypoole when itt is sold which is intended upon the first opportunity".

These cases do not represent the drainage administration as particularly efficient. Yet it may be that, in the years before full records were kept, it was disputes and inefficiencies only which were sufficiently important to be written down. Support for this suggestion comes from the fact that the two cases of improvement of which we know did not leave contemporary records.

The minutes for 1668 contain a a Wawne petition which states that "about 8o^{tie} years agoe or near thereaboutes..... a sewer was Cutt within the Lord ^{pp} of Waghen by the then Com^{rs} order for a drayne of ye waters running that way out of

(9) Minutes E, Feb. 1662

the North bayliwicke and over which sewer a great bridge was made called Lummer Coate bridge .....". An earlier drain appears to have followed at least part of this course[10], so this may refer to an enlarging or recutting only.

In 1735, a dispute over the New Clow in Cottingham led to evidence of drainage activity in the area south of Beverley in 1647 being copied into the minutes. The inhabitants of Woodmansey, Thearne and Skidby had complained to the Court of Sewers previous to 1630 "of the Continuall Surcharge of water lying upon the Greatest and most beneficiall pts and grounds of their Severall Lordshipps whereby that greate Levile and fertile soile is not only lost and of small Benefitt to the owners and occupyers but the great and Comon Roadway leading betwixt Beverley and Kingston-upon-Hull and also that other High way leading to Waughen fferrey through Thearn Carr and so into Holdernesse have been and still continue for the Greatest part of the year round impassible in winter ....."[11] In 1647 a scheme to alleviate this was adopted (Fig. 23). A new drain was cut and others enlarged to carry the water through Cottingham lands to a new clow in Cottingham (later known as New or Wharton's clow). The reason for activity in this case may have been complaints about the condition of the

(10) Melsa Vol. I p.79

(11) Minutes H. March 1735

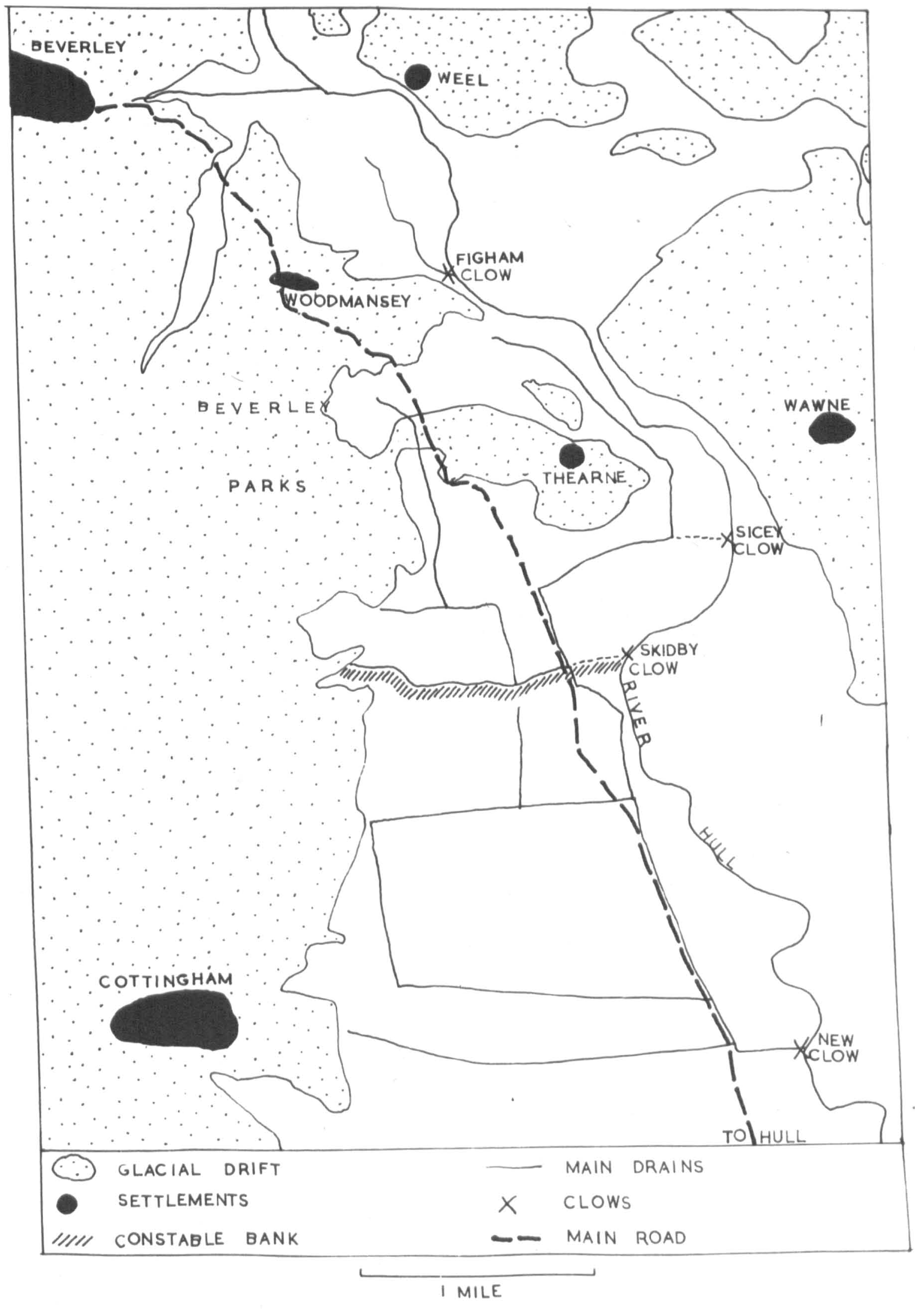

Fig.23. Cottingham Drainage,1647.Pecked lines indicate old courses of water into the river Hull before the New Clow and cuts were made.

Hull-Beverley road which would affect many local travellers. The influence of the rich merchants of Hull would have been greater than that of owners of almost worthless land. It was probably these merchants who instigated the order of the Privy Council to the Commissioners in 1634 to remove the nuisance.

Other similar improvements may have occurred, but failed to be documented. Yet it seems unlikely that there was much activity of this type, for the conditions at this period, described below, suggest neglect rather than improvement.

Conditions in the Valley before 1660. Since conditions probably changed so little between 1532 and 1660, we may draw upon sources throughout the period to obtain a picture of the peatlands at this time.

In 1660 and 1661 an inquisition was made by the jury of each bailiwick to ascertain the works which came under the Court's control.[12] The location and size of each drain and bank was recorded on a roll, and on the basis of this information pains were laid and written into a large book.[13] These inquisitions and pains provide the earliest complete picture of the drainage works of Holderness. At times the details they provide are tantalisingly incomplete; a drain runs from A to B, but which way does it go? Often the relief or the names of the drains suggest the answer, however, and

(12) Sowers 3.

(13) Book of Pains, with the Hull River Board.

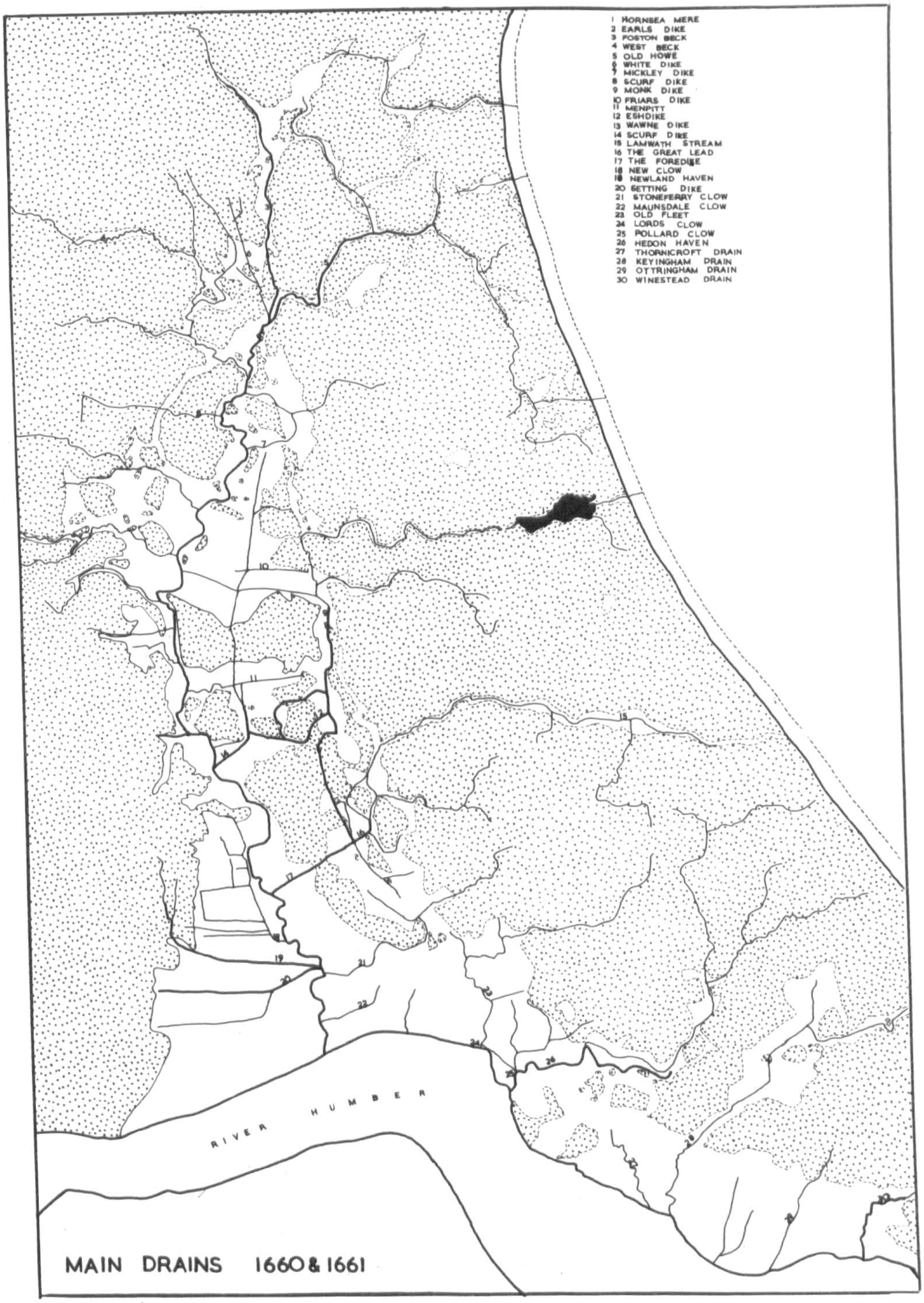

Fig.24. Based on the pains and inquisitions of the Court of Sewers.

only in a few cases is there genuing ambiguity.

Fig. 24 shows the drains mentioned in the inquisitions. The region round Fairholme is the main area where the interpretation may not be correct. The largest drains were those cut as navigation channels by the monks, which often retained their original dimensions of 20 ft. wide and 6 ft. deep. The smaller drains were mostly 8 ft. wide and 4 ft. deep, but there were some smaller ones still on the claylands. Although the widths and depths were relatively small, the drains probably seldom reached even those dimensions. For much of the time they would be filled with mud and weeds and their efficiency thereby considerably reduced.

If Fig. 24 is compared with Fig. 17, the most notable change is the development in the interval of north-south drains to link the earlier east-west watercourses. By 1660 the Foredike drainage and the Meaux drainage were linked by the 1588 cut through Wawne, while the Meaux drainage was also linked to the Tickton and Leven system to the north. There were a number of old clows which probably once had their own feeders, but by 1660 these had been diverted. A 1668 map of the river Hull by Captain Osborne(14) shows 13 clows on each bank.(Fig. 25) The tendency was to reduce the number

(14) Original lost during 1939-45 war. Photograph copies with the Hull Museums Department and the Hull City Reference Library.

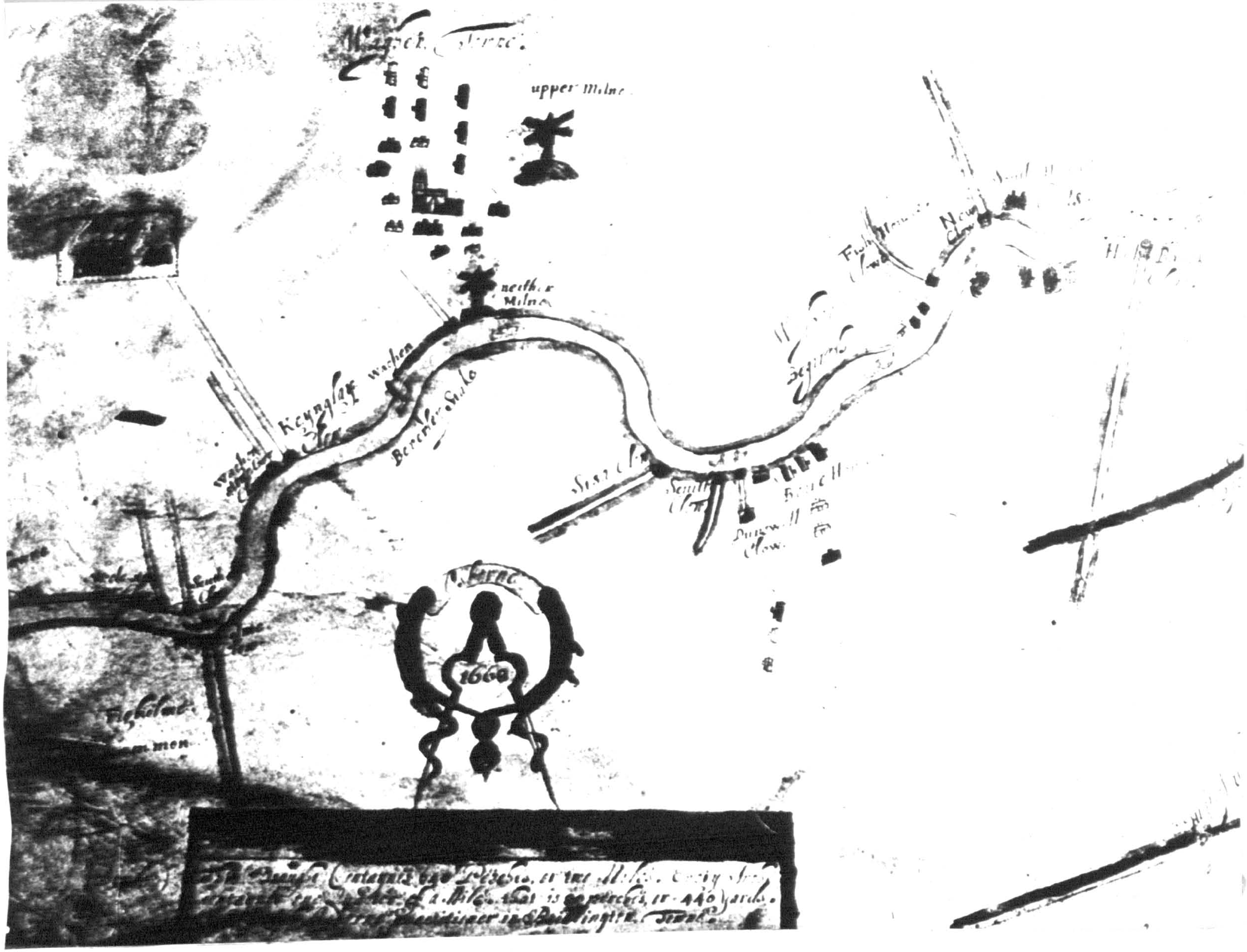

Fig.25. Reproduction of part of Osborne's plan of the river Hull, 1668. The section reproduced extends from Weel in the north to Stoneferry in the south.

of points at which the drainage waters flowed into the Hull, and so far as possible to restore the natural north-south trend of drainage. Lower down the river the tidal range was greater, clows could be set lower and a greater fall was provided for the water in the drains. Inefficiency of a clow was therefore countered by making a cut to a system further south and draining by its clow. The 1647 development in Woodmensey, Thearne and Cottingham was a clear indication of this tendency, although there an entirely new clow had been made. The pattern in 1660 showed clearly the two elements in the drainage at that time; the east-west watercourses still existed and were listed as main drains, but the north-south drains were becoming increasingly significant.

The inquisitions and pains themselves gave little indication of the efficiency or otherwise of this system of drainage. Only the Bainton Beacon Inquisition (1661) gives some suggestion of conditions. Hutton Beck was said to flow from a "little Marrish" west of Hutton to Hutton Grange where it "begins to overflow a level"; Skurfe Dike flowed from Watton to Hutton Clow "overflowing a considerable level".

More detailed evidence of this "overflowing" comes from other sources. In 1602 a survey was taken of the "drounded Ground adjoyning to Hull water" in North Holderness.[15]

(15) Sewers 2.

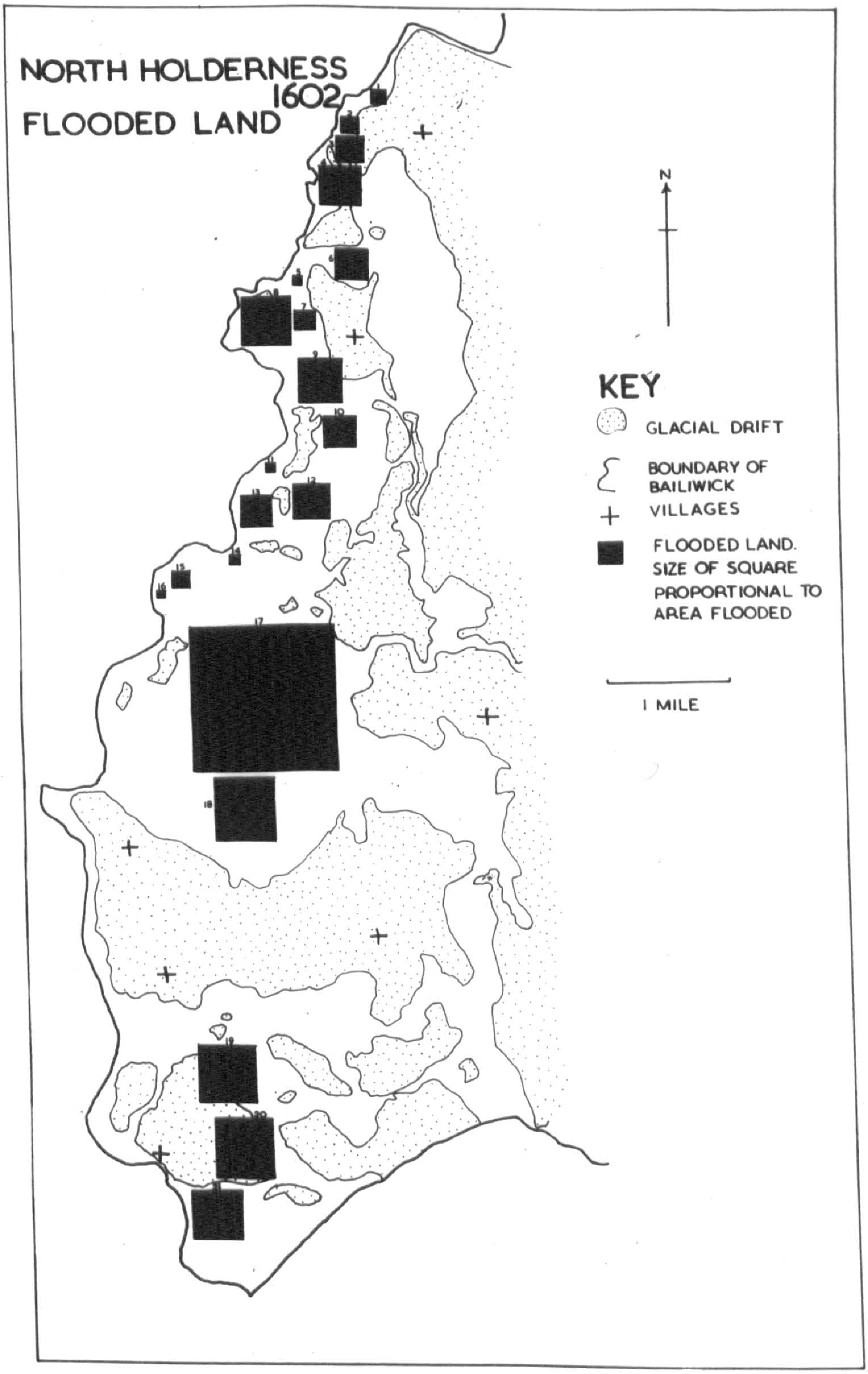

Fig.26. KEY.1-Kyrke Carr,N.Frodingham;2-Hye How,N.Frodingham; 3-Ox Pasture,N.Frodingham;4-JarrettsInge and Nue Inge,N. Frodingham;5-Emmotland;6-Goodhall House;7-Hempholme Inge; 8-Struntion Hill;9-Hempholmecarre;10-Hallythrom;11-Bursell parke;12-Brandesburton Inge Karre;13-Whytam;14-Low baswicke; 15-High baswicke;16-Wilton parke;17-Leven;18-Eske;19-Weel N. Inge;20-Weel Pasture carre and ther Inge;21-Weel Stone Carr.

This records 1,863 acres of flooded land within that one bailiwick (Fig. 26). The survey does not state whether this land was permanently flooded; or whether it was only flooded for part of the year (i.e. carrland), but the latter may be assumed since the value of the land is given as between 2s. and 3s. 4d. per acre.

In 1570, Humberstone surveyed the Leconfield estate of the Earl of Northumberland. His report illustrates both the condition of the carrs and the uses made of this land:

> "To the sayd manour also belongyth a great fenne, called the Carre, th'erle hath a greate marke of swannes and also many wyld swannes bredyng there yerely and very moche other wyld fowle, and a very proffitable fishing which th'erles have alweyes reserved to their owne possession for th'use and comodyte of their house, and appoynted foure kepers or overseers, as well of the fowle as the fyshe, and every of them hath for his travayle or paynes about the same iiis iiij d. And where as the tenauntes had comen of pasture in the same in dry yeres, the dryft of the cattell dyd disturbe the bredyng of the wyld fowle and especially of the wyld swannes, the late erle compounded with the tenauntes to forbere there comen in that fenne and payeth them yerely in recompence thereof Xiij s iiij d. ....." (16)

(16) P.R.O. E 164/37/249

The fowling, fishing and pastoral uses mentioned in this account were probably the same throughout the Hull valley. Fowling rights, probably usually belonged to the lord of the manor. Several decoys existed; e.g. the Parliamentary Survey of Leven[17] mentioned "that lately erected ffowleing place called ... the Coy ... situate ... about the middle of the Carrs of Moorish ground." There were decoys in Meaux,[18] Rotsea,[19] and elsewhere. Fishing rights seem to have been held both by the lord of the manor and his tenants. In 1555, fishery rights were granted in Aike Carr[20], and in 1610 in Deep Carr (Benningholme?)[21]. The Parliamentary survey of Leven refers to the liberty of fishing in the carrs belonging to the manor. Fishery rights were probably still valued at this time although they were decreasing in importance.

Pasture in the carrs was usually held in common. It was not valuable pasture, for it could be used for only about three months each year, and in wet seasons for a shorter period still. Cattle were the main stock. In some cases, though not all, the carrs were stinted, e.g. in 1629 in Brandesburton

(17) P.R.O. E 317 Yorks/34.

(18) P.R.O. E 317 Yorks/35

(19) Shown on the 6" map.

(20) Y.A.S.R.S. II. Yorkshire Fines, p. 186

(21) Y.A.S.R.S. LIII " " p. 143

there were 121 common rights, and each right was entitled to one gate in the 195 acres of Star Carr.[22]

Various surveys suggest that the provision of summer pasture was the most important of the functions of the carrs. In Leven there were 1,200 acres of carrland, valued for pasture at £50 or 4d. per acre. The fishing and fowling of the same area were valued at £5[23]. Elsewhere the pasture value was higher, e.g. in Meaux it varied between 10d per acre for 24 acres and 3s. per acre for 120 acres [24]. The small value of the Leven carrs for pasture may have resulted from their extreme lowness and waterlogged character, or from their abundance in relation to the extent of high ground in the township.

No doubt reeds for thatching and floor-covering and peat for fuel were also provided by the carrs, although direct references to these uses are lacking.

On the whole, therefore, the peatlands may have been more widely used than in medieval times, but the type of use was similar.

(22) 162ǂ Brandesburton agreements. City of London records.

(23) P.R.O. E. 317 Yorks/34

(24) P.R.O. E 317 Yorks/35

Drainage Activity 1660 - 1760. During the century following the Restoration, there were a number of efforts made to improve the drainage and raise the productivity of the carrs. The tendency to restore the north-south trend of drainage became even more marked than before 1660. The improvements were still on too small a scale to make more than local alterations to the character of the peatlands.

During this period it is possible to subdivide the peatlands of the valley into two parts, each of which developed separately and on rather different lines. On the east side of the valley there was the area which became known as the Holderness levels. This included the north-south valley east of the boulder-clay islands of Sutton, Wawne etc., and into it flowed streams from the drift area to the east. The rest of the valley formed the other region, which received water from chalk streams and had only the Hull as its outlet.

In the Holderness levels, before man's intervention much of the water of the streams from the east had probably been carried away by a stream flowing south along the eastern depression (for convenience this will be called the Sutton valley). Medieval times had seen the waters diverted into east-west watercourses flowing into the river Hull, but when the need for drainage once again became more important than the need for navigation canals, the old natural direction of drainage made itself felt and led to the linking of the east-west watercourses by north-south drains. By 1660 this tendency had gone so far as to make Foredike the principal drain of the Holderness levels. A Wawne petition in July 1661 described how three clows in that township were out of repair and useless because "since ye new Clow (rebuilt Foredike Clow) was builded all ye Sewers to these Clowes are observed to Runn backward and soe take away ye drain from of those Clowes and turns ye Current of ye waters wholy to ye new Clow and Goldick stock".(25) A full restoration of the old north-south drainage was impossible because Sutton had taken the opportunity during the medieval period, when the water was diverted from the Sutton valley, to block the valley for all but a small trickle of water. Within Sutton the valley narrows to a width of about 600 yards before debouching onto the Humber siltlands. Sutton possessed valuable pasture on the silt which she was anxious to avoid having flooded. Consequently the township had constructed a bank across the narrow neck of the valley in which there was only a small opening controlled by gates, known as Gold dike stock. In winter, when the danger of flooding was greatest, no water at all was allowed to pass through this stock. The water ponded up behind to flood Sutton carrs, and may even have drained north into Foredike. On March 16th of each year(26) the stock was opened to allow

(25) Minutes E.

(26) Minutes E. Feb. 1662

up to 2½ feet of water to pass, and it continued open throughout the summer. In this way the water was gradually drained off Sutton Carrs, but it was too small to carry away other water from further north, which therefore had to pass through Foredike. South of Gold dike stock, there were two channels which carried away the water and two other stocks which appear to have controlled the distribution of water between them. The two channels were the Old Fleet (the name suggests that this was the old natural drain for the Sutton valley) otherwise known as Coggem Clute, which led to the Humber at Lord's (Lord Dunbar's) Clow, and Ings dike which led to Stoneferry Clow on the Hull.

Although Gold dike stock had probably been in existence since early medieval times,(27) there are no references to it prior to 1660. But from that date onwards it became the centre of considerable controversy, as the townships further up the valley slowly realised that the water naturally tended to flow that way. In June 1661 these townships complained to the Court of Sewers that Gold dike stock was blocked so that only 1½ feet of water were able to pass through it, compared with the normal 2½ feet(28). As a result of this they said

(27) The fact than no medieval haven seems to have ever existed on the Old Fleet as on other streams suggests that the change was early.

(28) Minutes E, June 1661.

that the waters in the carrs were higher than usual in summer and they had "wholy lost the benefit of all their sumer pastures and are in great Danger to lose the benefit of their Meadowes". The Court ordered that the stock was to be controlled "soe as the sewer may containe the water without pjudising the high wayes or meadowes".(29)

In February 1662, Sutton and Stoneferry appealed against the 1661 decision, stating:-

"That the said stocke called Gold dike stocke of ancient time hath been but a foot and a half square, and was never to be opened until the XVIth day of March and then to be suffered to run during the sumer time .....

That if the said stocke should be made wyder than the ancient Garge and Suffered to runne at the pleasure of the watertowns Stoneferry Clow will never be sufficient and able to utter and vent the water lying upon her for that the Clow runneth but certain houres in a day and the stocke runnes continually w^ch will cause a constant overflowing in all the Levell grounds of Sutton and Stoneferry .....

That by the overflowing which must needs follow if the said Passage of waters be continually suffered, the meadows in Sutton Ings and the West Carre of Carr side being the very livelyhood of the said Lordpps of Sutton

(29) Minutes E, July 1661

and Stoneferry will be made altogether miserable and not worth anything to them ....."(30)

They illustrated the dangers of allowing Gold dike stock to flow in winter by quoting the events of 1648 when the stock burst:-(31)

"..... the inhabitants of Stoneferry, Sudcoates and Marfleet were enforced eyther to leave their houses or betake themselves to their Chambers and putt forth their goods to other places and many of their goods were drowned to their great losse and damage. And att which time the said ffrost water did lye with such a force upon ye banks of Humber that itt did wash and breake downe the said banks into Humber. And the saltwater mixing with the fresh such a great inundation was made that for a longe time all people both horse and foot inhabiting that pte of Holdernesse were deprived of going to any markett but with boates ....."

Their final argument against the carr waters passing that way was:-

"That the River banks on Holdernesse side between North Frodingham and the new Clow especially Leaven banks for

(30) Minutes E, Feb. 1662

(31) Hardly a fair illustration, for this was the same time as the Drypool banks were breached. At the time, the fault was said to lie with Drypool's neglect of the banks, and there was no mention of Gold dike stock.

many years have been defective and broke down whereby the River hath often overflowed w[ch] hath been one of the greatest occasions of the drowning of the aforesaid water townes of the Levele in Holderness. If the same banks were made of a sufficient height and breadth and soe kept from tyme to tyme and the river yearly in season scoured and cleansed from the woode and mud to prevent the overflowing, wee humbly conceive the Dreynes and Sewers upon the River allready made would be sufficient for the dreyning of the said watertownes."

The Court of Sewers was therefore faced by two possible methods of improving conditions in the Holderness levels. It could either improve the banks along the Hull and hope that the Sutton petitioners were right in suggesting that, if water from other parts of the valley were excluded, the drains which existed could provide a reasonably efficient drainage of the carrs. Alternatively it could order the diversion of greater amounts of water through Gold dike stock. In the following years both courses were tried. Following the petition of Sutton, the Court immediately ordered the raising of the banks along the Hull, and made it clear that, until that was done, it was not prepared to order the enlargement of Gold dike stock(32). But each township appears to have waited for

(32) Minutes E, Feb. 1662

its neighbours to act first, and there was little improvement. In April 1665, Sutton, S toneferry, Wawne and Swine complained to the Court that:-

"Whereas the banks which lie upon the river Hull have been for some years last past and now are in decay ruinous and much out of repaire whereby the waters have in great Quantityes run through the breaches and on some places for a long space overtopd ye said banks and that especially in winter time and whereas in several places adioning and nere adiacent to the great Levell of Holderness there have been of late years new and unaccustomed inletts of water and Cutts made by psons unknowne to yr Petn^rs whereby great quantities of water have been lett into the said Levell not onely to the great increase of water in ye low grounds of yr petn^rs whereby they are totally deprived of all the sumor profitts of them w^ch formerley they used to have, but allsoo to the drowning and surrounding most of the dry grounds belonging to yr Petn^rs ..... and also by the vast encrese of the said waters the Highways to the said markett townes of Beverley Hull and Hedon have been very much overflowen ....." (33)

In August of the same year the complaint was repeated, but there appears to have been little or no improvement. This

(33) Minutes E, April 1665

may have been partly the result of the difficulty of making banks with the local peaty soil. The expense of transporting more suitable soil appeared to be too great for the smaller farmers.

Although little improvement had been obtained by raising the banks, the Court was still reluctant to force Sutton to allow more water to pass through Gold dike stock. In 1671, an alternative solution was proposed by Mr. Snow, one of the Commissioners of Sewers, the first scheme for large-scale drainage improvement in the Hull valley(34). He proposed to cut a new drain from Foredike, through Sutton cars, across Sutton high ground west of Gold dike stock, to the Humber at Marfleet Clow (Fig. 27). This was to be 25 ft. wide at the bottom, 35 ft. wide at the top and 12 ft. deep. Snow was willing to pay for this new cut and clow, but within three months of the completion of the work, those who benefitted were to pay him their proportion of the cost. As his payment for doing the work he would be granted the drained land for his own use for 21 years. The scheme is very reminiscent of the adventurers' methods of draining in the Fens, Hatfield Chase etc. earlier in the century. An Act of Parliament was necessary, for as new work it could not be sanctioned by the Court of Sewers. Nevertheless, the commissioners were asked

(34) Minutes E, Oct. 1671, and Sewers 3.

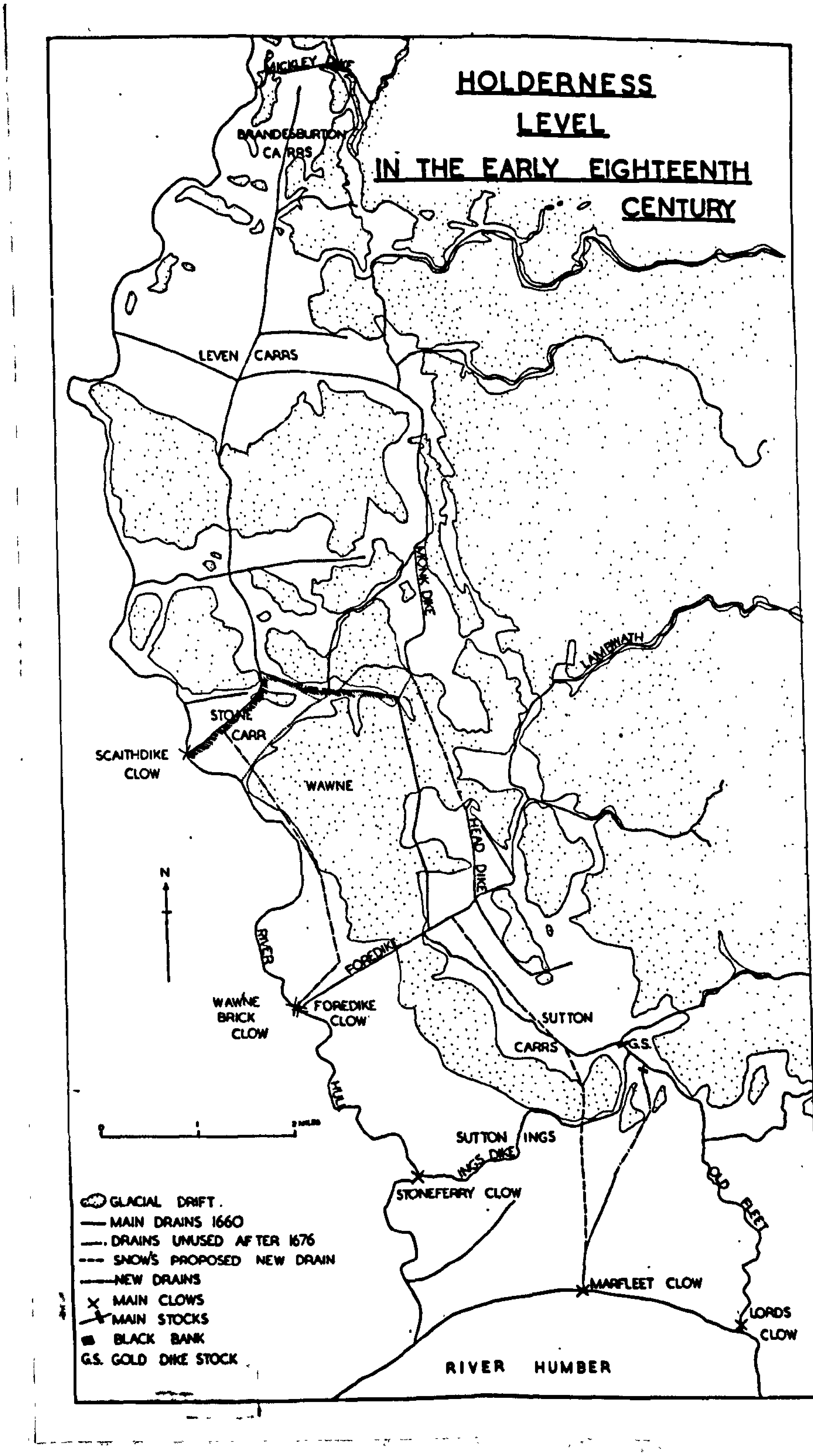

Fig.27. The Level in the early eighteenth century. The new drains in and near Wawne were cut in 1676 by Sir Joseph Ashe..

for their views on the scheme; they expressed doubt as to the adequacy of the proposed new drain and asked Snow to negotiate directly with the proprietors concerned. The scheme was abandoned, probably through lack of support.(35)

In 1690, the "watertowns" again complained to the Court that the carrs were badly flooded and asked for an enlargement of Gold dike stock. In order to overcome Sutton's objection that her meadows south of the stock would be flooded they suggested that a new drain should be cut or the old one enlarged.(36) The area was viewed, and in September 1690 the Court ordered the opening of a new channel from Gold dike stock to Marfleet Clow (Fig. 27) but there was no reference to enlarging the stock. Nevertheless, there appears to have been some improvement in the carrs, for when the new channel was stopped up again in 1696, it gave rise to the following petition for its reopening:-

> "whereas upon severall years experience had it hath been found that the drain of the water through the sewer leading from the stock at the N.W. corner of the Armitage to the new stock near Armitage gate, and through that Stock through the sewer leading from thence to Marflete Clow and through that Clow into Humber hath been very usefull and advantageous to the whole Levell for the drain of their grounds w^th^out any damage to the Lordpp

(35) Sir J. Ashe's petition. Minutes E, March 1675.

(36) Sewers 3. June 1690

of Marflete aforesd or any pte thereof and w[th]out any manner of Comp[et] until Michas Sixteene hundred and Ninety Six wch was occasioned as yo[r] Petn[rs] are enformed upon some difference happend between the townshipps of Marflete and Bilton and upon that Comp[et] itt was then ordered by the Court of Sewers that the Levell water should for the future be conveighd by itts ancient Course into Hull river unless Cause shown to the Contrary ....."

"Your Petn[rs] therefore for the reasons aforementioned and such others as formerly included and moved this hono[ble] Court to order the passage of the water to the New Stock as aforesd Humbly pray yt the said former orders may be continued and confirmed and the water have itts current that way." (37)

The Court therefore ordered the channel to be reopened and this southerly outlet for the water was maintained until the Holderness Drainage Act of 1764.

The period from 1701 to 1760 saw a number of attempts to improve the drains leading from Gold dike stock. In 1723, Sutton complained that the channel to Marfleet was flooding her lands, and a stock was therefore placed in this drain to limit its flow(38). But this sent more water along

(37) Sewers 4, May 1701

(38) Minutes F, July 1723

Coggam Clute, to the Lord's Clow, so that in 1728 there were complaints of flooding in Bilton. In 1730, the Lord's Clow was rebuilt in order to cope with this extra water.[39] Although Gold dike stock does not appear to have been enlarged, after 1730 its opening was controlled by a body of four Sutton bylawmen and four members of the Sewers jury for Middle Holderness. The interests of both Sutton land and the carrs were in this way safeguarded, and probably more water was allowed to pass through the stock than when Sutton controlled it alone. Nevertheless its size was so small[40] that still the largest proportion of the water from the Holderness levels must have drained by Foredike.

The Court of Sewers was therefore unable to bring more than a small improvement to the drainage of the Holderness levels. Probably the small freeholders were fairly content with these minor improvements, especially during the early eighteenth century when rainfall was relatively low. But among the larger landowners there were some who realised the potentialities of the carrs if they could be drained. Since there seemed to be little prospect of improvement by the Court of Sewers they were forced to carry out the improvements themselves. There were as a result a number of private

(39) Minutes H, Aug. 1730

(40) In 1763 Grundy reported that the stock was 19" wide.

piecemeal improvements within the Hull valley during this period.

The first and most important of the private drainers was Sir Joseph Ashe. He was a newcomer to the district, having been granted the manor of Wawne after the Restoration. It would be interesting to know whether he had had earlier associations with other marshlands drained by adventurers, and had gained his knowledge of and enthusiasm for drainage there. In 1675 he produced a plan to improve the drainage of Wawne, although he considered his scheme was also for "a publick Good". Part of his scheme had to receive the approval of the Court of Sewers for it concerned public drains, and of these changes we have details in the minutes and pains of the Court. But he also made other works that involved his land only, and details of these are less easy to obtain. We can only presume that drains mentioned in a case in 1747 concerning the taxing of Wawne lands for the repair of Foredike Clow(41) and shown on Tate's map of the Holderness Drainage in 1764 (Fig. 33) were constructed at this time.

Fig. 27 shows the new drains and banks made by Sir Joseph Ashe. In the north, Scaith dike was deepened and widened and Black Bank thrown up on its south side. The old Eshe dike was stopped up and in its place new cuts carried the water from

(41) Windham family records, E.R.R.O.

Monkdike (originally With dike) into Head dike and eventually into Foredike. Wawne Stone carrs and Wawne ings were in this way freed from all outside water and were drained by a new dike which opened into the Hull through a new clow just north of Foredike Clow[42]. The windmills known to have existed later on this drain seem to have been built at the same time, for some notes of late seventeenth century date in the British Museum state that "About 20 years ago, Sir Joseph Ash ..... made drains and two mills for casting out water and draining four low grounds in his Lordship".[43] Other windmills were apparently added later (perhaps because of peat shrinkage as in the Fens) for in 1760 it was reported that "Mr. Bowyer's water is conveyed into the River Hull thorrow his own Clow; which watter is forced thether by 6 Engins"[44]. There is no record of the date when the other four windmills were added, but with all six at work the drainage appears to have been adequate, for in 1764 the Wawne estate was excluded from the

(42) The enlarged Head dike gave rise to some dispute for it passed through an area that had previously been common to the inhabitants of Fairholme and Benningholme as well as Wawne. The agreement making this arrangement dated back to the time when Meaux abbey owned much of Wawne. The Benningholme inhabitants complained that they could no longer benefit from their common rights, as their cattle were unable to cross the widened drain. The problem was solved by an agreement to divide the common, and Mr. Constable, as owner of Benningholme, was granted 150 acres on the east side of the new drain. Windham family records.

(43) B.M. Lansdowne 894.

(44) Sewers 5.

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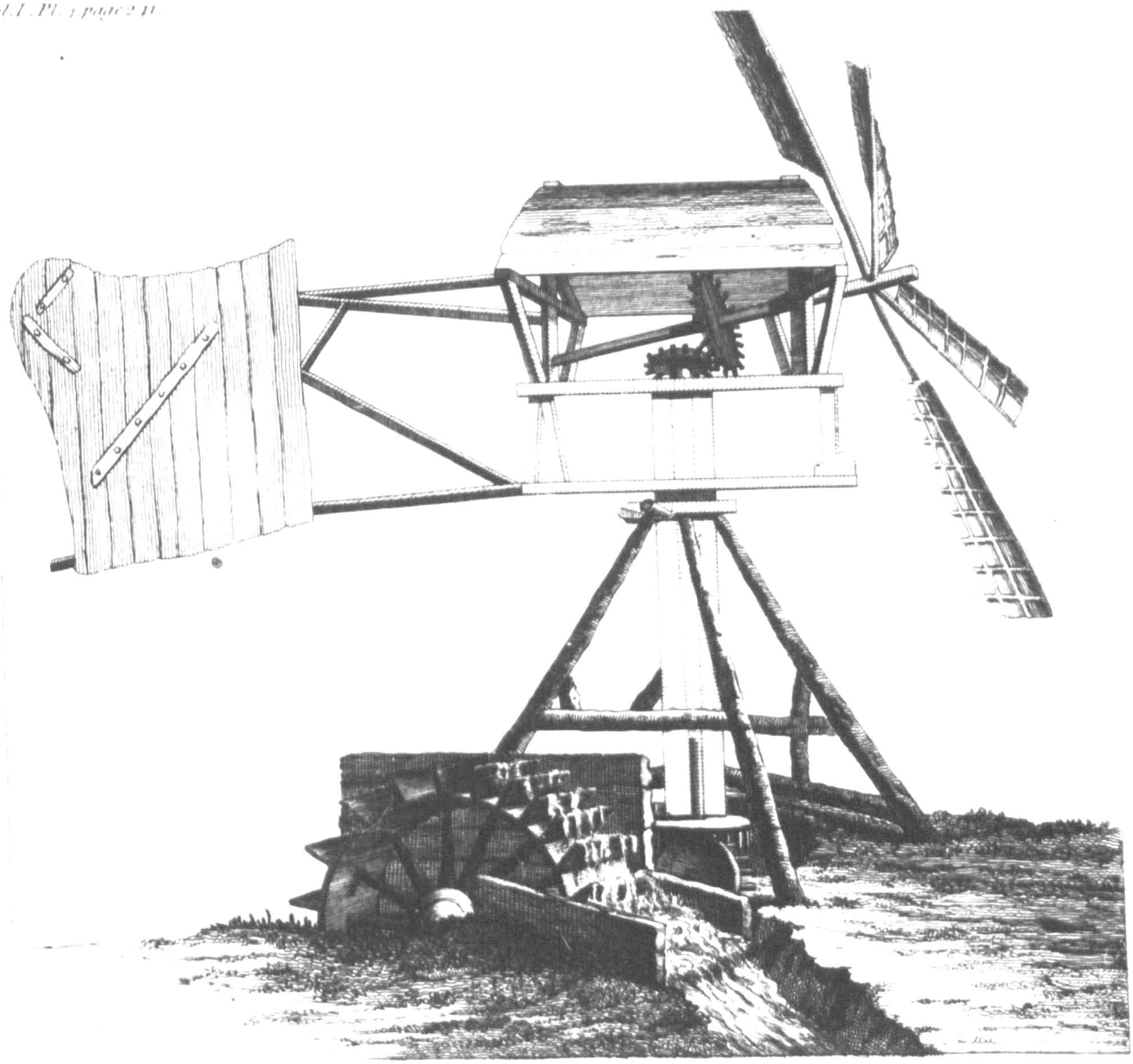


Fig.28. A drainage windmill in Holderness.Reproduced from A.Young,"A Six Month's Tour in the North of England".

Holderness drainage area.

The drainage works in Wawne brought little direct benefit to the surrounding carrlands, but they may have provided an example to other large proprietors in the level. About 1693 Sir James Bradshaw erected an engine in Routh(45) and thereby "hath drain'd some of the grounds there and sown them with rape the said Mill also is for grinding rape from Waggen (Wawne)". In 1726, Lord Micklethwaite also adopted the method of drainage by windmills and informed the Court of Sewers that he had "some hundred acres of low Ground in his Lordshipp of Swine which he is desireous to imbank and drain with Engines"(46). Arthur Young noticed a number of private windmills in the area(47), and included an illustration of one in his account. (Fig. 28). Some of the windmills were shown on maps of the area, while others have left traces of their existence in the field-name "Engine Close". Fig. 29 shows the distribution of such windmills as can be located.

Another area where private drainage improvements were attempted was in the north of the Holderness levels. There Samuel Hassell made efforts to drain a large holding in Brandesburton and Burshill, but he does not appear to have used windmills. Few details are known. In 1723, offended neighbours petitioned the Court of Sewers "That in or about

(45) B.M. Lansdowne 894.

(46) Minutes G. Aug. 1726

(47) A. Young. Six Months Tour through the North of England 1770 Vol. I. p.241

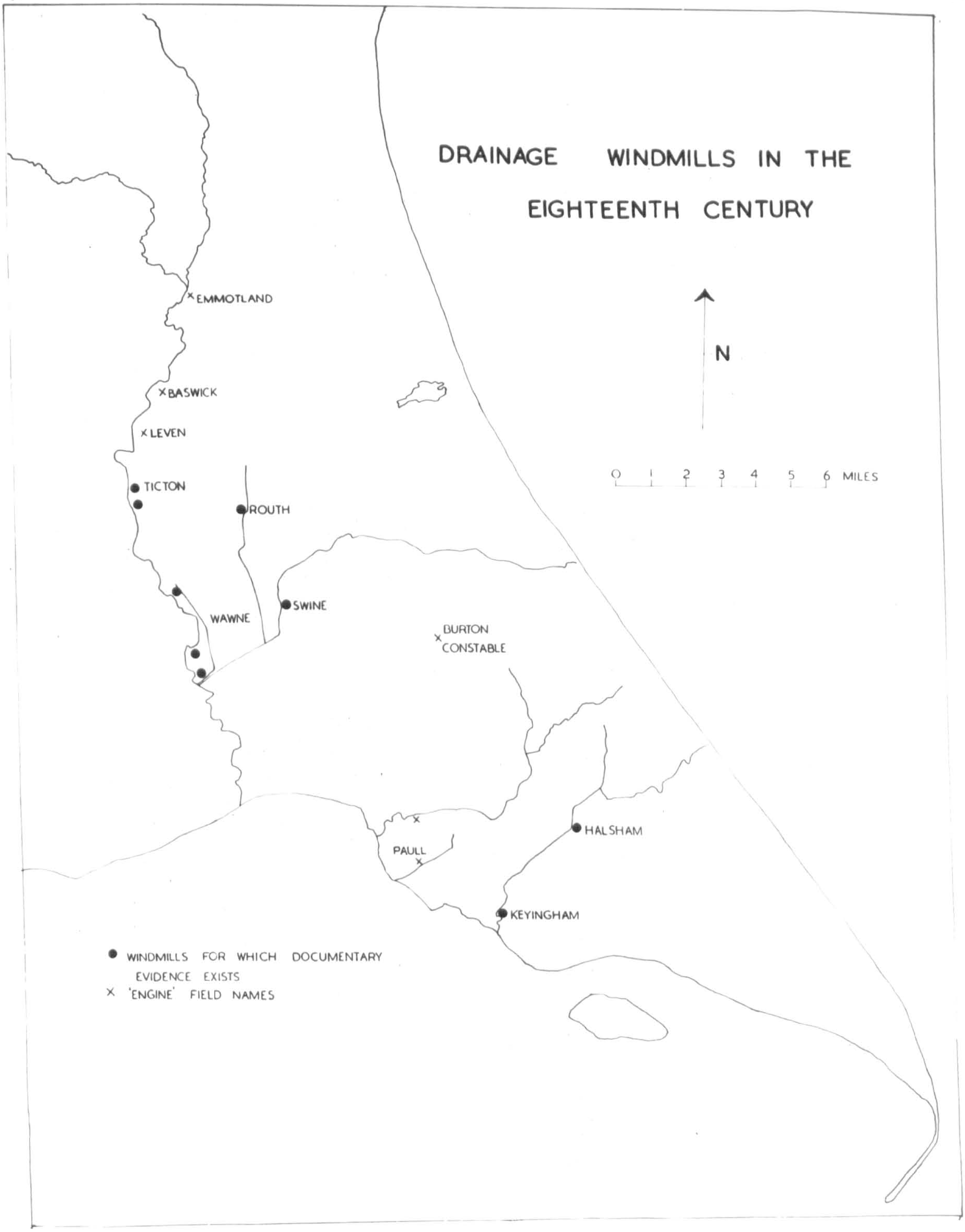

DRAINAGE WINDMILLS IN THE EIGHTEENTH CENTURY
N
0 1 2 3 4 5 6 MILES
EMMOTLAND
BASWICK
LEVEN
TICTON
ROUTH
SWINE
WAWNE
BURTON CONSTABLE
PAULL
HALSHAM
KEYINGHAM
WINDMILLS FOR WHICH DOCUMENTARY EVIDENCE EXISTS
'ENGINE' FIELD NAMES

Fig.29

the year 1717 Samual Hassell Esq. made a large Cut through a Bank called the Barff by which he diverted the water out of its proper course and turnd it upon the Grounds of your Petitioners"(48). A 1743 survey of Brandesburton refers to "all the Drains and Improvements that Mr. Hassill made upon this Comon (i.e. Ing Carr) and White Holm Carrs"(49). But Hassell's efforts do not seem to have produced any lasting results.

The period between 1660 and 1760 therefore saw a number of small changes within the Holderness Levels, most of which were the results of private efforts. The need to allow the water to drain southwards had been clearly realised, but it had also become apparent that this was unlikely to be obtained while control over drainage remained with the Court of Sewers.

While the Holderness levels were busily devising schemes of improvement, there was little activity in the rest of the Hull valley. The technical difficulties were greater, for most of those carrs were further from the Humber and the Hull was the only obvious direction of drainage. Conditions were very bad in the northernmost carrs round Nafferton and Wansford. In 1661 the inhabitants of Brigham complained that "they are miserably drowned by the neglect of divers persons ..... by suffering their bancks to be downe whereby

(48) Minutes F. July 1723

(49) Brandesburton documents. City of London records.

the water overflowes their low grounds to their very great loss and damage".[50] In addition, the drains were choked with mud, for example "the waters of Wansford Carre should pass downe a sewer called Syuid(?) dike into White Dike but the said White Dike is soo stopped up with mudd that it can scarce have any passage that way". Some of the blame for the flooding was also put on the numerous mills in the district, e.g. at Foston and Nafferton[51]. In 1671, in order to alleviate these conditions, White dike was ordered to be increased in width to 10 yards. In 1702, William Wilberforce appears to have made minor alterations to the drains[52], and between 1716 and 1719 Nafferton diverted her water out of White Dike into Driffield Beck, but was ordered by the Court of Sewers to return it to its old course.

There was even less activity in the rest of the valley, with the exception of the extreme south. There, in Hullshire, the conflict between land drainage and water-supply to Hull flared up again. The Legard family owned an estate in Anlaby and Hessle, and found that much of the lower land of those two townships was frequently flooded. After several attempts to divert the flood water into Julian dike, they made other cuts to carry it instead to Hessle Haven.[53]

(50) Minutes E. Nov. 1661

(51) Minutes E. April 1665

(52) Sewers 4.

(53) Legard family papers. E.R.R.O.

While the Holderness levels were becoming more conscious of the importance of the Sutton valley and Gold dike stock between 1660 and 1760, the western part of the valley appears to have realised its dependence on the efficiency of the Hull. The river seems to have been cleaned of weeds and mud more regularly and more thoroughly than before. In 1671, instead of the usual practice of the owners of adjacent land each dressing their own share of the river, they were taxed at ½d per rood of river bank, and the Court of Sewers supervised the work as a whole.(54) In the following year this method was reported to have been very successful.

Two principal features detracted from the value of the river as a main drain. These were, first, its tidal nature, which prevented the land water flowing into it for several hours at each high tide, and second, the many irregularities in its bed. These features received some attention in the early eighteenth century. In a number of rivers the problem of saltwater damming back the fresh water at high tide had been overcome by building a lock and sluice near the mouth. The Ancholme, only a few miles away and with relatively similar tidal conditions, had been controlled in this way since 1639. In 1711 a group of owners of lands in the Hull valley carrs, of whom Samuel Hassell of Brandesburton appears

(54) Minutes E, May 1671

to have been the leader[55], proposed "makeing a lock and other conveniences in the River Hull, in order to draine the low grounds on both sides of the said River, and alsoe to render thereby the Queen's highways more passable".[56] But no more was heard of this scheme; did the port of Hull and the navigation interests on the river oppose it? or was it again the cost and the need to obtain an Act of Parliament that provided the hurdle that could not be crossed? If such a scheme had been adopted it would have proved of great value to the valley by providing the basis for a co-ordinated system of drainage.

The irregular bed of the river was first brought to the notice of the Court of Sewers by a complaint from John Spencer of Beverley, master and mariner:-

> "Whereas the River Hull has been of Ancient times navigable to the said Town or Libertyes of Beverley aforesaid but by the decay of Trade has not been much used by shipps of late fitt to go to fforeigne ports which in the meane time several towns and places have made and laid Causewayes and purpostures into the said River so that in such places a very small ship is not able to pass. And further .....your peticoner haveing a shipp or vessell of the Burdon of ffifty tunds which is employed by the Merchants and Traders in the sd Town of Beverley to Convey and Carry malt Corne and other

(55) Letter to F. Boynton, Sewers 4.
(56) Sewers 4. A brief account of the scheme signed by 10 supporters.

merchandizes to the port of London and other fforreigne ports and to bring coles salt and other merchandizes to and for the said Town of Beverley and other places adjacent which sd causeways and purprostures are greatt hindrance and damage to your petitioner shipp or vessell so passing and repassing ....."(57)

The river was surveyed in 1721, as a result of this petition, and numerous recommendations for deepening and widening were made. At Weel and Wawne the causeways were to be cut through to make the river 3½ feet and 2½ feet deeper respectively, and at two points lower down the river, 2 feet and 3 feet of river bed were to be removed. Since there were no further complaints from the navigation interests, and navigation on the river appeared to prosper,(58) these improvements were probably made, and must have proved of some advantage to drainage also. Nevertheless the Hull remained relatively shallow and of irregular depth throughout this period, for in 1788 Jessop found depths of 6 ft. at Wawne and 5 feet 8 ins. at Weel, compared with adjacent stretches between 9 and 11½ feet deep.(59)

Outside the Holderness levels, therefore, there were

(57) Minutes F, June 1721

(58) Beverley Beck, the mile-long canal linking Beverley to the Hull was cleaned out in 1727 and 1744. Beverley Corporation Acts.

(59) Report on the river Hull by W. Jessop, Minutes L. 1788.

few signs of improvement. However, growing awareness that true improvement could come only from large-scale works beyond the power of the Court of Sewers was probably felt in all parts of the valley equally. The century between 1660 and 1760 may therefore be regarded as one of experiment and preparation leading up to the great period of drainage activity between 1760 and 1810. From the geographical point of view, its chief feature was the awakening to the importance of the level of the outfalls of the drains. This led the Holderness levels to harp after an outfall into the Humber and the rest of the valley to hope for improvements in the Hull which would lower its level.

The Valley in the Middle Eighteenth Century. Because the changes since 1660 had been restricted to relatively small areas, the descriptions of the valley about 1760 are very similar to those of the earlier period. In 1764, Mr. William Iveson described the Holderness level: "the said low grounds and carrs consisting of about 13,000 acres are generally overflowed with water and of very small advantage to the Proprietors; some of which let at 2d per acre, others at 1s. and 2s.6d. per acre; .....Lands in the Neighbourhood letting at present from 10 - 20s. per acre".(60) When John Grundy surveyed the Holderness levels in December 1763

(60) Journal of the House of Commons. 26th Jan . 1764.

he found an average depth of water of between 2ft. 4ins. and 4ft. 8ins. on all the carrs.[61]

The most detailed description of the carrs and their uses comes from a 1743 survey of Brandesburton by Thomas Brown[62]. (See Fig. 27 for the location of Brandesburton carrs). He described the Great Ox Carr of 49 acres as "coarse boggy carr in which no cattle can go it is in a Dry Year always mown and the Sedge and Flaggs serve for young or dry cattle in the winter, but this is under Water 9 months at least and sometimes all the year". In the Ing Carr (556 acres) the inhabitants of Brandesburton had 240 beast gates. "Above three parts of it is nothing but Boggs upon which no Cattle ever goes and in a wett summer at least 9 parts in 10 lyes under water and the Gates or Comons are then not worth 2d a piece, but such summers as the three last they have been let from 2s. 6d. to 4s. each. The Surface of the Water upon the Hull River is higher than four fifths of this Comon ..... all the Water that comes from the Country has no way of getting of but by a very small sewer that is not above Ten foot over and Emptys itself at a Goat or Sluce near Hull eight miles below this place".

(61) J. Grundy. Report on the Drainage of the Holderness Levels, Dec. 1763. Hull Corporation Records.

(62) The Field Book of Thomas Brown, 1743. Brandesburton documents, City of London records.

Brown's description makes it clear that the principal use of the carrs at this period was as summer pasture for cattle, but it also spotlights a major drawback, the unreliability of this pasture. In a wet year the small areas of pasture not flooded would be overstocked, while in a dry year there was understocking. The latter might be partly overcome by letting beast gates in dry years to townships with less summer pasture. That letting of gates occurred in the area is indicated by a 1721 petition to the Court of Sewers from the occupiers of common rights in Summergangs pasture in Drypool.(63) The owners of demesne commons "have power to lett their Comon right to any stranger or whom they please and their being nine hundred sheep Gates belonging to the Comon all lett ....." Yet even if letting of gates to other townships occurred, the disadvantages of the unreliability of the carr pastures still remained in the form of fluctuating cash incomes.

The patches of improved land were most important in the Holderness levels, but even these were relatively few and scattered. Some of this land was sown with rape, but there were probably other patches which were still too wet to be ploughed, but which nevertheless provided regular pasture for cattle. Although the total area of improved land was small,

(63) Minutes F, June 1721. This common was on silt, hence sheep were important. But the system of letting gates it illustrates was probably widespread in the valley.

its significance was great. The owners of unimproved land were made more fully aware by the improved patches of the limitations of their own land, and were perhaps as a result more ready for the period of improvement after 1760.

Chapter VI. The Hull Valley Drained 1760-1900

In the year 1760, the Hull valley was a watery waste for a large part of the year. Much of it had remained unchanged throughout historic times, except for the small areas improved by private drainage during the previous century. By 1900, the valley showed little sign of its earlier condition; floods were rare and arable and pasture land replaced the old carrs. The improvement was the work of drainage authorities set up by private Acts of Parliament. The landowners appear to have realised by the end of the eighteenth century that joint effort and large-scale schemes were necessary to drain an area like the Hull valley, and since the Court of Sewers was precluded from making large changes the schemes had to be organised by new drainage authorities. In the period between 1760 and 1800, five new drainage authorities came into being with control over part of the Hull valley. These were the Holderness Drainage (1764), the Cottingham Drainage (1766), the Beverley and Skidbey Drainage (1785), the Hessle Drainage (1792), and the Beverley and Barmston Drainage (1798). Fig. 30 shows the areas each controlled. Each Drainage was run by a body of commissioners or trustees chosen by the owners of the land within the level, and most also had some paid officials, especially a surveyor and a clerk. Each had power to lay

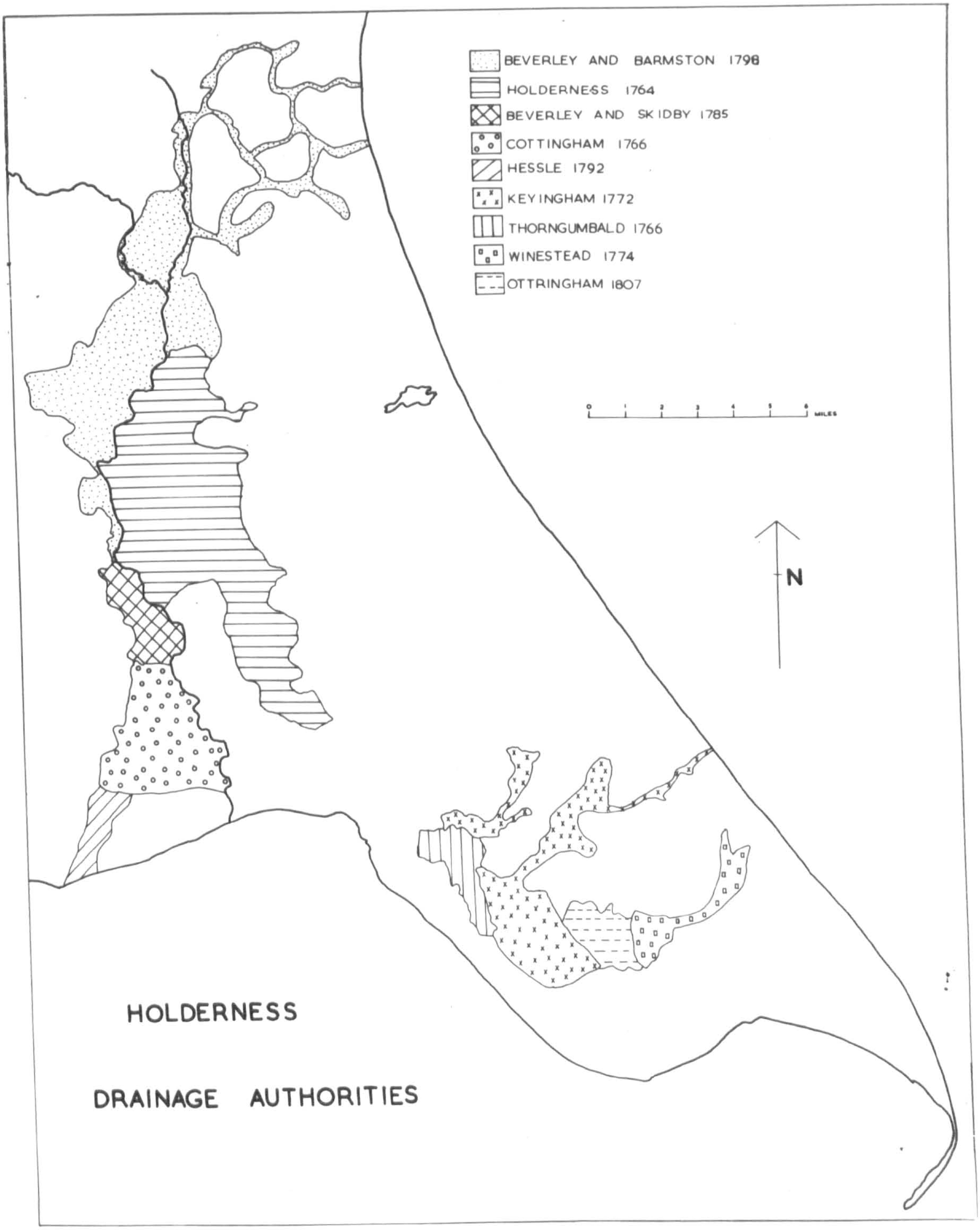


Fig.30. The authorities established by private Acts of Parliament with the dates of establishment. In the areas left blank the Court of Sewers retained control.

taxes on all the land within the level for the construction and upkeep of drainage works, although the new works were strictly limited by the terms of the respective Acts.

There are no local records which explain why so many new drainage authorities came into being between 1760 and 1800. Probably some factor, such as increased rainfall, led to the formation of the Holderness Drainage, which then acted as a stimulus to other parts of the valley.

The drainage of the Hull valley between 1760 and 1900 was determined by the problems which faced the new authorities, and the means of improvement they took in face of these problems.

The Problems

First and foremost, the new authorities had to grapple with the same persistent problems of physical geography that had troubled earlier would be drainers, i.e. the large volume of water from the chalk springs, the irregular flow of the drift streams, the very slight gradients, and the unsuitability of peat for constructing banks. Nevertheless, the engineering skill which had been accumulated by this date as a result of experience in draining other areas, such as the Fens, and in works of navigation, was such that the physical problems in the Hull valley were not unsurmountable. As it happened, however, the new authorities were also faced by other problems which combined to make the achievement of adequate drainage much more difficult.

Although the creation of new drainage authorities made possible the great improvements of the period, it contained within itself a significant problem. Previously the Court of Sewers had controlled the whole valley and was able to balance the interests of the different parts. The creation of new bodies meant that by 1798 there were six drainage authorities in the valley. (The Court of Sewers retained control over the Hull and the upland streams before they reached the levels). Each level had already developed on rather different lines during the previous century, e.g. the Holderness level already had a common interest as the area drained by Foredike, and the Beverley and Skidby level was principally the area drained by the 1647 new cut and clow. The creation of separate drainage authorities fossilised these incipient subdivisions of the valley. Each level created its own independent system of waterways, sometimes with results which look strange on the map. For example, the Holderness Drainage Act of 1764 made Mickley Bank the northern limit of the level, and excluded the area to the north, which was therefore joined with the carrs west of the Hull under the Beverley and Barmston Drainage Act (1798) and drained under the Hull into the Beverley and Barmston main drain (Fig. 35). The six authorities did not readily co-operate with one another, but were most concerned to prevent the others making any improvements that might have detrimental effects in their own part of the valley. This problem was most acute in the case of the Beverley and Barmston Drainage. By 1798, the Holderness Drainage had already been in existence for 34 years, and it had been able to achieve a relatively successful system of drainage, because the west side of the valley remained as a safety-valve for receiving the flood waters. It therefore insisted on the insertion of three clauses into the Beverley and Barmston Drainage Act, limiting the new works to the made. The clauses were:-

1) That the Beverley and Barmston banks should be at least 150 ft. from the Holderness banks.
2) That the height of the Beverley and Barmston banks should not exceed that of the opposite Holderness banks.
3) That there should be an overfall or overfalls of 300 yards in length in the Beverley and Barmston banks, at least six inches lower than the lowest 100 yards of the Holderness banks. This would ensure that if floods occurred it would be the west side that suffered, not the east.

These clauses put the Beverley and Barmston Drainage to considerable trouble. They had to remove some old banks and build new ones further from the river[1] The overfall

(1) B.& B. D. Minutes, Oct. 1802; H.D. Minutes, March 1803; Reports of W. Chapman on the B.& B.D. April and May 1803

at Grovehill continued to receive floodwaters and send them into the already overfull main drain until 1880. The limitation on the height of the banks was particularly irksome, for during the early part of the nineteenth century the Holderness Drainage was very slack about raising the opposite banks.(2)

The river Hull, too, exemplifies the problems which arose out of divided control. Four of the new drains opened into the Hull, and it was the water of this river which threatened to overflow the banks of the four levels. It was therefore in their interest to lower the level of the water in the river and increase its efficiency as a main drain. The Court of Sewers retained control, but was unwilling to make such improvements, which would give little benefit to the lands under its control. The individual drainages were unwilling to undertake the work, for it would benefit not only their only level, but also the other three. Co-operation

(2) Report of A. Bower, May 1816, to the Trustees of the H.D., copied into the Minute Book of the B. & B.D., Dec. 1838. Also Almack and Leonard's report to the B. & B.D. 1832. Speaking of Bower's report, which recommended the raising of the Holderness banks, they say: "We believe that these banks have never yet been raised ... So long as a belief is maintained that the B. & B. district is bound by law to receive the surplus water of the river, either by the overfall at Grovehill or over the banks generally, so long will the Holderness Proprietors escape the necessity of raising their banks". Page Spencer, surveyor to the H.D., said in a report, Jan. 1855: "I have inspected the whole of the E-banks of the river Hull, and find them in a great many places very defective, both as regards height and strength".

between the drainages was difficult to achieve, hence little was done to improve the river until 1873.(3)

A further problem arose out of the development of navigation interests in the valley. The main navigation authority in the valley was the Driffield Navigation, established by an Act of Parliament in 1767. This navigation used the Hull as far as Emmotland, and beyond this a canal was constructed to Driffield north of the West Beck (Fig. 31). This canal and other minor navigation canals were of some limited value as drains(3a), and drainage also benefitted by a more rapid run-off when the Driffield Navigation made a cut across the Struncheon Hill meander in 1801. But in many other ways drainage and navigation were in conflict. Whereas drainage required low water levels, navigation required the retention of water. The main difficulty was experienced north of the lock at Hempholme on the Hull, which the Driffield Navigation constructed in 1801. The Act of Parliament which sanctioned the new lock limited the

(3) H.D. Minutes and B.& B.D. Minutes. The two drainages agreed to combine to remove shoals and raise the adjacent banks. Little had been done before the opposition of the Driffield Navigation stopped further activity.

(3a) It was stated in favour of the Driffield canal that "the proposed Navigation will be a means of draining the adjoined lands that are now subject to be overflowed, as he (Grundy, the Engineer) has calculated the cuts to be made so deep that the surface of the navigable water will be 2 feet under the surface of those lands, and by which means the navigable canals will serve as a Mother Drain for the Country". Journal of the House of Commons, 26th Feb. 1767.

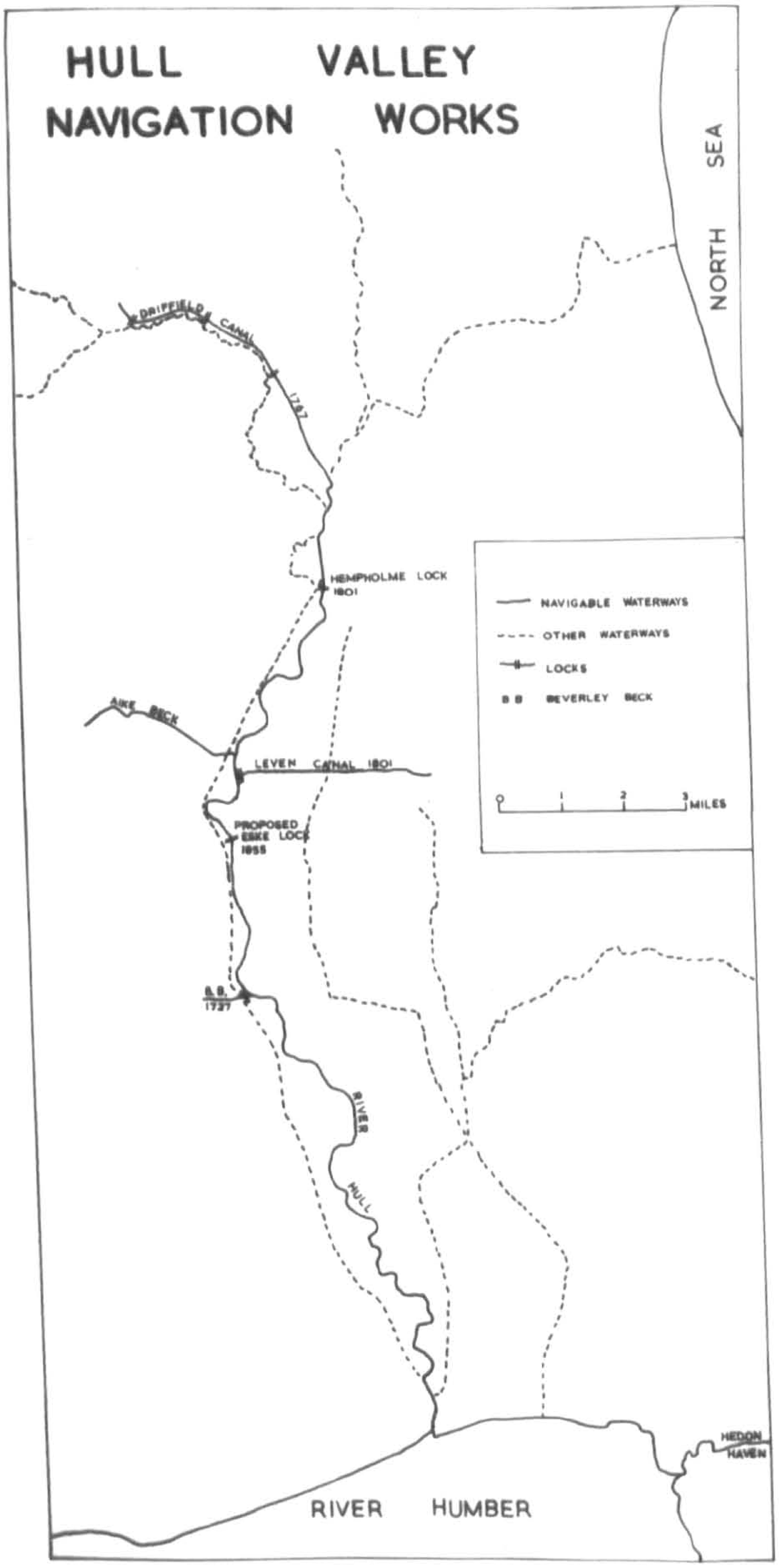


Fig.31.The dates shown are those of the year when the Act of Parliament was passed allowing the construction.

height to which the water was to be held, but in fact water was constantly kept one foot or more above this agreed level,[4] to the detriment of the adjacent carrs within the Beverley and Barmston district. In 1855 the navigation attempted to extend its control further south still, when it proposed to build a new lock at Eske[5]. The two main drainages both opposed the scheme and were able to prevent the necessary Act of Parliament being passed[6].

The interest of the Driffield Navigation commissioners in retaining the depth of water in the Hull also led them to oppose the dredging of the river when at last the Drainages had decided to co-operate in this venture. Welsh's report explained the detailed reasons: "The effect of the whole works ..... will be to lower the ebb stream throughout the entire length of the river, amounting to 8 inches at Struncheon Hill (Hempholme) Lock; closing the navigation through this lock (when it would otherwise be open) for entire days or successions of days, whenever there shall occur a

(4) B. & B.D. Minutes, Oct. 1814, Oct. 1839, June 1843, Nov. 1876. Report of Mr. William Lewin of Boston, Engineer, on the Present State of the Beverley & Barmston Drainage with a scheme for improving it. 1847.

(5) Report on the Improvement of the Driffield Navigation. Edward Welsh. Oct. 1855.

(6) B. & B.D. Minutes, Nov. 1855, Jan. 1856. H.D. Minutes, Oct. 1855.

combination of neap tides and moderate freshets".[7] In 1880, when the Beverley and Barmston Drainage Act gave specific permission to dredge the river, the Drainage had to stand the expense of lowering the lock in the interests of the Navigation.

Thus navigation added to the problems of drainage by leading to a retention of water, and by opposing the dredging of the Hull.

An even greater problem arose from the existence of the town and port of Kingston-upon-Hull at the southern end of the valley. This ~~involved~~ affected the drainage of the valley in several ways. It contributed to the inefficiency of the Hull as a drain, but at the same time led to the opening of the main drains into the river. It made difficult a change in the drainage pattern once it had become established, and there was often conflict between drainage authorities and citizens over the river.

Until the construction of Humber Dock in 1809, all Hull's shipping was forced either to anchor in the lower section of the river Hull, known as the Old Harbour, or to pass through this section in order to reach Queen's Dock (Fig. 32). The banks of the Old Harbour were lined with warehouses and the

(7) Report of E. Welsh, engineer, to the Driffield Navigation, June 1874.

~~the~~ river itself often crowded with vessels. Chalk and rubbish were dumped in the river to provide sites for loading and unloading, and the flow was thereby considerably hampered. The city corporation did little to keep the channel open; in fact in 1781, it allowed the mud removed in the construction of Queen's Dock to be dumped in the river.(8) In 1800 "the obstructions have now risen to such an extent as to be injurious not only to several of the drainages, but also to Hull haven, by preventing the influx and efflux every tide of a large body of water requisite to scour the harbour and keep it to its depth".(9) By 1835, "The warehouses, granaries, timber-yards, boat-builders yards, cranes etc., have been built and erected to the upmost extent of the right of the owners and lessees, and they subsequently have erected platforms of piled cliff-stone (i.e. chalk) projecting from those buildings and other erections into the river on which a vessell at high tide is laid up for the purpose of convenient loading or discharging her cargo. They have now extended those platforms so that two vessels are frequently laid abreast of each other. The platforms of stone are frequently breaking down and lodging in the deepest part of the river".(10) The effect of this on drainage can be readily imagined.

(8) H.D. Minutes, Aug. 1781. contain complaints about the effect of this on the Drainage.

(9) Report on the Proposed Branch Navigations from the river Hull. W. Chapman, 1800

(10) H.D. Minutes, Jan . 1835. Report by Stickney, Moiser, Jackson and Collett to the Commissioners of Sewers.

Not only was the city the cause of this choked condition of the lower Hull, it was also the influence which led the drainages to suffer from this. We have already seen that during the previous century more and more attention had been paid to the level of the outfalls. Followed to its logical conclusion this tendency favoured north-south drains opening directly into the Humber. When the two main drainages came into being, they were aware of the advantages of having outfalls directly into the Humber, and the increasingly choked nature of the Old Harbour must have emphasised these advantages. The original Holderness Drainage plan was for an outfall into the Humber at Marfleet(11), although there was also to be another into the Hull just north of Hull North Bridge. The Beverley and Barmston Drainage seriously considered an outfall into the Humber at Dairycotes.(12) But the Hull Corporation feared the Old Harbour might silt up if the scour provided by this water were lost, so it brought pressure to bear on the Drainages to open their drains into the river Hull, and condemned them to the problems this involved. The restricted size of the Old Harbour limited the outflow and raised the level of the Hull to the north.

(11) Report by J. Grundy, Dec. 1763 (Hull Corporation Records). Report by J. Smeaton on the Holderness Levels, 12th Jan. 1764.

(12) The Report of Mr. Chapman respecting the Drainage of the Low Grounds on the west side of the river Hull, 1796

The clows were therefore able to open and allow the landwater to flow for only short periods of time.

In the case of the Holderness Drainage, there is no direct evidence that it was the influence of the city authorities which led to the abandonment of the scheme for a Marfleet outfall, for neither the minutes of the Drainage, nor the Hull Corporation records make any mention of the matter. Two indirect references, however, suggest that the diversion of all the water to the Hull was made to benefit the Old Harbour. In 1786 "A Friend of the Undertaking" said: "It seems to have been an unreasonable objection to a drainage by that direction (i.e. to Marfleet), that, by taking away the back water coming from Holderness Carrs, it would have injured Hull Haven".(13) In 1807, Rennie reported on means of improving the Holderness Drainage: "The question therefore is How are these evils to be removed, without depriving the River Hull of any water that could be usefully employed in assisting to keep open the Harbour of Hull ..... Water is principally wanted as a Scour for Hull Harbour during summer, and in dry seasons, when the water in the river Hull is deficient".(14) There is more evidence in the case of the

(13) Observations on the Drainage of Certain Low Grounds on the East Side of the River Hull by a Friend of the Undertaking.1786.

(14) Report by John Rennie on the Holderness Drainage, Jan. 1807 E.R.R.O.

Beverley and Barmston Drainage. In November 1796, a joint committee of the Hull Corporation, the Dock Company and Trinity House was set up "to take into consideration the Probable effects of the intended Drainage of the Low Grounds on the West Side of the River Hull will have on the Haven of this port"(15). This committee agreed that each body should contribute £200 towards the expense of cleansing and deepening the lower part of the Hull if the Beverley and Barmston Commissioners agreed to open their main drain into the river(16). The drain was opened into the Hull, but the money never appears to have been paid(17).

In this way, the town of Hull can be blamed for one of the biggest problems facing the Drainages during this period, the inadequacy of the outfalls. Although the pressure to retain the outfalls into the Hull does not appear to have been continued after the opening of Humber Dock in 1809, and Princes Dock and its link to Queen's Dock in 1829, Hull contributed to the continuance of this problem in the
west of the valley in

(15) Hull Corporation Bench Book No. 10. Trinity House Vote Book 12th Dec. 1796.

(16) Trinity House Vote Book, 2nd March 1797

(17) There is no reference to it in the Trinity House Account Books of the period. The report of Almack and Leonard in 1852 says that the three bodies concerned "never contributed one farthing according to the terms of the agreement".

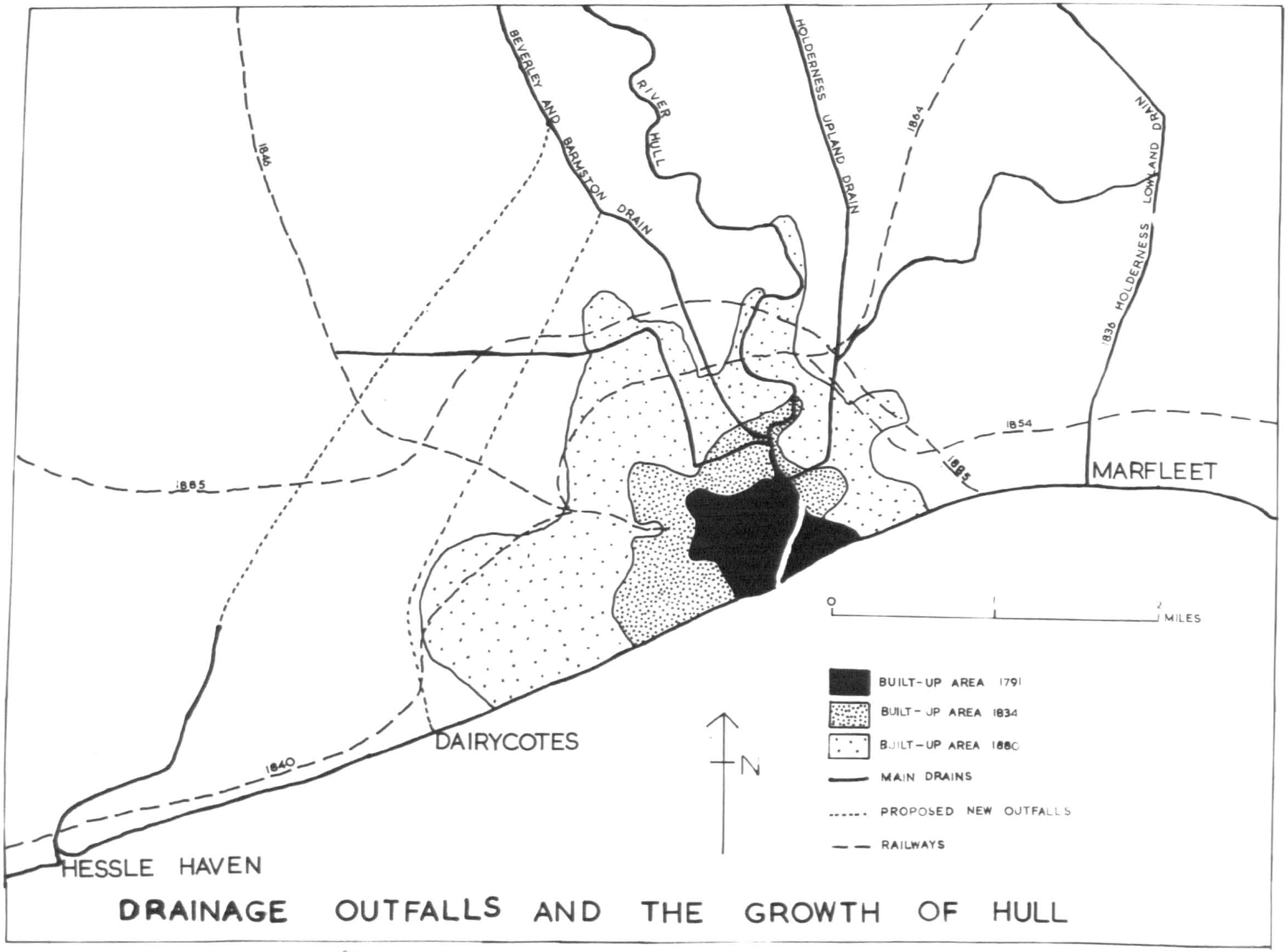


Fig.32. The obstacles between the Beverley and Barmston Drain and the Humber by the 1850s are obvious.

another way. The town was by this date coming to serve ~~function~~ more and more as the port of the industrial West Riding and North Midlands, hence it had developed important rail and road links to the west. A new outfall for the Beverley and Barmston waters direct to the Humber would need to tunnel under these, several lesser roads, and the railway to Beverley. These proved a major obstacle which prevented such an outfall ever being made, and forced the Beverley and Barmston level to continue to depend for its outfall on the inadequate Hull.

In many lesser ways, too, the growth of Hull provided problems for the drainage authorities. As the lower ends of the main drains become included in the built-up area, encroachments on the banks became frequent[18], numerous industrial undertakings wanted to pour their effluvia into the drains[19], and until the end of the century, much of Hull's sewage went into the drains[20]. These minor nuisances added together formed one of the major problems of the drainages by the latter half of the nineteenth century.

(18) e.g. H.D. Minutes Dec. 1826. B. & B.D. Minutes, Sept. 1835, June 1843, Aug. 1849.

(19) e.g. the Kingston Cotton Mill Co. B. & B.D. Minutes, April 1847 and B. & S.D. Minutes, April 1847. Hull Cotton and Flax Mill Co. H.D. Minutes, Sept. 1839, Feb. 1842, Nov. 1849. Isaac Reckitts, H.D. Minutes, July 1858.

(20) B. & B.D. Minutes, Aug. 1850, Aug. 1866, Oct. 1871. H.D. Minutes, May 1853, Aug. 1857, Jan. 1865, July 1866, Aug. 1867, July 1868.

Finally, the Hull valley was not free from a problem which perpetually limits drainage activity, a shortage of money. At all times the amount of improvement expected had to be set against the cost and even when no other problems arose, shortage of capital was from time to time sufficient to prevent changes. For example, in 1846, the Beverley & Skidby Drainage considered a recommendation to improve the drainage by enlarging the outfall clow and straightening and enlarging the drains, but were forced to reject it on account of the expense(21). The cost factor naturally loomed greater during periods of depression, and it helps to some extent to explain the periodicity of improvement. Prosperity was linked with the spate of improvement at the end of the eighteenth century, while the succeeding period of depression between about 1815 and 1830 was a time of inactivity. The high farming era of the middle nineteenth century brought another wave of interest in improvement.

The problems imposed by physical geography alone were considerable, but quite straightforward. The other problems contributed by the human geography served to make it considerably more difficult to achieve an adequate system of drainage, and their influence is apparent in the progress of improvement.

(21) The Report of Mr. Oldham on the State of the Drainage, B. & S. D. Minutes, April 1846.

The Stages of Improvement.

Economic factors tended to produce periods of activity separated by quieter periods. Changing conditions of human geography and changes in drainage technique altered the problems and possible solutions between one period of activity and the next. Three main stages by which the final drainage of the valley was achieved can be distinguished, in each of which the particular method that was best adapted to current conditions was adopted or considered. It is therefore possible to consider each stage in terms of, first, the system of drainage evolved and the reasons for it, and second, the conditions in the valley following each improvement.

Stage I. Drains opening into the Hull.

The new drainage authorities formed between 1764 and 1798 all constructed main drains to open into the river Hull just north of the then northern outskirts of the city.(with the exception of the Hessle Drainage which could most conveniently drain direct to Hessle Haven). In the cases of the relatively small Cottingham and Beverley and Skidby Drainages there were no real alternatives, but in the two larger levels the possibility of carrying the drains direct to the Humber was considered. In each case banks excluded the water from other parts of the valley, and the main drain was intended to carry off the water from the carrs.

In 1764 the Holderness Drainage Act was passed, and gave permission for large-scale works to drain the 13,000 acres of carrland "generally overflowed with water" on the east side of the river (Fig. 30). That this was the first area to be subject to a Parliamentary drainage can be explained by the more favourable physical conditions there. A large part of the level consisted of the subsidiary pro-glacial valley east of the main Hull valley, from which the chalk stream waters could be relatively easily excluded, and which received only relatively small drift streams. This was the part which had been most affected by earlier attempts to drain (Chapters IV and V), and it therefore had a stronger tradition of improvement than the rest of the valley.

It was generally agreed by everyone connected with the level that the first step was to build good banks along the Hull and Mickley Dike (the northern limit) in order to exclude the water of the rest of the valley. The advice of two eminent engineers, Grundy and Smeaton, was obtained on the more technical problem of removing the water from the carrs. The reports of the two engineers displayed a considerable measure of agreement.[22] Both favoured two main drains, one each side of the string of morainic islands forming the high ground

(22) Report by J. Grundy, Dec. 1763. Hull Corporation Records. Report by J. Smeaton on the Holderness Levels, Jan. 1764. Printed reports of J. Smeaton, Vol. I p.88

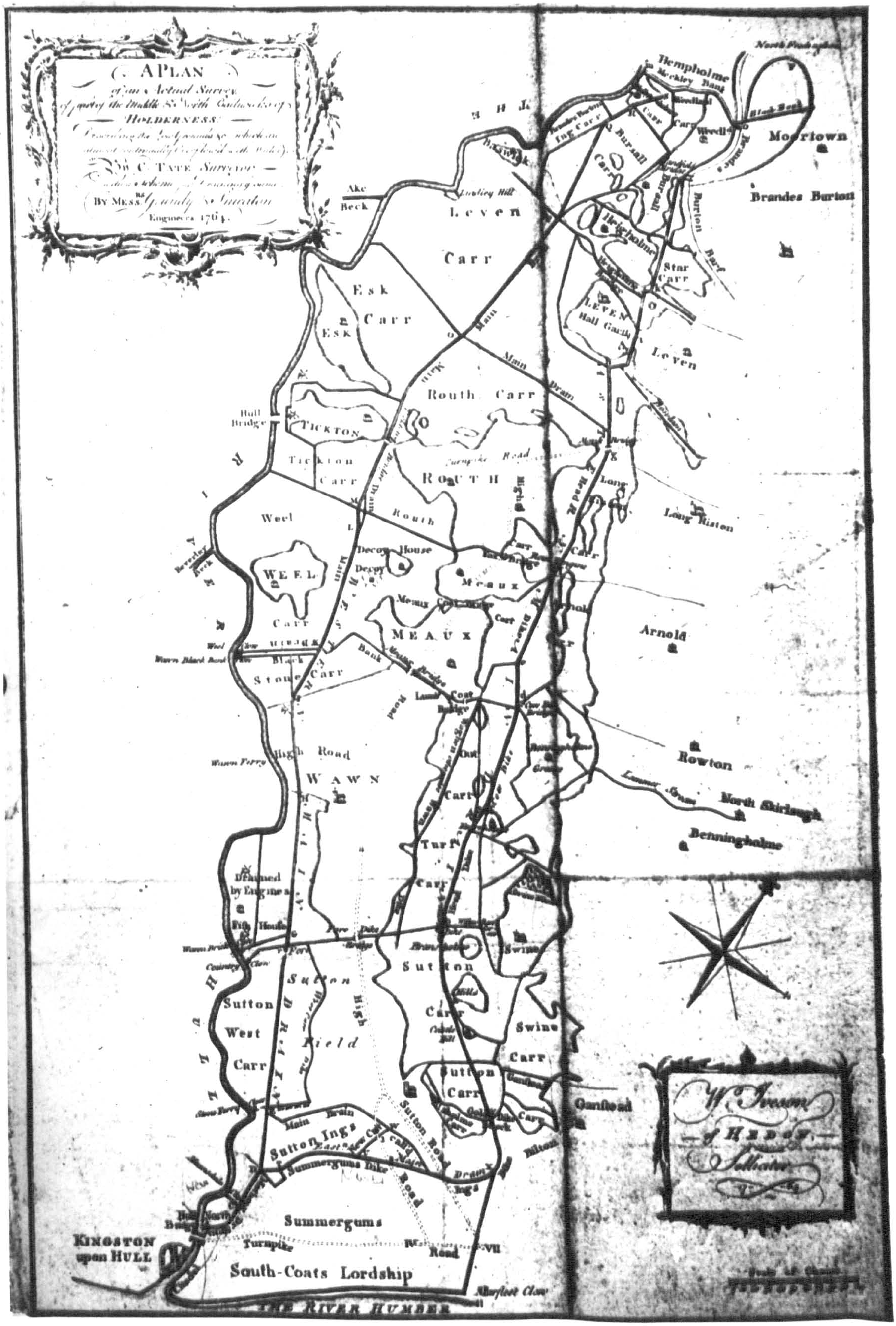


Fig.33. Reproduction of Tate's plan, 1794, showing Grundy's proposals for the draining of the Holderness Levels.

of Sutton, Wawne, Meaux, Routh etc., and two outfalls, one to the river Hull just above the Old Harbour, and one into the Humber at Marfleet (Fig. 33). All the clows higher up the river would be removed and the drainage allowed to follow its natural southward tendency. The two main drains were to a large extent intended to follow old but enlarged drains, linked in places by new cuts. The western main drain was to make use of the Engine Drain cut through Wawne lands by Sir Joseph Ashe in 1675 and at its lower end was to follow the longest new cut, from Foredike to the new clow into the Hull.

That this scheme was not followed through was the result of financial difficulties and the pressure of the Hull Corporation. The latter influence led the Marfleet outfall to be abandoned and all the water diverted to the Hull, even though the water which passed through Gold Dike Stock had originally passed southwards to Marfleet and the Lord's Clow, and had never contributed to keeping open the Old Harbour. Financial difficulties led to as few new works as possible being made, and old drains were not enlarged and straightened as Grundy and Smeaton had suggested. The western main drain was not taken through Wawne, Engine Drain, probably because compensation would have been required. The outfall clow to the Hull was made only 16 feet wide, 8 feet narrower than the size the engineers deemed necessary when it was planned to take only half the water.(23) The banks were also made smaller than Grundy had proposed. In September 1765 he reported: "The banks through Leven have been repaired all the way, in some parts by earth cast from the foregrounds of the river, in others out of the carrs ..... but are everywhere too weak and low, being as near as I can judge 12 - 15 feet base, 1 foot top and from 4 - 5 feet high. By the scheme they should be made 36 ft. base, 6 ft. top

(23) "Observations on the Drainage of Certain Low Grounds on the east side of the river Hull, 1786, by a Friend of the Undertaking" paints a clear picture of the economies made: "Instead of making the clough with 24 feet neat waterway, it was made with only 16; after, I believe, strenuous efforts to have it made only 12; instead of making the mother drain from the outfall to the proposed junction of the main drains 24 feet wide at the bottom, it was made only 18; instead of having a main drain by Gold Dike Stock to bring the water with expedition to the outfall, this drain was totally deserted; instead of carrying the western main drain from its junction with the eastern to about half the way over Stoneferry Common, and then dividing the same into two branches ... the whole was confined to one course ....; and instead of making this new mother drain which was to receive the water that was intended to be conveyed by both branches 22 ft. wide at the bottom, it is not in some places 14 ft. wide at the bottom. And thus, instead of bringing the great body of water in the carrs with a broad stream to within ½ mile of the outfall, it was confined to a narrow space extending about 3½ miles in length".

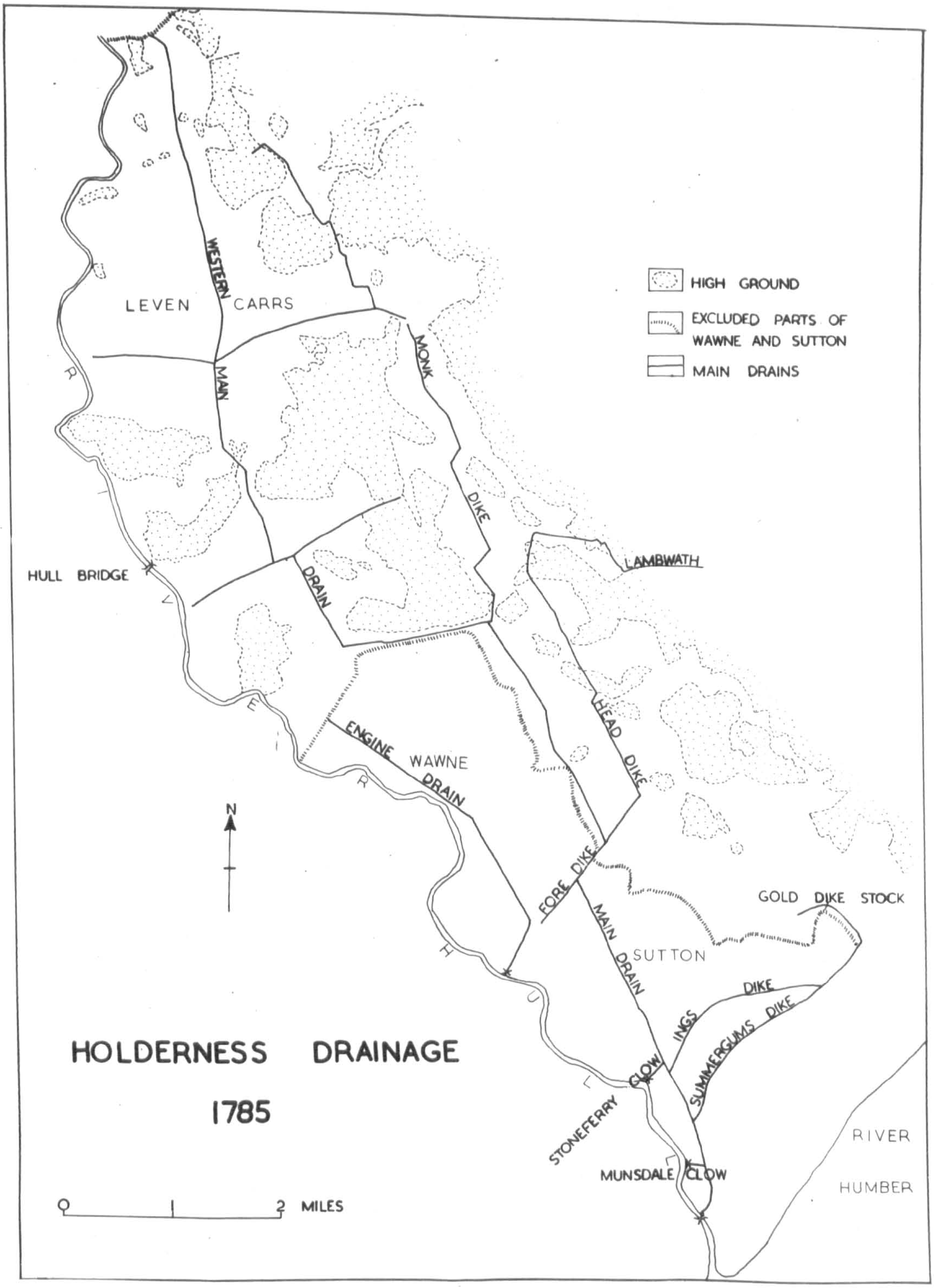

HIGH GROUND
EXCLUDED PARTS OF WAWNE AND SUTTON
MAIN DRAINS
LEVEN CARRS
WESTERN
MAIN
DRAIN
MONK
DIKE
LAMBWATH
HULL BRIDGE
RIVER HULL
ENGINE DRAIN
WAWNE
HEAD DIKE
FORE DIKE
MAIN DRAIN
GOLD DIKE STOCK
SUTTON
INGS DIKE
SUMMERGUMS DIKE
STONEFERRY CLOW
MUNSDALE CLOW
RIVER HUMBER
N
HOLDERNESS DRAINAGE
1785
0 1 2 MILES

Fig.34

and 9 ft. high"(24).

The main works which were completed were the new clow into the Hull, and the new drain from Foredike to the clow (Fig. 34). If the level had to drain to the Hull, this was the best position for the clow, for the tidal range was greater than further upstream, so that the clow could be set lower and the gradient of the drains increased (see Appendix I).

In spite of dissatisfaction with the state of drainage in the level, voiced by "A Friend of the Undertaking"(25) and John Hoggard(26) in 1785 and 1786, there were no major changes in the drainage for seventy years. The dissatisfaction led to the calling in of the engineer W. Jessop, who reported in 1787 in favour of the original scheme proposed by Grundy, with the exception that the Marfleet outfall and the drain through Wawne were omitted. These seems to have been followed by some small improvements to banks and drains in the

(24) Report of J. Grundy, Sept. 1765, quoted in a Report by A. Bower, May 1816. See also W. Jessop in a Report of July 1786, quoted in the Report of a Committee of Trustees of the Holderness Drainage, Jan. 1791: "about 9 miles of these banks at the upper end are in a very precarious state as they are barely sufficient in height to turn the large floods, and are in general so steep as to be much liable to be galled by the water when agitated with the wind".

(25) See note 23.

(26) John Hoggard's Minutes Relating to the Proceedings of the Holderness Drainage, from 3rd Dec. 1785. Hull University Library.

1790s[27]. But so long as the Old Harbour remained of so great concern to Hull, the major outlines of the drainage were unchanged.

The three small drainages at the southern end of the west side of the valley came into being after the Holderness Drainage, but before the Beverley and Barmston Drainage. The Cottingham Drainage (1766) and the Beverley and Skidby Drainage (1785) adopted the methods employed by the Holderness Drainage. The banks along the Hull were raised[28], and two main drains carried away the waters from the levels. The Beverley and Skidby drainage suffered, like its larger neighbour, from lack of capital, so that the outfall clow was made too narrow and the drains leading to it were not enlarged and straightened.[29]

A drainage for the remaining part of the valley was first mooted in 1796, when the landowners combined to call in three engineers for their views on possible methods of improvement. The reports of these engineers, Hodgman, Jessop and Chapman, reveal the choice of methods of drainage which faced the area. All three were aware of the limitations of the river Hull as a main drain, and this was expressed

(27) One measure may have been the embanking and control of the Lambwath where it crossed Swine Carrs. H.D. Minutes, Jan. 1792. The minutes for March 1795 and April 1796 express satisfaction with "the works".

(28) B. & S.D. Minutes, Jan. 1791.

(29) B. & S.D. Minutes, March 1800, and Oldham, op. cit. 1846.

most clearly by Hodgman:

"the river Hull in the parts opposite to the present cloughs is so high as to override the internal waters; by which means, and the great deficits there are in the present drains, the low grounds and carrs are in wet seasons overflowed with water..... if the contractions of the sides and the obstructions of the bottom of the river Hull by stones and timber be continued to be made ..... the drainage of the country above must be growing continually worse and worse"(30).

Hodgman therefore suggested a deep cut from the northern end of the valley through the boulder clay and gravels to the sea at Barmston. Jessop similarly thought an outlet into the Hull impossible, but he considered that a cut to Barmston, though practicable, would be too expensive, and therefore favoured a cut to an outfall into the Humber(31). Chapman agreed with Jessop as to the expense of draining the whole area to Barmston, but suggested taking the water of some of the upper tributaries in that direction, for which much shallower cuts would be required. For the rest of the water, he thought there were two possible outfalls; either into the Hull, where he found the bottom of the drain would be "on a level with the surface of the river in the rather flooded

(30) The Report of Richard Hodgman, Engineer, 1796.

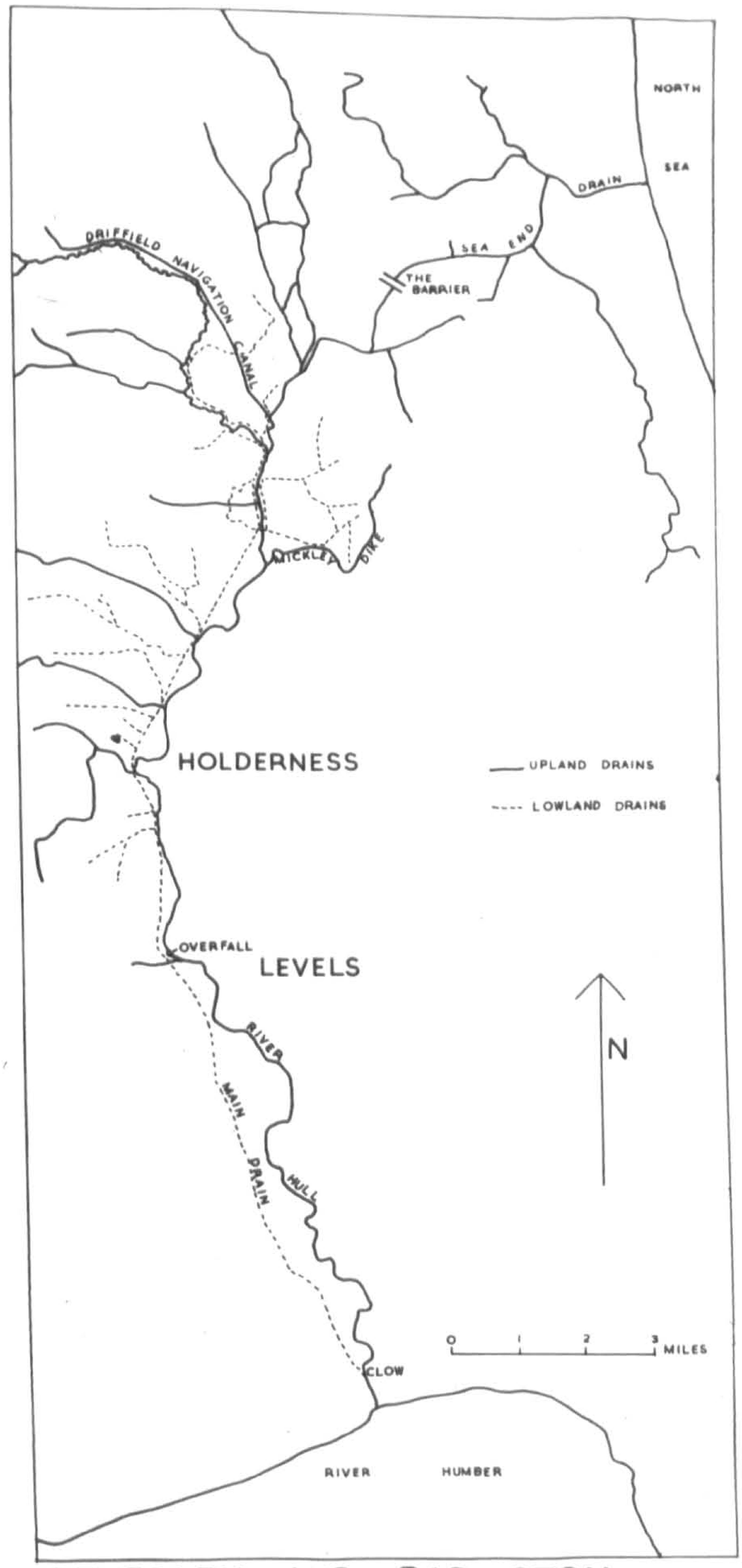
(31) The Report of Mr. Jessop concerning the Drainage of the Low Grounds on the west side of the river Hull etc. 1796.

state ..... and 2 ft. 9 ins. under the highest flooded state of the river at low water"[32]; or into the Humber at Dairycotes. Since the latter outlet would give a greater fall at a similar expense, Chapman, like Jessop, favoured a Humber outfall.

When the three reports are taken together, they show a clear emphasis in favour of an outfall direct to the Humber, and if the landowners had been guided only by these reports, there is no doubt that this course would have been chosen for most of the water. But Chapman had said that an outfall into the Hull was a possible alternative, and the pressure of the Hull Corporation, Trinity House and the Dock Company led this outfall to be the one chosen. In 1798 the Beverley and Barmston Drainage Act was passed. This sanctioned the cutting of a new drain to open into the Hull, and also embodied the various limitations imposed by the Holderness Drainage.

Fig. 35 shows the drainage system which was evolved under the Act. Chapman's scheme for diverting some of the water to Barmston was adopted, and new cuts linked improved sections of old drains to carry all the water east of Foston

(32) The Report of Mr. Chapman respecting the Drainage of the Low Grounds on the west side of the river Hull etc. 1796.



BEVERLEY AND BARMSTON DRAINAGE 1810

Fig.35

to the sea[33]. A barrier prevented the waters from the lands further west passing this way. For some time the Commissioners of the drainage endeavoured to persuade Chapman (then engineer to the drainage) to send more water to Barmston. In March 1801 they resolved: "that all the water which could with propriety be carried to the sea, ought to be carried to the sea"[34] and "that the barrier, if there be to be any barrier at all, ought to be placed not nearer to the sea than the Driffield Navigation"[35]. Chapman considered that this was impossible, the barrier remained at Foston, and the Sea-End (as it was called) evolved as an almost separate drainage area.

In the main part of the valley, banks were raised along the Hull and the main tributary streams, and the Hull continued to be the main drain for the upland water. A new drain was cut for the lowland water which passed through culverts under the embanked tributaries. The overfall insisted on by the Holderness Drainage was placed at the southern end of the Level, at Grovehill near Beverley. South of Grovehill, the drain was cut through land under the control of the Beverley

(33) A sea-clow was planned initially, but in 1801 the Commissioners decided this was unnecessary. B. & B.D. Minutes, March 1801.

(34) Ibid.

(35) B. & B.D. Report Book, April 1801.

and Skidby, and Cottingham Drainages to an outfall clow into the Hull close to that of the Cottingham drainage and just north of the Old Harbour.

There are various references which give some indication of conditions in the valley following these improvements. It is clear from these that the Holderness levels were converted principally to summer grounds, while the improvement in the Beverley and Barmston level was slightly greater, producing some winter grounds. The extent of improvement following the Holderness Drainage Act of 1764 is revealed by the drainage award map of 1775 (Fig. 36). A considerable area in the south of the level had an increased value of 8s. or more per acre, but in the north there were areas where there was either no improvement or only a very negligible amount. The records and reports of the Holderness Drainage draw most attention to the shortcomings, but others were impressed by the improvements. Chapman stated in 1796 that the carrs on the Holderness side of the valley were then on an average two feet lower than those on the west side, owing to the peat shrinking after drainage.(36) In 1812, Strickland reported that the Holderness Drainage "though still imperfect, has made a great improvement in the adjoining lands, many of which, from

(36) Report of Mr. Chapman respecting the Drainage of the Low Grounds on the West Side of the River Hull, 1796.

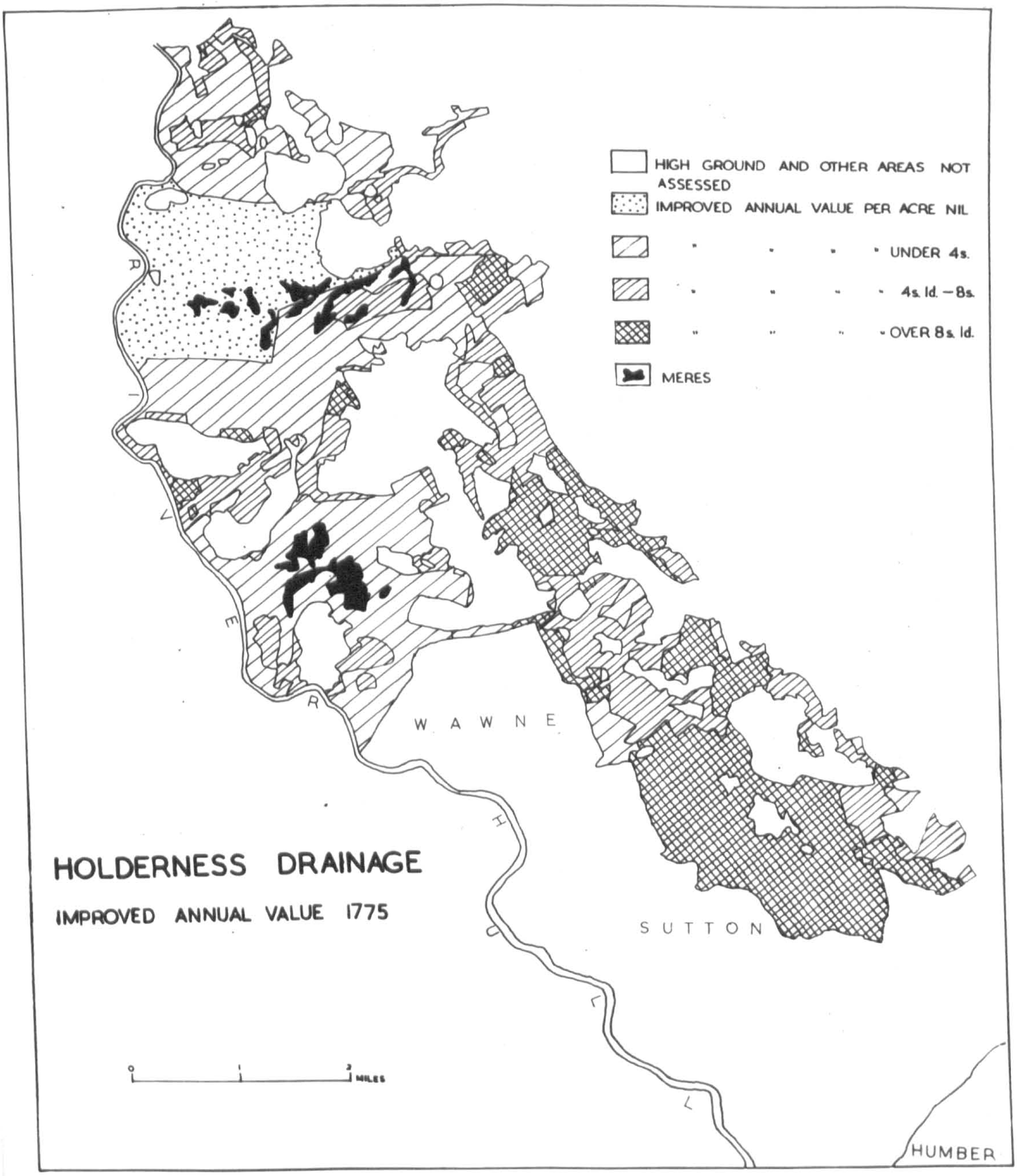


Fig.36. The map shows that in the initial stages of the Holderness Drainage it was the southern carrs that benefitted most.

having been of little or no value, are now let from fifteen to thirty shillings per acre"(37).

The imperfections of the drainage, mentioned by Strickland, were described in more detail by others. In 1785, "A Friend of the Undertaking" found "Sutton Carrs and the carrs adjoining about a foot and a half under water"(38), and a Committee reported finding 1 ft. 4 ins. of water on Wawne low lands, and 1 ft. 8 ins. on Sutton low lands in February 1786(39). Rather later, in 1831, but still before further changes were made, the surveyor to the drainage found "the principal part of the Low Grounds covered with water to a great depth. They remained more or less in this state for 5 or 6 weeks"(40). The limitations which led to these conditions were also emphasised in contemporary comment. Bower pointed out the restricted outfall provided by the Old Harbour: "It is highly proper that steps be taken to remove and prevent any further encroachments on each side of the River at Hull, which are now become so numerous and extensive that even a boat

(37) H.E. Strickland. A general View of the Agriculture of the East Riding of Yorkshire 1812 p. 105. The high values he quotes compared with those noted by the 1775 award may have resulted from inflation in the intervening years.

(38) op. cit. Even this figure reveals improvement, for in Dec. 1763 Grundy had found 4ft. 8ins. of water there.

(39) H.D. Minutes, Feb. 1786.

(40) Report of Mr. Edward Page upon the Better Drainage of the Lands within the Level of the Holderness Drainage, May 1831.

cannot pass at low water"(41). John Hoggard noticed that when the clow doors of the main drain were shut, the water tended to overflow from the drain into the carrs(42). Rennie found "there is little water running in the Main Drain which passes to the River Hull at the Old Sugar-House, and none at all in the Lamwith Drain, or in the small Drains on the East side of it; In fact, there is but very little living Water on the East side of the River Hull"(43). A Committee described how they found "the river bank between Hull Bridge and Watton Beck in several places not more than one foot above the water in the river, And that in some places the water was actually over the banks"(44). It is clear that the drainage of the level was far from complete.

There is less evidence at this time of the condition of the Beverley and Barmston level after the new drain was cut. Strickland found that "the average improvement of the lands is 14s per acre"(45). Later reports by Page, however, describe the many shortcomings (p. 192), and contemporary dissatisfaction is revealed by the decision in 1813 to ask a Mr. Thackeray of Gainsborough for his suggestions for

(41) Report of A. Bower to the Trustees of the H.D. May 1816.

(42) Hoggard, op. cit.

(43) Report by John Rennie on the H.D. Jan. 1807. E.R.R.O.

(44) H.D. Minutes, Jan. 1791.

(45) Strickland, op. cit.

improvement.(46)

Unfortunately, none of the accounts of the valley give details of the uses to which the improved carrs were put. In those parts which were still normally flooded in winter, pasture was the most likely use. Elsewhere some land was cropped, but probably the conditions were such as to favour spring-sown crops such as rape, oats and barley.

Stage II. Drains opening into the Humber.

Between about 1830 and 1865, both the Beverley and Barmston and the Holderness Drainages were concerned with altering their pattern of drainage in order to divert the lowland water direct to the Humber. The Holderness Drainage successfully completed this change, while the Beverley and Barmston Drainage did not, a reflection of the influence of Hull's westward links.

In 1829 the connection was opened between Queen's Dock and the Humber via Princes Dock and Humber Dock. Thereafter the Old Harbour became of much less importance to the city, and the Drainages were released from the requirement to send their water into the lower Hull. The Holderness Drainage rapidly took advantage of this change. In May 1831, Edward Page, the surveyor to the Drainage, reported on the difficulties

(46) B. & B.D. Report Book, July 1813. There is no evidence that Thackeray ever made a report.

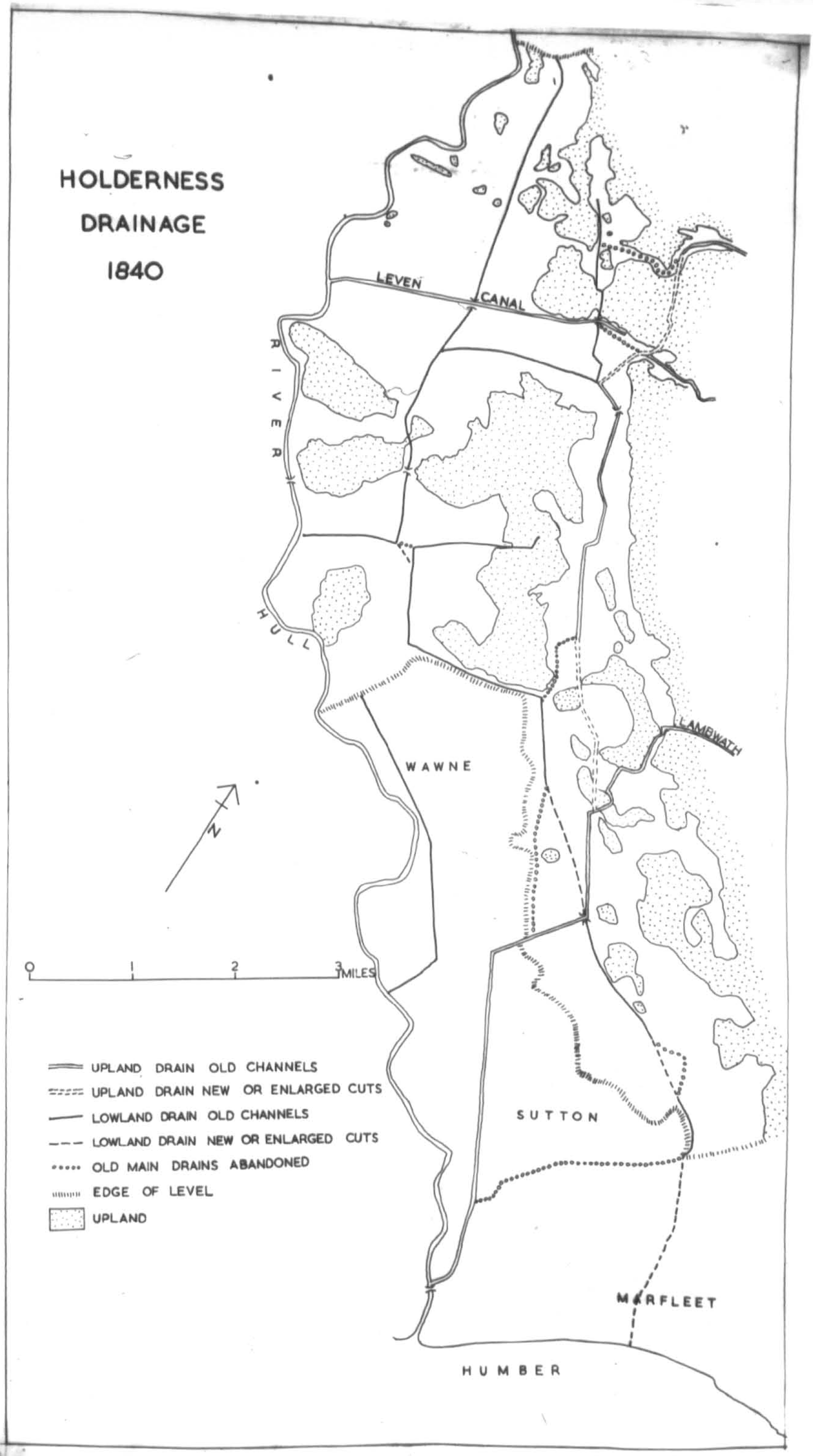


Fig.37. Based partly on Edward Page's map of the Levels,1831, which showed the proposed changes.The alterations were sanctioned by the 1832 Act,but Page's plan was not followed in all details. The drains shown as abandoned no longer functioned as major carriers,but were used as minor drains.

which resulted from having the main outfall into the Hull, and recommended the separation of the upland and lowland waters and the opening of a new outfall to Marfleet(47). This scheme was adopted and embodied in the Holderness Drainage Act of 1832.

Fig. 37 shows the changes made under the Act. The upland waters (principally the Lambwath) were embanked and carried at a relatively high level to the existing clow into the Hull. Because the drain was at a higher level, the clow could be set higher, and the high level of the Hull was not therefore so great a disadvantage. The lowland water was carried under the upland drain by the new cut to Marfleet, where L.W.O.S.T. was about 8 ft. lower than at the clow into the Hull. Fig. 37 indicates how the existing drains were used together with a few new cuts. At the same time the opportunity was taken to enlarge and straighten many of the drains.

The Beverley and Barmston Drainage did not make any moves towards obtaining a change of outfall until much later. In 1847, the engineer William Lewin was called in to make a report on methods of improving the drainage. He realised that the greatest problem was the condition of the Old Harbour,

(47) Page, op. cit. 1831. The scheme has some resemblances to that proposed by Rennie in 1807, although Rennie planned to take the upland water to the new outfall.

and therefore proposed that either the bed of the Hull should be cleared out and deepened below the Beverley and Barmston clow, or a new cut should be made to the Humber[48]. But already roads and railways lay across the line of the proposed cut[49], so that the balance of cost was in favour of the first alternative. The Commissioners of the Drainage therefore decided in favour of dredging the Old Harbour, but they hoped for the co-operation of others in this work. A deeper Old Harbour would have been to the advantage of the other Drainages and the shipping interests, so the Beverley and Barmston Commissioners approached these other bodies with the view of obtaining their financial assistance. But the Corporation of Hull and the Dock Company had by then little interest in the Old Harbour; the Holderness Drainage was not unduly troubled by its choked condition now that it only sent upland water into the river; and the Cottingham and Beverley and Skidby Drainages were too poor to contribute. The Beverley and Barmston Drainage therefore allowed the idea to lapse.

During the following few years the search for a cheaper means of improvement continued, and a great many engineers gave their views. Nevertheless the various reports made it

(48) Report of Mr. William Lewin of Boston, Engineer, on the Present State of the Beverley & Barmston Drainage with a scheme for improving it, 1847.

(49) The Hull-Selby railway was opened in 1840

quite clear that the chief hope of improvement was to adopt one of Lewin's alternatives. In 1848, Leather was called in to consider whether improvement could be obtained by raising the banks, and he reported that raising the banks would bring little improvement unless the river were dredged at the same time(50). Page made a report in 1850 which favoured a new outfall to Dairycotes on the Humber(51). Parkes favoured diverting all the water to Barmston(52), while Almack and Leonard proposed raising the banks, building a lock across the Hull at Stoneferry, and diverting more water to Barmston, where a sea-clow should be built(53). Jackson supported the dredging of the lower Hull(54). The proprietors of the Drainage set up two Committees, in 1858 and 1861, to consider these conflicting possibilities. Both decided that a new outfall to the Humber would provide the cheapest adequate improvement, although the first favoured

(50) Reports on the State of the B. & B.D. with the Improvements Suggested Therein by George Leather Esq. C.E. Leeds, 1848

(51) Report on the State of the B.& B.D. by Edward Page, presented Jan. and July 1850 and printed in 1853.

(52) Report of Josiah Parkes on the B. & B.D. 1853

(53) B. & B.D. Report to the Proprietors by John Almack and Abraham Leonard, Commissioners, 1852

(54) Remarks on the Methods Proposed for improving the Drainage of the Low Grounds of the B. & B. Level by Hugh W. Jackson, one of the Commissioners, 1853.

Hessle Haven and the second Dairycotes[55]. But on both occasions the proprietors rejected the recommendations. No reasons are given for the rejection, but undoubtedly the cost was the principal factor which influenced the decision.

Since the principal hope of improvement had been so effectively barred by Hull, the Drainage was forced back onto the main alternative, the dredging of the Old Harbour. A dredging machine was purchased and 16,000 tons of material removed from the bed of the Old Harbour between April and July 1864[56]. This lowered the level of the river considerably so that, for the first time for many years, the clow was completely uncovered at low tide. Unfortunately this improvement was shortlived, for sufficient account had not been taken of the 'greasy' nature of the silt. The foundations of adjacent buildings were affected[57]; the Drainage was faced by a bill of £1038.10s. compensation, and to prevent further damage it lined the bottom of the river with about three feet of chalk. Much of the advantage gained by dredging was therefore lost. Yet another means of improvement was effectively closed to the Drainage.

(55) Report of Messrs. James Hall, Thomas Prickett, Daniel Boyes and William C. Harrison upon the Condition and Practicable Means of Improving the Drainage, Nov. 1859. Report of the Committee to the Proprietors, May 1861.

(56) B. & B.D. Minutes 1864

(57) Ibid. A series of exceptionally high spring tides was the immediate cause.

During the middle decades of the nineteenth century, therefore, there was a contrast between the two sides of the Hull valley, with the Holderness level more effectively drained than the Beverley and Barmston level. The clearest indication of the improved nature of the Holderness level comes in the report by Jackson, one of the Beverley and Barmston Drainage Commissioners, in 1853: "There can be no doubt that the Holderness level is much benefitted by the late improvement in their drainage, as the land is neither so frequently flooded, nor does the water continue so long upon it"(58). Nevertheless, there was still some cause for dissatisfaction: "a quantity of land in the Holderness level is still in wet seasons under water ..... some ..... from 4 to 6 weeks"(59) and in 1854, one sixth of the taxable land was still liable to inundation.(60)

Several of the reports which proposed improvements in the Beverley & Barmston Drainage also described conditions as they were in the level. Page was able to give the fullest account, for he had been surveyor to the Drainage for some years. He described how, in July 1828, there had been up to 4 ft. 6 ins. of water on the carrs, and he and a companion

(58) Jackson, op. cit. 1853

(59) Ibid.

(60) A Report to the Proprietors (of the H.D.) on the State of the Main Drain with a Scheme for its Improvement by Daniel Boyes 1854.

had "sailed in a boat, without much interruption, over land and fences, in nearly a direct line from Hull Bridge to Frodingham Bridge"(61). That was no doubt an exceptional year, but winter flooding appears to have been common in much of the level. In 1852, Almack and Leonard found "as near as we could judge from observation, about 300 acres under water at the sea end and 1200 at the Hull end"(62). Page considered that "it is impossible in its present state to clear the land of weeds or pursue any regular or profitable course of management, the manures are rendered almost useless from repeated floods; the seasons of seed-time are often lost or much protracted, the autumn-sown wheats frequently perish in the ground, and a great deal of corn has been lost when ready for reaping, as was the case in 1828 and 1829"(63). Such reports were inevitably biased towards finding evidence of need for improvement, and therefore do not mention such areas as may have been adequately drained. Nevertheless they show that in some parts at least a great deal of improvement was still needed.

Several sources indicate the uses made of the carrs during the middle decades of the nineteenth century. The tithe

(61) Page, op. cit.

(62) Almack & Leonard, op. cit.

(63) Page, op. cit.

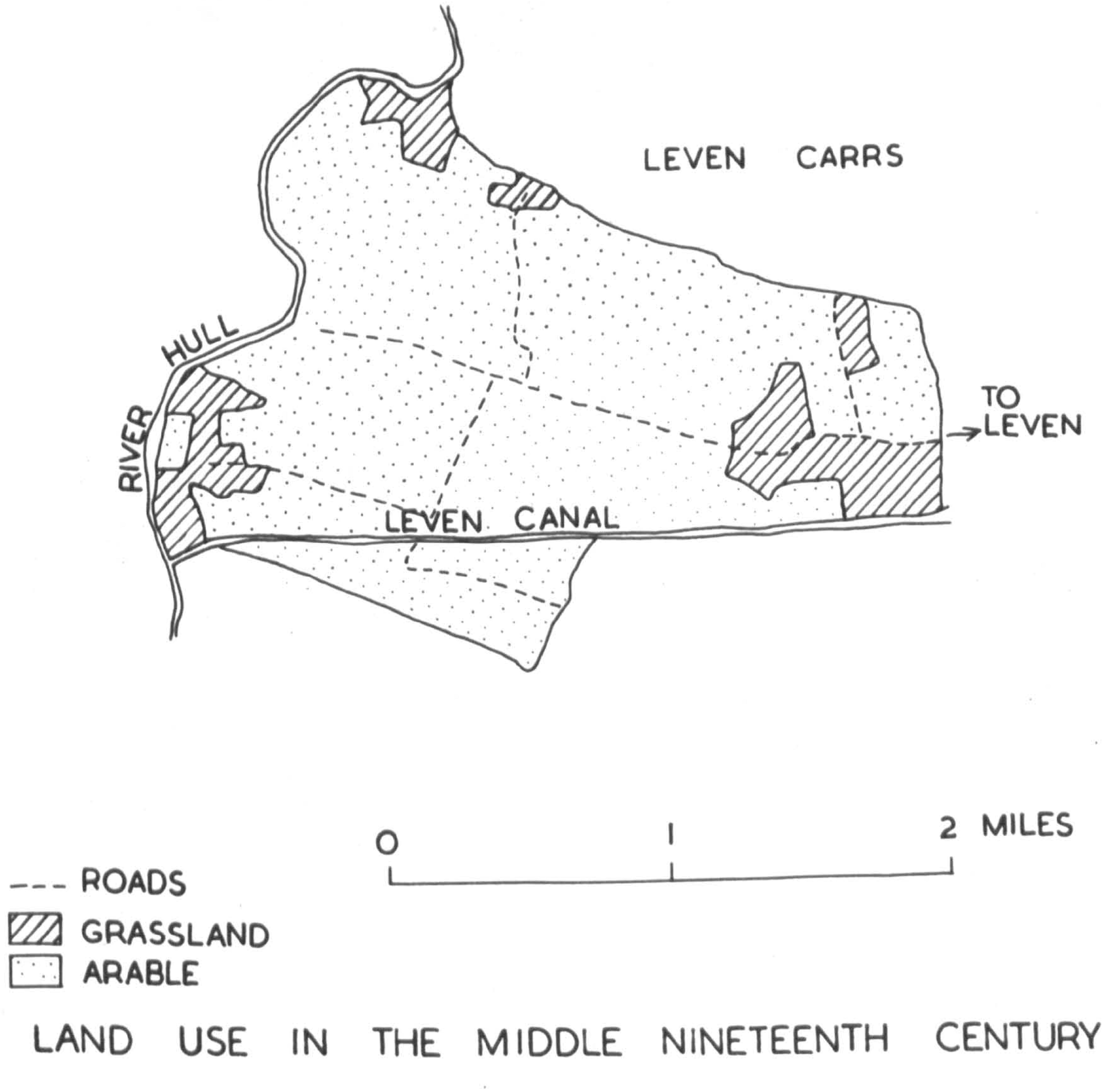


Fig.38. Based on the Tithe map and award.

records of the 1840s show both pasture and arable, with arable predominating in area. (Fig. 38). Legard gave more details of the arable: "The Carrs, of which the surface is peaty, extend from Brigham to Tickton, and comprise nearly 17,000 acres. On these peaty soils ..... turnips are cultivated and may be eaten by sheep, and this consequently involves the 4-shift course. No soil is better adapted for the growth of rape than the peaty Carrs, prodigious crops of it are here produced; and it rarely fails unless the season be extremely dry"(64). A more detailed picture of the crops was given by Page, who noted in his report the land use of the fields flooded in 1828. In those fields where the flood waters were less than 3 ft. deep, oats and wheat were the chief crops; where the flood-waters were deeper, and where therefore flooding was probably more frequent, barley and grass were most common(65).

(64) Farming in the East Riding of Yorks. G. Legard. Prize Report in Journal of the Royal Ag. Soc. Vol. 9. Pt. I 1849, p.101.

(65) The following table summarises Page's observations:

Crop	Barley	Grass	Oats	Wheat	Fallow	Othercrops
Total no. of fields	33	30	25	19	22	5
With less than 3 ft. water	11	11	16	16	11	4
With over 3ft. water	22	19	9	3	11	1

No crops are mentioned in 27 cases.

Stage III. Pumping.

The latter part of the nineteenth century saw the Hull valley finally acquire a reasonably adequate drainage by the use of steam pumps.

Two new factors affected the drainage of the valley during this final period, one of which was beneficial, the other was not. The beneficial factor was the increasing amount of water which was prevented from reaching the drains by its abstraction by waterworks. As the city of Hull grew, its water requirements expended, and in 1860 the first waterworks were established at Springhead, near the source of the old Julian Dike. Gradually more and more chalk spring water was absorbed by this waterworks, by the Cottingham pumping station opened in 1890, and by others serving Beverley and Driffield, until by 1950 over 20% of the chalk water moving south and east from the Wolds towards Holderness was used by waterworks.(66) This extraction of chalk water was of greatest benefit to the Drainages on the west side of the valley.

At the same time, underdraining of the claylands of Holderness increased rapidly "causing the accumulated waters therefrom to flow into the lower portions of the level more

(66) C. Green. Water Resources of the Yorkshire Chalk. British Waterworks Assoc. Feb. 1950.

rapidly than they did a few years ago"[67]. There had been a little underdraining in the earlier years of the century by means of trenches filled with thorns or stones, or covered by an inverted sod.[68] But tile drains became popular only in the 1840s and 50s[69] and the cumulative effect of the improvements was not felt until the 1860s and 70s. It was the Holderness Drainage which was the principal recipient of the additional flood water, and which suffered a deterioration in drainage conditions as a result.[70]

The first steam pump in the district was that erected by the Beverley & Barmston Drainage in 1868, where its main drain passed under Arram Beck. Since the height of the river Hull was such that the water seldom flowed freely from the drain into the river, the drain often became so full that it could not carry away the flood water on the carrs. The pump was intended to relieve the drain so that it could carry away more of the flood water. The apparent impossibility of

(67) Report by Harker, (the surveyor) Jan 1877, H.D. Minutes.

(68) Strickland, op. cit. p.200

(69) Legard, op. cit 1848 p.101. "in many parts of Holderness this (underdraining) has been done vigourously within the last 2 or 3 years - so much so, that turnip-culture has been introduced on some farms where previously the land produced nothing but a miserable stunted herbage, or was devoted to the old, profitless, monotonous wheat, beans and fallow course, and hardly repaid the expense of cut".

(70) Harker, op. cit.

obtaining a better outfall for the main drain had forced the Drainage to adopt this solution. Nevertheless, the pump could seldom be used owing to the limited capacity of the river. The height of the Beverley & Barmston banks was still limited to that of the opposite Holderness banks, and the overfall still existed. There was no advantage in pumping water into the river at Arram if it was only to overflow back into the drain at Grovehill.

During the following few years therefore, the efforts of the Beverley & Barmston Drainage were directed towards increasing the capacity of the river Hull above the Old Harbour, so that it would form a larger reservoir to receive water pumped out of the carrs. In 1873 it persuaded the Holderness Drainage to join it in a scheme to dredge the shallowest parts of the river and use the mud to raise the banks on both sides equally.(71) It was hoped in this way to bring the banks to an average of 12 or 13 feet above the level of the adjacent carrs. Unfortunately the improvement had scarcely started(72) when the Driffield Navigation opposed the works, on the grounds that they would reduce the depth of water in the river. (see Welsh's report, p. 161). Dredging was therefore abandoned for the time being. The

(71) H.D. and B. & B.D. Minutes, 1873.

(72) A little dredging was completed near Hull Bridge.

Holderness Drainage was unwilling to sustain the expense of making the improvements in such a way as to satisfy the Navigation, and the 1798 Act still prevented the Beverley & Barmston Drainage taking action on its own.

To overcome these difficulties the Beverley & Barmston Drainage Act of 1880 was obtained. Under this Act the Hull was dredged between the Old Harbour and the Driffield Canal, the lock at Hempholme and the Leven canal outfall were altered to suit the lower water level, and the banks along the Hull were raised. At last the Hull was fit to receive large amounts of water pumped out of the carrs, and the pumping stations at Hempholme and Arram Beck (Fig. 40) were able to start work in the winter of 1882-3.

The Beverley & Skidby Drainage was also dependent on an outfall into the Hull, and adopted pumping as a solution to its problems. This was recommended by the engineers Harker and Welsh in reports in 1879[73], and the pump was erected at Dunswell in 1880.

There was less need for pumping in the Holderness level, although the increasing amount of flood water from the upland which entered the drains led to a proposal to pump from the drain at Marfleet into the Humber at high tide when the clow doors were shut. Nothing came of this suggestion, but later

(73) Reports by Harker, April and July 1879. Report by E. Welsh, Oct. 1879. B. & S.D. Minutes.

THE MARFLEET OUTFALL AND THE DOCKS

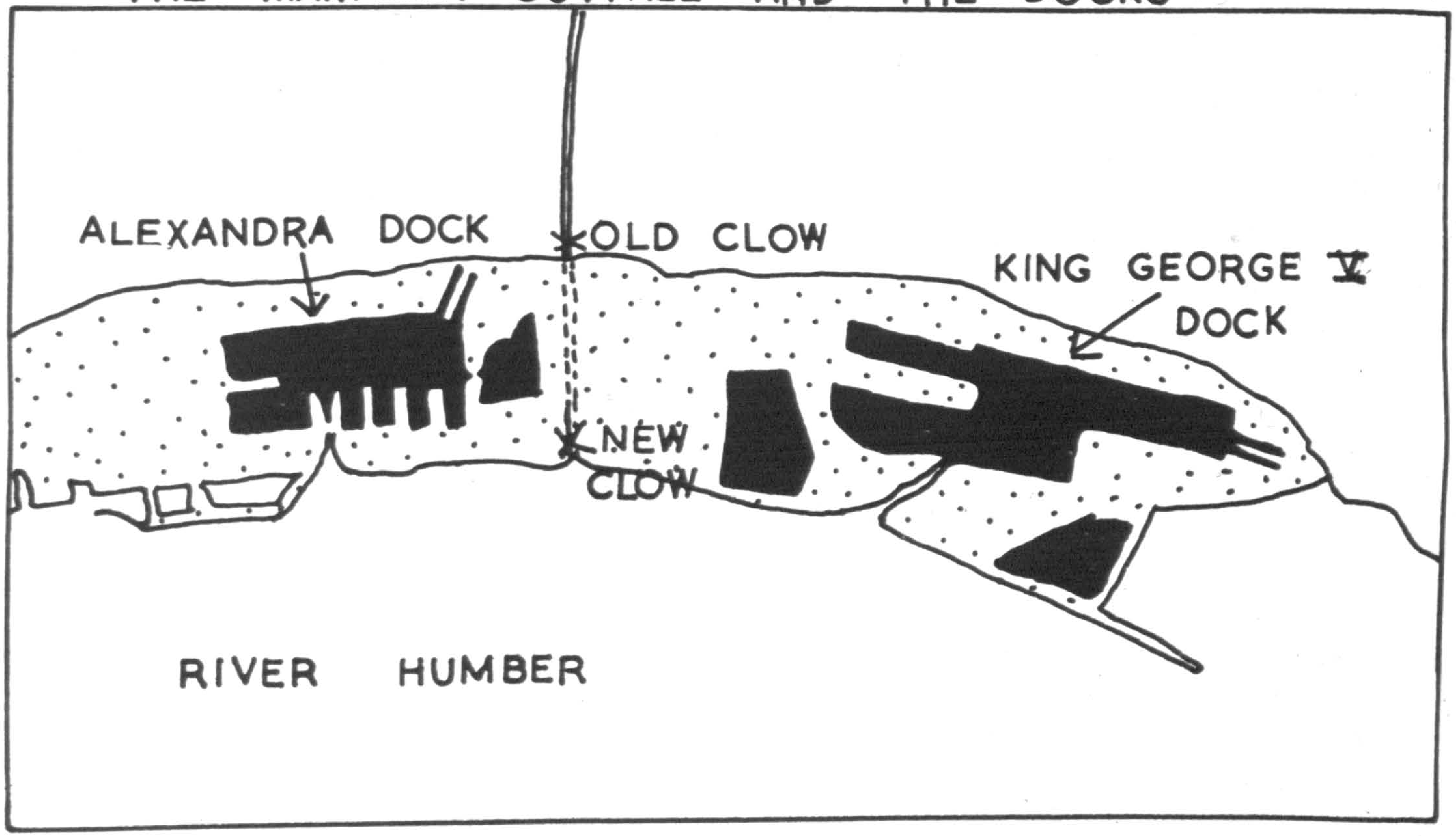


Fig.39

the Drainage obtained the benefits of pumping without cost to themselves. In 1882, the Hull and Barnsley Railway Company obtained an Act of Parliament, which enabled them to construct a new dock east of Hull, now known as Alexandra Dock. In 1885, the Holderness Drainage granted the Company permission to pump water from the Marfleet Drain into the Dock.(74) In 1889, the same company obtained an Act of Parliament which led to the construction of the King George V Dock, opened in 1913. The Holderness Drain was extended to a new clow between the two docks, and water from the drain was also pumped into the new dock. (Fig. 39)

The effect of the pumps was to reduce flooding in the valley to negligible proportions, although some of the lowest areas were still waterlogged in wet seasons. In March 1883, after the Hempholme pump had been run for 24 hours "the effect was such as to lower the water (in the drain) 9 inches and to clear the surface of the land in the Hempholme and Frodingham district and a considerable proportion of Arram Carrs"(75). The improvement was reflected by a further decline of grassland and the increase of arable in the valley. Spring-sown cereals remained the chief crop.(76)

(74) H.D. Minutes, April 1885

(75) B. & B.D. Surveyor's Report, March 1883

(76) S.E.J. Best. East Yorkshire, a Study in Agricultural Geography 1930. p.169

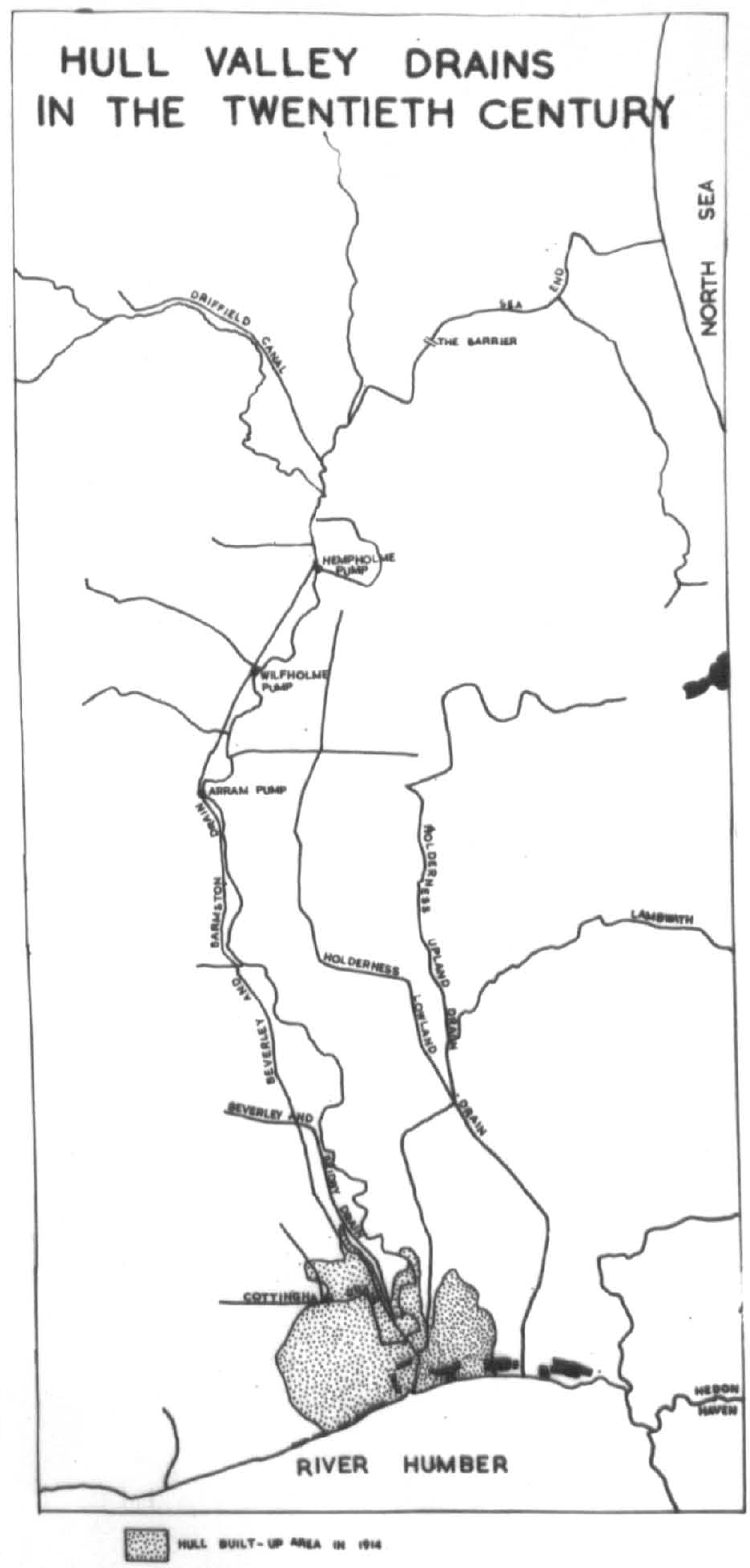


Fig.40. The old Arram pump went out of use when the new Wilfholme pumps were started.

The relative efficiency of the system of drainage evolved in this slow piece-meal way is reflected by the small amount of change made during the present century. The main alteration has been the replacement of the steam pump at Arram by two oil-pumps at Wilfholme. The separate levels came under the general administration of the River Hull Catchment Board in 1930 and the Hull and East Riding River Board in 1948.

Chapter VII. The Lower Humber 1532 - 1900

The lower Humber region includes all the marshlands east of the Old Fleet. The largest proportion consists of siltlands in a zone along the Humber, but the area also includes four valleys across the claylands drained by the Hedon, Keyingham, Winestead and Easington Fleets. Each of these valleys is considerably smaller than the Hull valley, but resembles it in containing areas of peat. The greatest extent of peat is in the Keyingham valley. Smaller upland streams without well-marked valleys, e.g. in Thorngumbald Ottringham and Skeffling, flow into the Humber between the four main streams.

Sixteenth and Seventeenth Century Conditions. The thirteenth and fourteenth century losses of siltland along the Humber appear to have been followed by 250 to 300 years during which changes in the area were relatively few. The conditions which existed during the seventeenth century, as exemplified by the more abundant records then, were probably representative of the whole period.

The peatlands in the four valleys were occupied by carrs flooded for much of the year. The flooding may have been less regular than in the Hull valley, however, for all the water came from the surface drainage of the boulder-clay. Conditions were worst after heavy rain. In May 1674, a petition from owners of land in the Winestead level stated that they "suffered great damage the last summer through a great inundation of water"(1). In the same year, Burstwick Ings in the Hedon valley were "all overflowed with water and for some years especially the two last almost wholy lost and this year likely to fare noe better"(2). In the Keyingham valley, Burton Pidsea Deep Carr was several inches lower than the valley nearer the outfall(3) and it contained Pidsea mere(4). There is no evidence of the uses made of these carrs, but they were no doubt similar to those in the Hull valley.

Two of the valleys, those of the Keyingham and Easington fleets were faced by extra dangers as a result of the gradual erosion of the North Sea coast of Holderness. Both valleys originally extended further east, but by the seventeenth century the coast cut across their upper sections. The Keyingham valley was only about 100 yards across where it was breached at Sandley Mere, but the Easington valley had probably suffered from erosion for considerably longer, so that a section over half a mile in width was exposed along the coast (Fig. 4). Salt water was liable to enter the valleys

(1) Minutes E.

(2) Ibid.

(3) A 1730 survey found it to be 14 inches lower than the Fleet at Keyingham Bridge, 5 miles nearer the Humber. Silting may have slightly increased the difference in level by that date.

(4) Feet of Fines, 1550 and 1606

at both points during storms, and would have rendered the carrs useless for several years. (The Easington level was flooded during the storm surge of February 1953 and the land made valueless for some time). By the seventeenth century the Keyingham valley breach was protected by a "rampier" or embankment at Sandley Mere, for the upkeep of which the whole level was taxed. The first recorded taxation for this purpose was in 1622[5], but the rampier had probably been in existence for long before that. In the Easington valley the size of the gap made it much more difficult to block. A 1670 report on South Holderness to the Court of Sewers gave much space to this problem:-

> "We doe finde the breach of the sea att Hutton is 760 yards in length att the entrance upon the shoare. When the sea overflowes the water keep itt course towards the levell at an uncertaine widenesse for about fifteen score yards from the Sea Cliffe, and then the water is contracted into a narrower passage, (That is to say) about 60 yards, soe runnes into the sewer called Blyth Bridge sewer, and from thence by a Clow att Cart Gappe and soe into Humber. Butt the water that comes in att the breach being more than the sewer can possibly conteyn Itt overflowes A Levell wthin the Lordpp of Easington

(5) Sewers 2.

called by the name of waters (which conteynes 261 acres of meadow and pasture) and Ffurtholme w^{ch} conteynes 100 acres of arrable land, and one hundred and fifty acres of meadow and pasture within the Lpp of Kilnsey. And we are informed that the last breach of the sea was about seaven years since, And that the Levell called the waters was totally drowned thereby, w^{ch} did soe much prejudice that for the space of ffive yeares after the breach the owners received noe benefitt or pfitt of that ground."(6)

The report proposed that a bank 80 yards long and 7 feet high should be constructed across the breach where it narrowed, but it is not clear whether this was ever done.

The salt water was held back along the Humber shore by banks and by clows at the exits of the drains. The clows of the four main fleets had to be set low in order to give as much fall as possible for the water from the carrs. The lowness of the clows meant that they opened to allow the landwater out only for relatively short periods at low tide. Much of the time they were closed and had to bear a heavy strain from the salt water. Often they were inadequate, and let in salt water. The 1670 report mentioned above stated that Keyingham clow was then letting in salt water, and no doubt this was a frequent occurrence. The difficulties of the carrs were thereby

(6) Minutes E.

further increased. The small upland streams were in a more fortunate position. Their clows could be set higher, e.g. in 1730, Thornicraft clow bottom was 5 ft. 4 ins. higher than that of Keyingham clow(7). The fresh water was therefore able to flow for a longer period of time, and the drainage provided by these streams was more adequate.

The clows on the main drains were normally set several hundred yards back from the Humber shore in order to reduce the strain as much as possible. The short tidal reaches below the clows provided small havens. The most important of these was at Hedon, which had been a port before the rise of Hull. It was further up the Humber than the other havens, and was therefore more sheltered from the attacks of storm waves. Keyingham, Winestead and Easington had only minor havens, but at Patrington a creek scoured by the water of an upland stream from Welwick was an important local harbour, from which vessels sailed especially to Hull and further up the Humber.

The silt zone was only relatively narrow by the seventeenth century, as a result of the earlier losses. Losses were negligible after about 1560, and probably for a century or more before that date. About 1580, a chart was drawn for

(7) Report by W. Brown, Surveyor, in June 1730. Minutes H.

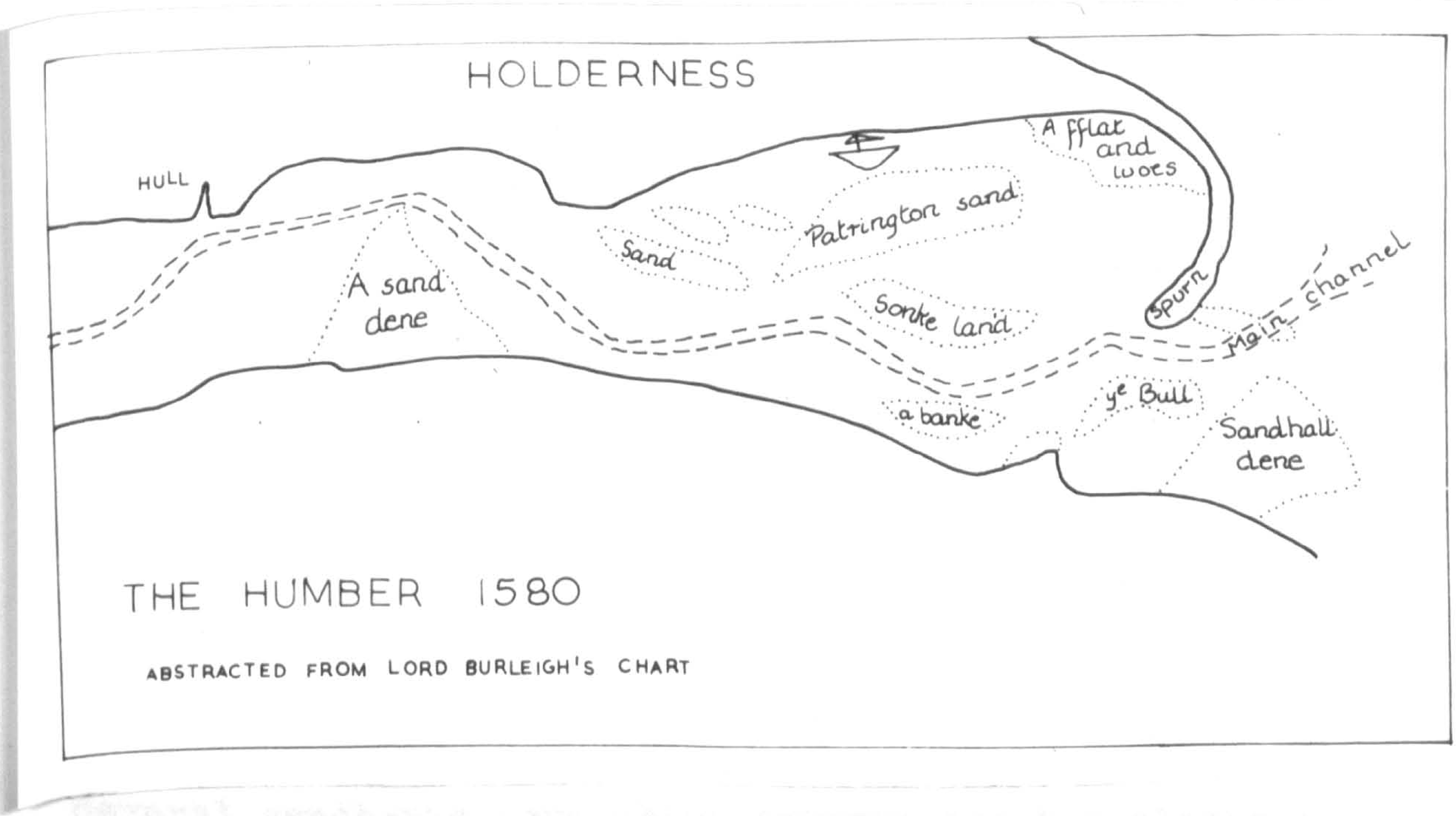

HOLDERNESS
HULL
A sand dene
Sand
Patrington sand
A fflat and woes
Sonke land
Spurn
Main channel
a banke
ye Bull
Sandhall dene
THE HUMBER 1580
ABSTRACTED FROM LORD BURLEIGH'S CHART

Fig.41

Lord Burleigh showing the East Yorkshire coast[8]. The Humber coastline that this shows cannot be compared in detail with that shown on later maps, because the chart is so rough. (Fig. 41) The shape of the coastline does resemble the line which appears to mark the furthest north location of Humber banks in recent times, however. Field-names and patterns suggest that this old Humber bank followed the line of the Pant Drain; south of the drain, field-names such as "groves" and "growths" are frequent. The similarity between the two lines is fairly certain evidence that there were no serious losses along the Humber after 1580. In addition, by that date serious losses would certainly have been mentioned in contemporary documents.

Lord Burleigh's chart also gives some indication of conditions in the Humber itself. The main channel was in approximately its present position, but the existence of another channel close to the Holderness shore (the North Channel) was suggested by the drawing of a vessel there. Several sandbanks were shown between the two channels. The largest was named "Patrington Sand", while south of that was another labelled "quicke sand some called Sonke lands". The notes on the chart described the Holderness shore:- "All alongist the shore of Holderness, saving three quarter

(8) Reproduced in T. Sheppard, "East Yorkshire in Map & Chart",

of a myle forenempst Pewle ys clay ground and woes (ooze) and that ys pebill stones". It is easy to understand from the information this chart gives us how the name Sunk Island, which was later given to land reclaimed from the Humber, was derived from the sandbank called Sunk Land. The name Sunk Land must surely indicate that the sandbanks were where dry land once existed, i.e. Tharlesthorpe and the other medieval settlements. Eighteenth century reclamation merely took back from the Humber land which the Danes and Normans had earlier embanked.

The siltland that had escaped medieval erosion was protected by banks. In 1580 "Humber Banke on Holdernes syde from the South blockehous at Hull to Easington eastwards ys commonly one yarde and a haulfe or ij yardes of height, saving at Paule Hill, and there the banke is higher alongist the shore by haulfe or quarter of a myle towards Humber mouth".(9) But in spite of these banks, there were "two breaches at Sawtey (Salthaugh) and one at Welwick called Bitchcrofte as large as both thother ij, for the repayring whereof the Quenes Maiesties Landes be chargeable. And therfore the said breaches ought to be made and amended by hyr Highnes Coste, expenses and charges, or else the country and her Maiesties Lands there wilbe drowned".

(9) Ibid.

The seventeenth century records of the Court of Sewers suggest that the sea was then still attacking to some extent, and would have eroded more of the siltland had not the banks held it back. There were several references to banks damaged and broken by storms. One of the earliest records of the court is an order for the building of a new seadike at Skeffling as the old ones were "so torne and undermined with the floods of that river of Humber"(10). In 1660 the inhabitants of Skeffling complained "that the late tide of Humber hath been so vehiment violent in working on our Skeffling shoare that it hath prostrated our banks and bendings ....."(11) The commissioners viewed the area and decided "that it is an impossibility for the neighbourhood there to make up their seabanks in the usuall place of their standing seeing that there is nothing but sand to work upon. And the afores^d bank lying soo neare and soo much upon the raging of every meane tide that in our judgm^ts a speedy removall must be obtained ..... and a new bank erected upon firmer ground although it be to the loss of the Inhabitants; or else the best banks they can make in the place aforesaid may break with one tide and ruine the Levell of Weighton, Skeffling, Easington and Kilnsea"(12). It is unlikely that

(10) Sewers 2, 1643.

(11) Minutes E.

(12) Ibid.

very much land was abandoned, but the necessity for vigilence was clear.

Skeffling banks were not the only ones affected. A Preston petition of July 1661 referred to land adjacent to the Humber in danger of being washed away(13). The report on South Holderness in May 1670 said that "there are severall places betwixt Pattrington and Paull w^{ch} are soe exposed to the violence of Humber that we believe it requisitte some care should be taken for the better p^{r}servation of that p^{te} of the Country. The places that seeme to be more concerned for the p^{r}sent are Ottringham at Ripley nooke, Salthaugh at Roome Peake nooke, Paulholme the shoare agt. Newlands"(14). In these places it was recommended that new banks should be constructed inside the old ones, and the Commissioners ordered this to be done in November 1670. In December 1674, the banks at Ottringham were reported to have been broken down in a storm(15), there was damage at Easington in 1682(16), and in 1695 the bank at Winsetts was reported to have been thrown down by a Humber flood(17).

(13) Ibid.

(14) Ibid.

(15) Ibid.

(16) Easington jetty was then "soe farr and remote from the Lande the River of Humber having gain'd soe much ground".

(17) Sewers 3.

These are all the known references to damage to the banks. Seven references over a period of sixty years suggest that the danger was only intermittent and local. One reason for this relatively small danger of loss may have been the construction of breakwaters, known as jetties, perpendicular to the shore. These breakwaters may have been a relatively recent development in the area. The earliest known reference was in 1602 when "A Survey of the Drounded Ground adjoyning to Hull Water" gave "the setting up of Jetyes at the south end of Hull" as one of the reasons for the tides flowing further up the river Hull.(18) Some debate went on during the seventeenth century as to the best method of ensuring their efficiency. In the 1670 report on South Holderness, it is noted "that the setting of the Tides upon Humbers shoare is the best direction for the making of fences for lessning or increasing of them or taking them away, for the Country as they have Informed us by Experience have found that the Coast at Weighton is best p^{r}served by long Jattyes, att Welwicke by shortening the Jettyes, And att Pattrington by takeing away of the Jettyes have increased and betterd those shoares".

The jetties not only protected the banks from erosion, but also sheltered the havens. In 1715, the decay of Easington jetty caused "the losse of the Humber bank adjoyning

(18) Sewers 2

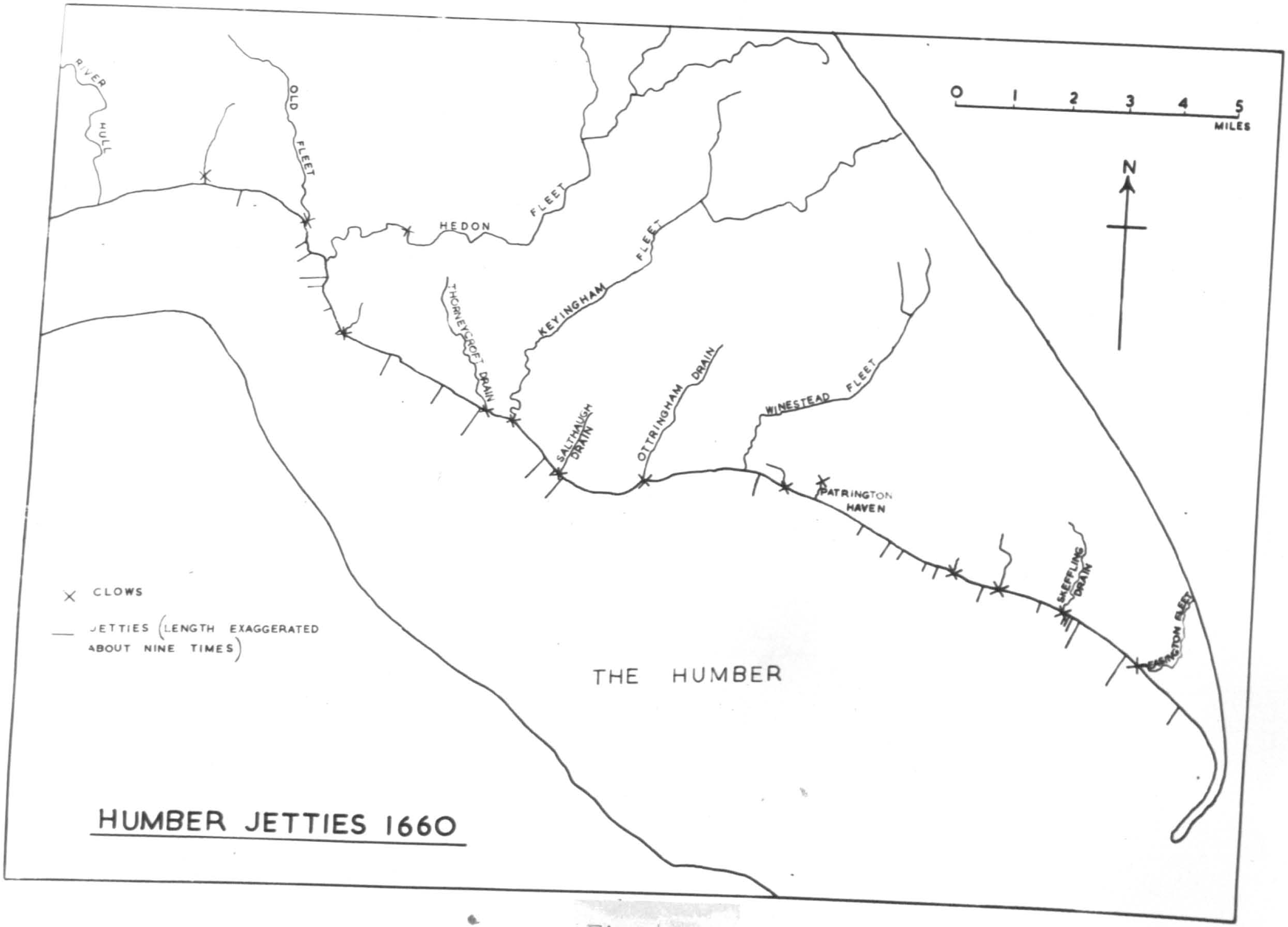

HUMBER JETTIES 1660
0 1 2 3 4 5 MILES
N
RIVER HULL
OLD FLEET
HEDON FLEET
KEYINGHAM FLEET
THORNEYCROFT DRAIN
SALTHAUGH DRAIN
OTTRINGHAM DRAIN
WINESTEAD FLEET
PATRINGTON HAVEN
SKEFFLING DRAIN
THE HUMBER
CLOWS
JETTIES (LENGTH EXAGGERATED ABOUT NINE TIMES)

Fig. 42

on the west side of the said Jetty and ..... the loss of the said Bank and Jetty must unavoidably warp up the sewer belonging to the 5 Towns of Easington, Skeffling and Kilnsea".(19) Instructions for the repair of this jetty give some indication of its character. It was to consist of 19 "roomsteads". Each "roomstead" was to be 12 ft. long, and the first three were to be placed further inland than the old jetty. The first nine were to be 5½ ft. above the ground, the rest 5 ft. Both wood and stones appear to have been used in the construction. The 1660 Inquisition for South Holderness listed the jetties then in existence with details of their length. It is impossible to locate all the jetties precisely, as there is usually only the name to go by, e.g. Paull East Jetty. But the approximate locations are shown in Fig. 42. The fact that 25 then existed along the north shore of the Humber suggests that they were highly valued for their protective function.

The period prior to 1700 in the lower Humber area was therefore concerned principally with protecting the silt lands from flooding and erosion, and carrying the water from the carrs so far as was possible. There do not seem to have been any attempts to improve the carrs as occurred in the Hull valley during the same period.

(19) Minutes F, June 1715

Silting and the Resulting Changes in Drainage 1700 - 1850

The succeeding period was dominated by a complete reversal of conditions in the Humber. Silting took the place of erosion, and gave rise not only to the embanking of large new areas of siltland but also to considerable complication of drainage outfalls.

Although silting did not affect the Holderness shores until 1700 or later, the sand-banks appear to have been growing at an earlier date. Thirteen acres of Sunk Sands were reclaimed in 1695 to form the nucleus of Sunk Island, so that this sand-bank was probably growing for at least five or ten years beforehand. The dates of damage to the Humber banks are suggestive of the growth. In the west, where the growing banks would have provided protection from the Humber waves, there are no reports of damage after 1674. The areas where the Humber was still attacking in 1682 and 1695 were both towards the eastern end of the estuary where there was no such protection. This suggests that the rapid accumulation of silt round the old sand and mudbanks began between about 1670 and 1690. Once these formed a barrier to the more powerful waves, silting was able to develop in the slack water of the sheltered North Channel. The first reference to silting along the Holderness shore was in November 1701 when Keyingham haven was described as having "grown so very large betwixt the Clow and the Humber"[20]. This must refer to the length of the haven, and indicates the growth of mud banks on both sides. In November 1702, Patrington haven was reported to be "growing up"[21]. References to silting became most numerous after 1720.

More than a century afterwards, Chapman blamed the change from erosion to deposition on a change in the currents of the estuary.[22] If this was the case, it poses the question of the reason for the change. There are three main factors which may have been concerned.

In the first place, it may have been the result of changes further up the Humber basin. Vermuyden had made new cuts in Hatfield Chase in 1627-8 and 1633, which increased the runoff from those areas. The increase in fresh water coming down the Humber may have affected the currents in the estuary, but this seems an unlikely factor in view of the disparity of dates.

The second and more likely explanation is that there were changes in Spurn Head. It has been suggested that Spurn Head passes through a cycle of growth until it is breached near the land, when the spit migrates as an island across the

(20) A report on Keyingham Clow and Haven, Sewers 4.

(21) Sewers 4.

(22) Report on the Defence of the Estate of Cherry Cobb Sands by W. Chapman, 1801, Hull City Reference Library.

Humber.[23] According to this theory, erosion of the north Humber shore follows the breaching, and deposition occurs when Spurn grows again. If the losses of the thirteenth and fourteenth centuries were the result of such a breach, the period of relative equilibrium of the fifteenth, sixteenth and early seventeenth centuries can be related to the time when Spurn was short. In 1602, the "Survey of Drounded Ground adjoyning to Hull Water" referred to "the Wastinge and the great Dekay of Ravinspourne"[24]. The silting after 1670 would be explained in this theory by the growth of Spurn at that time to a length sufficient to shelter the coast and banks.

One drawback to this explanation is the considerable length of time during which Spurn must have been very short, followed by the apparently sudden growth sufficient to give rise to the extensive silting. However, human interference may explain this. Holderness and the coasts to the south were lacking in stone suitable for building and road making, and probably relatively early used Spurn cobbles for these purposes. The removal of the cobbles would have prevented the natural growth of the spit. In 1670, the Commissioners of Sewers appear to have awakened to the consequences of this removal of stones, and therefore issued the following order:-

(23) See Chapters II and IV

(24) Sewers 2.

"Whereas the Court being this day informed and complaint made y[t] that takeing a way of cobbles from Spurn head and thereabouts is very destructive to all the Country of Holdernesse side betweene the said heade and the towne of Kingston-upon-Hull: Itt is therefore ordered that noe pson or psons whatsoever shall at any time or times hereafter without a licence or order in writing under the hands of six or more Com[rs] .....
p[r]sume to take and carry and carry away cobbles from Spurne head or any pte of Holderness Coast within three myles of the same head upon paine of forfeiting five pounds for any boate loade soe takeing from thence"(25)
Two months later, in May 1670, they also forbade the taking away of sand "from the sand bed neere the same Spurne head and alsoe the sand called Holme Sands lying agt Paul Paulholme and little Humber".

The fact that this order was made in 1670, and that it was soon after this date that deposition began suggests that there may be some connection between the two events. But on the other hand, there is evidence that cobbles were still used after 1670. In 1674, Tickton was given permission to take some to repair her roads (This gives some indication of how far the stones might be transported, for Tickton is 28 miles as the crow flies from Spurn). Many loads were also

(25) Minutes E

removed without the knowledge of the Court. In 1691, a Boston man was fined for this,[26] and in 1735, although the order against removal had been reiterated in 1733, a letter among the Court of Sewers' records tells of cobbles still being taken. In 1794, Leatham mentioned that "it is very common to fetch gravel from the sea-shore, two or three miles distant", and he recommended taking some cobbles to improve the roads of Howdenshire[27]. Many of the cobble cottages of the villages near Spurn and other parts of the North Sea coast were probably built about this time. Altogether the evidence suggests that the Court's order did not have a great deal of influence on the amount of cobbles removed, though a small reduction in the numbers taken may have just allowed supply to exceed loss and led to gradual growth.

The third possible explanation is that reclamation itself provided the trigger action leading to silting. Strickland gave the following extract from a book called "observations on the Land Revenue of the Crown, 1787":-
"So lately as in the year 1667, a grant was made by the Crown of a tract of sandy ground in the river Humber called the Great Sand, or Sunk (and now called Sunk Island) to which no man

(26) Sewers 2.

(27) I. Leatham. A General View of the Agriculture of the East Riding of Yorkshire, 1794. p.16

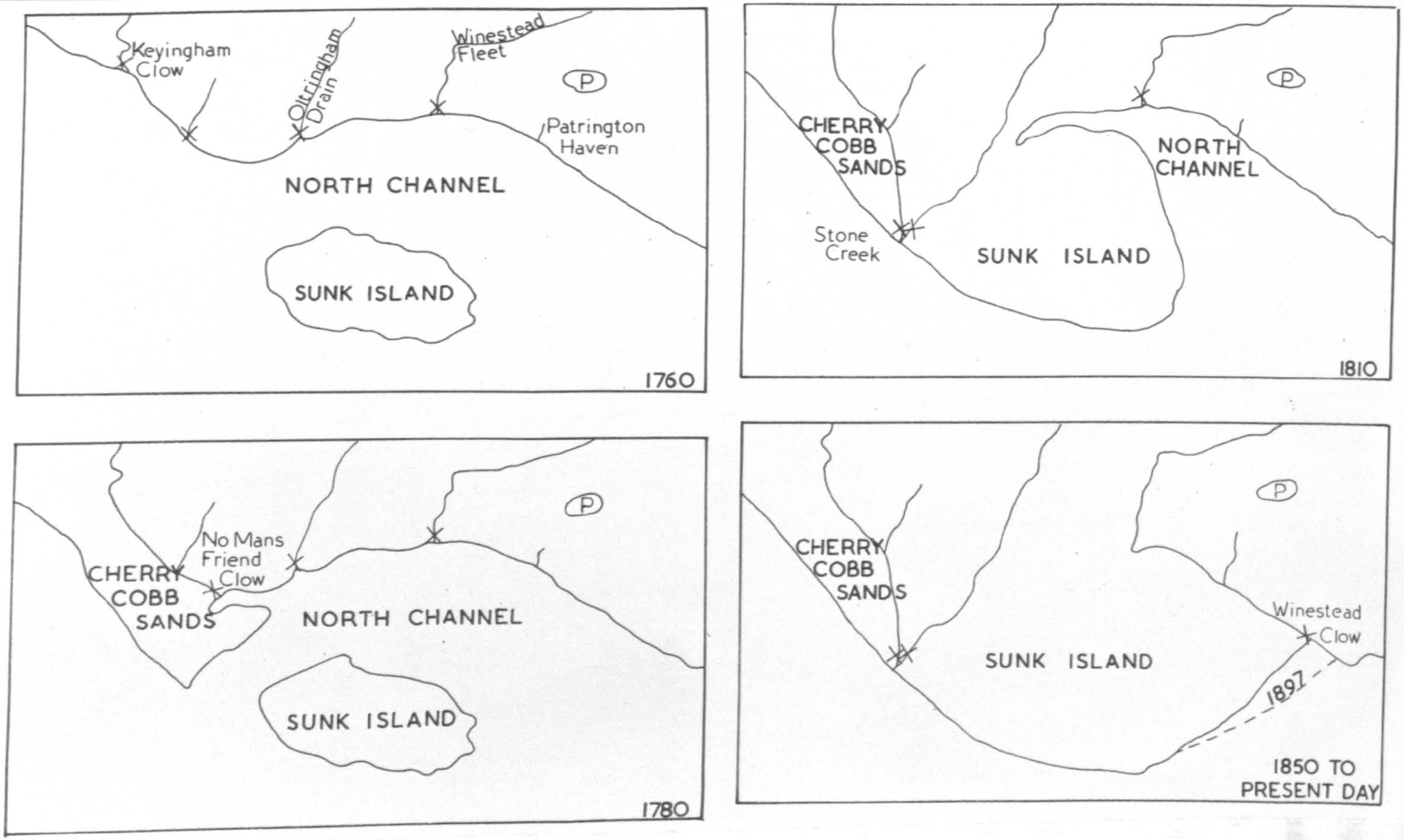


Fig.43. Changes in the South Holderness coast.
P.-Patrington.

pretended title, and on which no beast or sheep were ever known to have been, the ground being overflowed every spring tide"[28]. It may be that the grantee realised the possibility of embanking the area, and carried out works to trap the silt; such activity could have started the chain of silting elsewhere. The date 1667 accords well with the date of commencement of silting suggested earlier, 1670 - 1690. It seems likely that this may have combined with the growth of Spurn to produce the marked change in conditions in the estuary.

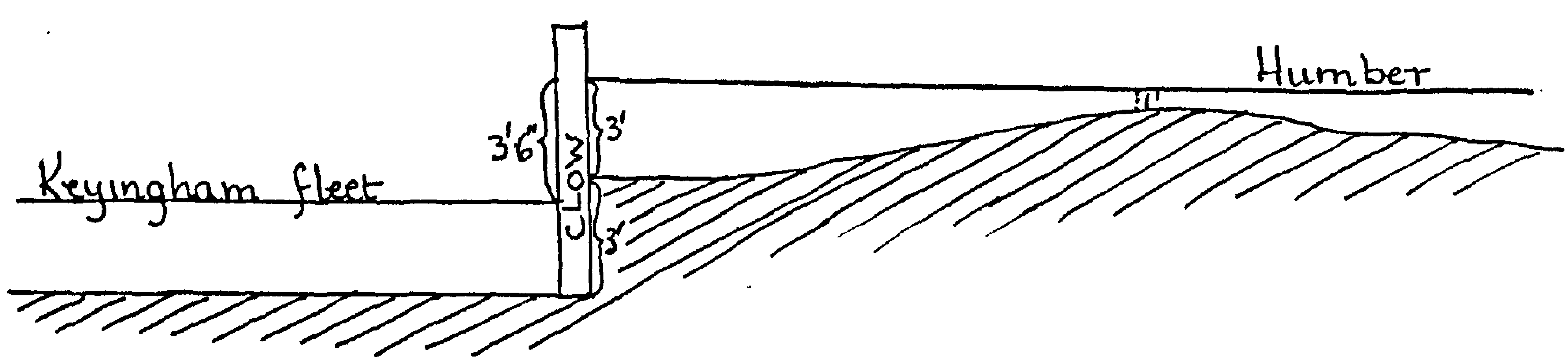
The siltlands which accumulated were gradually reclaimed during the eighteenth century (Fig.43). Sunk Island was increased in area in 1744, and Cherry Cobb Sands embanked in 1769[29]. The accumulation of silt made the drainage of the carrs in the four valleys even more difficult than it had been before. Cherry Cobb sands lay directly in front of the outfalls of the Thornicroft Drain and Keyingham fleet, but the other drains were also affected to a lesser extent. The length of the havens was increased by the silt which accumulated on both sides, and silt also raised the levels of their floors and reduced the flow of water.

(28) Search has been made in the P.R.O. among the Land Revenue records for this book and reference, but it has not been found. It is possible that it may be among the records at Burton Constable, which have not been seen.

(29) An Act of Parliament then divided these sands between the Constable family and the Sons of the Clergy.

The first indication that silting had become a serious problem was in 1728, when Keyingham haven was "so warped up that the water leading thereto cannot issue"(30). William Brown, the surveyor, was asked to make a detailed study, and in June 1730 he presented his report. Fig. 44. summarises his findings concerning the level of the bottom of the drain, and shows the rise from the carrs to the higher land near the clow. This is how he described the haven:-

> "On the salt side there is 3 ft. of earth on the soal of the Clow and 3 ft of water upon it, but from the clow to the channel (i.e. North Channel of the Humber) in several places only 1 ft. of water. Also from the surface of the water now on the salt side of the Clow to the surface of the water in the Channel 3 ft, 6 ins. fall".(31)



The chief difficulty was that the Keyingham fleet did not

(30) Sewers 4, Nov. 1728

(31) Report by W. Brown, Surveyor, June 1730. Minutes H.

PROFILE ALONG KEYINGHAM DRAIN 1730

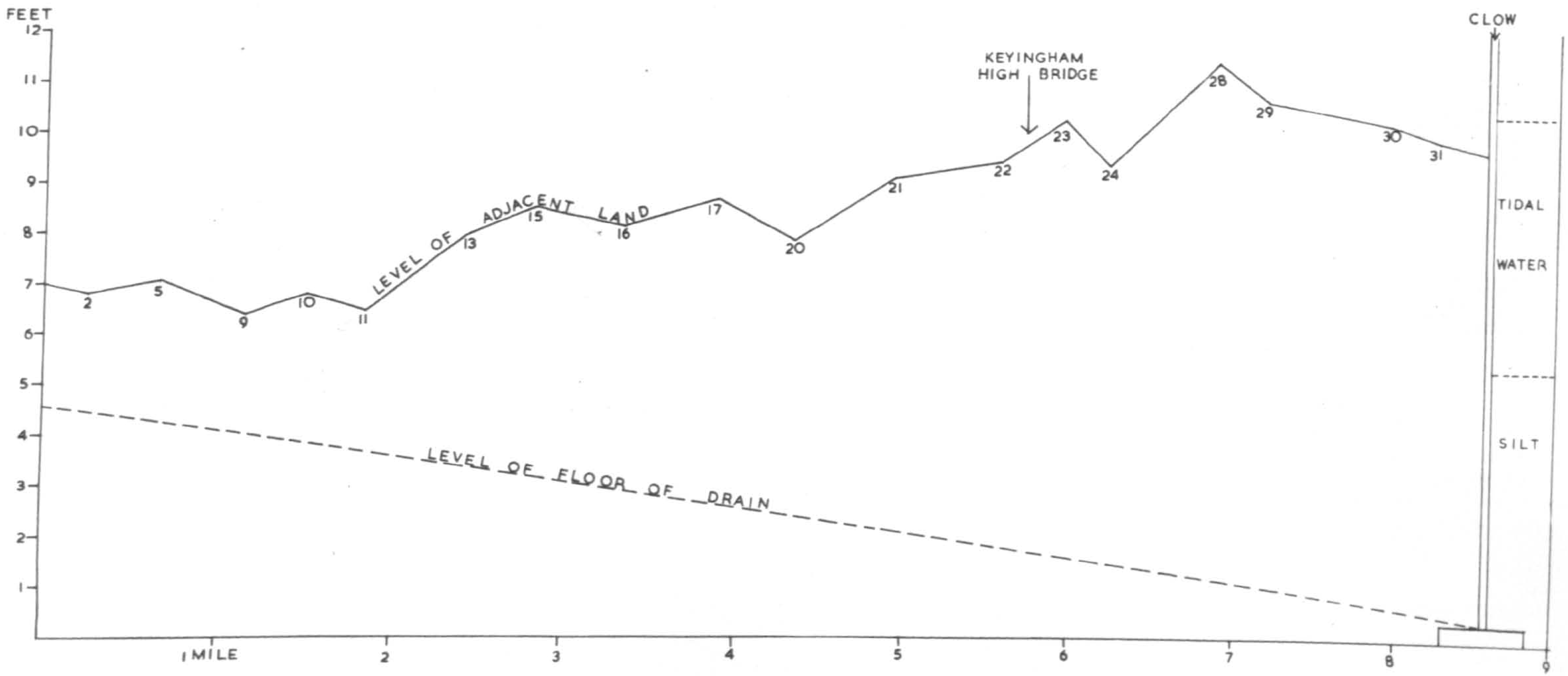
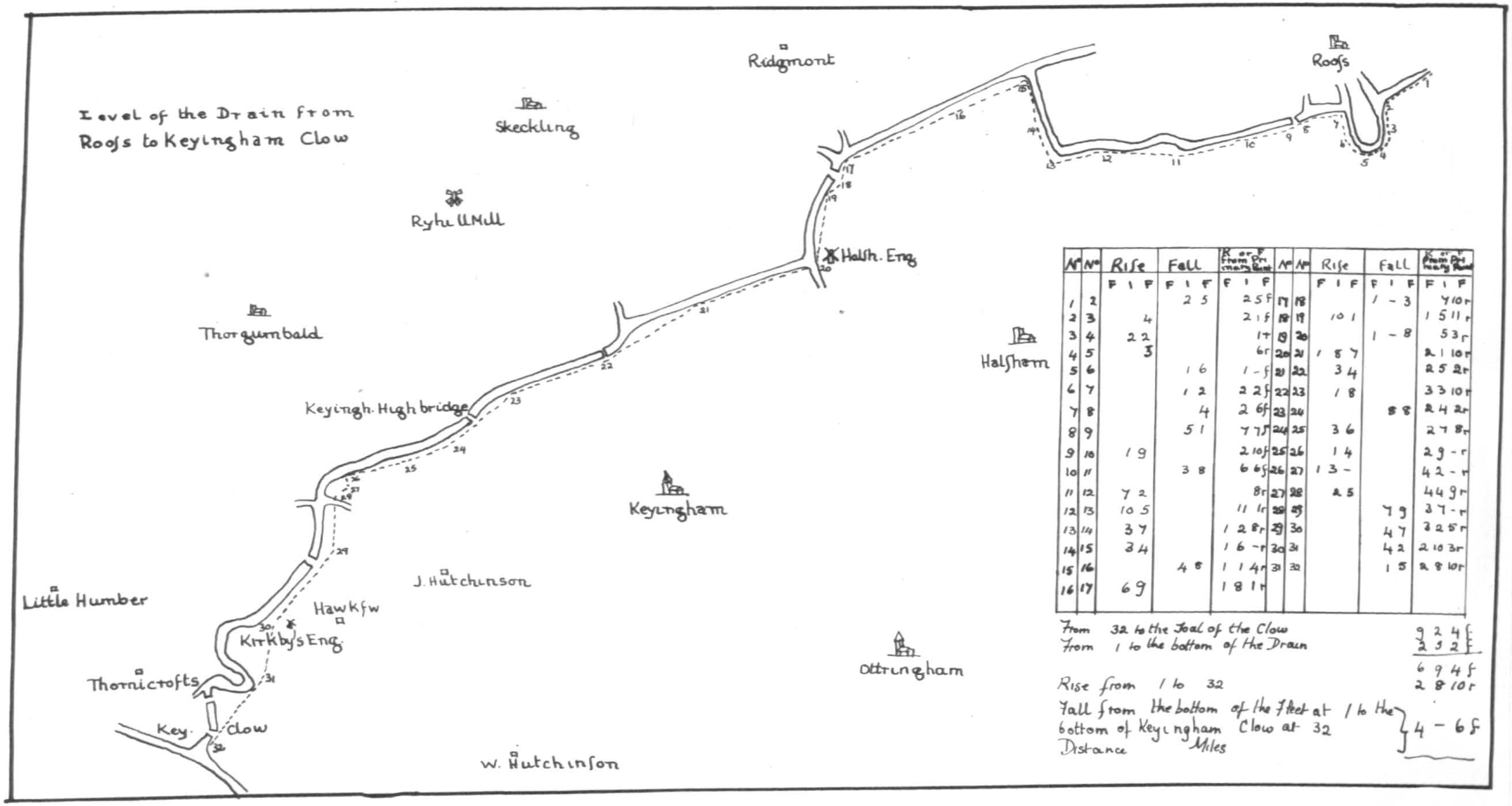


Fig.44. Based on the levels given in Fig.45. The rise from the carrs to the silt zone is marked. Vertical exaggeration about 1,500.



No	No	Rise F I F	Fall F I F	R or F from Primary Point F I F	No	No	Rise F I F	Fall F I F	R or F from Primary Point F I F
1	2		2 5	2 5 f	17	18		1 - 3	7 10 r
2	3	4		2 1 f	18	19	10 1		1 5 11 r
3	4	2 2		1 f	19	20		1 - 8	5 3 r
4	5	3		6 r	20	21	1 8 7		2 1 10 r
5	6		1 6	1 - f	21	22	3 4		2 5 2 r
6	7		1 2	2 2 f	22	23	1 8		3 3 10 r
7	8		4	2 6 f	23	24		8 8	2 4 2 r
8	9		5 1	7 7 f	24	25	3 6		2 7 8 r
9	10	1 9		2 10 f	25	26	1 4		2 9 - r
10	11		3 8	6 6 f	26	27	1 3 -		4 2 - r
11	12	7 2		8 r	27	28	2 5		4 4 9 r
12	13	10 5		11 1 r	28	29		7 9	3 7 - r
13	14	3 7		1 2 8 r	29	30		4 7	3 2 5 r
14	15	3 4		1 6 - r	30	31		4 2	2 10 3 r
15	16		4 8	1 1 4 r	31	32		1 5	2 8 10 r
16	17	6 9		1 8 1 r					

Fig.45.. Reproduction of a plan of the Keyingham Drain in the Hull City Reference Library. There is no date on the plan, but as the levels correlate with those given in W.Brown's reports of 1728 and 1730, the plan probably dates from the same period.

contain sufficient water to scour its haven clear of silt. This was in spite of the fact that about 1675 the waters of the Hedon fleet had been diverted into the Keyingham fleet. An ancient drain, known as the Ellyfoot Drain (Fig. 45) had long connected the two valleys, and in 1675, the townships along the upper part of the Hedon valley had petitioned that the drain should be cleared out to allow their waters to flow into the Keyingham fleet because "when wee have the Greatest flods the haven (i.e. Hedon) is stopped with boots and is not sufficient of ittself to utter it"(32). In 1719, Hedon petitioned for the return of the water which had been diverted "of late years"(33), but by this date it was too important to the Keyingham fleet in helping to provide some scour of the haven.

The first solution to the silting of Keyingham haven which was tried was to build a new clow several hundred yards nearer the Humber than the old one.(34) In this way part of

(32) Minutes E.

(33) Sewers 4. This petition claims that the Ellyfoot drain was originally cut to carry part of the Keyingham fleet waters to Hedon. This must have been prior to 1660, for the inquisition of that year did not even mention the drain. The water may have passed this way in medieval times when Hedon was an important port, and this would explain the origin of the drain.

(34) This was built by the Constable family, who held much land in the district. A petition from William Constable in 1738 stated that his father built a new clow, but did not give the date. Its location was shown on Stickney's map of 1802.

the haven was freed from further silting, but the average gradient of the stream was reduced. As the years passed, the continued growth of Cherry Cobb sands made the new clow as useless as the old. In 1743, the surveyor was asked to find a "ffall into the Humber free from any obstruction of growing sands"(35). He reported that "Winestead (i.e. North) Channel is 7 ft. 8 ins. above the floor of Kayingham Clow; that the Top of the Sand at Paul Stock is 10 ft. 8¾ins. above the floor of the said Clow; that the floor of the Clow is below the water and sludge within 2 ft. 10 ins; that the Top of the Sludge without is above the floor of the Clow 1 ft. 8 ins; and that the water that may run off is 1 ft. 2 ins. to the Westward and 1 ft. 6 ins. to the Eastward".(36) The silt also troubled the outfalls of the Thorneycroft and Salthaugh drains, although the higher level of their clows enabled them to withstand these conditions more easily. But in 1737, Thorneycroft old clow "being rendered useless" was taken out of pain, and a new one constructed nearer the Humber in 1741(37). Farther east, silting was less powerful, and Ottringham and Winestead waters were able to scour their havens to a sufficient depth. Patrington haven had a smaller source of fresh water for this

(35) Minutes 1

(36) Ibid.

(37) Minutes H and I

purpose and was more affected. In 1702, a complaint was made to the Court of Sewers that Welwick waters were not flowing to the haven as they ought, as a result of which the haven was silting up.(38) The water was ordered to be restored to its old course, and there were no further complaints. In the other direction, Hedon haven suffered through lack of fresh water to scour it, although silting was less active in that section of the Humber. A 1726 survey found it was only 27 ft. wide at the lowest point measured, and only 14½ ft. wide half-way between there and the upper end of the haven.(39)

There is little indication of how the carrs were affected by the silting. No complaints were made about the Winestead and Easington levels, which further suggests that these eastern drains were little affected by silting. In the Keyingham level, the joint effect of silting at the outfall and the addition of the Hedon fleet water was to increase flooding to the stage where the carrs were useless in summer as well as winter. In June 1719, a petition of the townships of the level reported that much of it was "so very much oppressed with water that several hundred Acres if not thousands are become of little or no value ..... also in Winter the Roade from Rooss to Halsham and also some other roads are so oppressed with

(38) Sewers 4.

(39) Minutes F.

water ....."[40] The carrs of the Hedon valley below the Ellyfoot drain diversion seem to have suffered similarly from the silting of Hedon haven. In 1717 the inhabitants of Burstwick complained that Burstwick West Carr was no longer drained as adequately as it used to be. They therefore petitioned the right to divert some of the water south to the Thorneycroft drain and clow. This was allowed, although the amount of water to pass that way was limited by a stock 12 inches high[41] (c.f. Gold Dike Stock, p.128) These carrs seem therefore to have been in a worse condition than those at the upper end of the Hull valley at this date. Not only were they unimproved, but their condition had actually deteriorated.[42]

As in the Hull valley, matters came to a head soon after 1760, and there were considerable attempts to solve the problem during the succeeding fifty years. At the same time, large areas of siltland were reclaimed. Since the problem was greatest in the Keyingham valley, it was this area which attracted most attention, and changes elsewhere were largely the indirect results of changes at Keyingham.

(40) Minutes F.

(41) Minutes F, Oct. 1717

(42) There was a windmill at Halsham by 1730, but its function is not known.

The essential geographical aspect of the changes was the abandonment of the North Channel as a tidal creek receiving drainage waters, and the opening of the drains instead directly into the main channel of the Humber. The change took place in three stages. Between 1760 and 1795 the North Channel remained the main recipient of the water; between 1795 and 1805, the Keyingham waters were diverted directly to the Humber; and between 1805 and 1850 the North Channel gradually silted up.

During the first period, it was the Cherry Cobb Sands which provided the greatest difficulty. By 1762, these were obstructing the Thorneycroft drain outfall very seriously (Fig. 46) A report of that year to the Court of Sewers stated: "We think it very impracticable to convey the water off the same premises by any of the Old Drains or Sewers leading to Thorney Croft Clow, it appearing to us that the said Clow where she now stands is obstructed by the strong Current of Water through Kayingham Clow which meets the Drain coming from Thorney Croft Clow to the Humber, and that as Cherry Cobb Sand lyes between Thorney Croft Clow and the Humber no proper Cutt can be made that Way to carry off the same Water, as it would be subject to warp up".(43) The report proposed a new direction for the drain and a new outfall to the Humber west of Cherry Cobb Sands, but such a major alteration was beyond the powers

(43) Minutes K.

of the Court of Sewers. In 1766, however, a private drainage act was obtained which legalised the alteration.(44) The outfall then made still functions.

In 1769, Cherry Cobb sands were reclaimed, and the Keyingham waters were forced to follow a much lengthened haven into the North Channel. In 1772, the first Keyingham Drainage Act was obtained. This gave powers to include most of the old haven in the drain and to build a new clow at No Man's Friend, a point about two miles east of the oldclow and near the eastern end of Cherry Cobb Sands (Fig. 43). Although silting could then be prevented inside the clow and the drainage thereby improved, two disadvantages remained. First, the drain still opened into the North Channel where the tidal scour was small, and second, the gradient of the drain was further reduced. Nevertheless for a few years at least, these changes may have brought improvement to the carrs. James Golborne wrote in 1799: "From the information that I received (when in Holderness) it appeared to be generally admitted that the sole or bottom of No Man's Friend Clough was laid sufficiently low to drain the lowestlands of the Keyingham level above it; and that all, or very nearly all, the carrs were cropped with corn for some years after its being put down"(45).

(44) Copy in Hull City Reference Library.

(45) Report of James Golborne, Engineer, on the Drainage of the Keyingham Level, 1799. Hull City Reference Library.

However, Golborne was not an unbiased observer, and this description is probably very exaggerated. Unfortunately there is no other account of the area at this time by which the accuracy could be checked. Neither is there any indication as to whether an alternate outfall was considered, for the records of the Keyingham Drainage have been lost.(46)

The second period, from 1795 to 1805, is marked by the increasing silting and constriction of the North Channel. The unreclaimed sands round Sunk Island grew higher and linked up with Cherry Cobb sands, so that the only entrance for tidal water and exit for fresh water (except at spring tides) was at the eastern end of the North Channel. Keyingham fleet flowed into the western extremity of the channel, while Ottringham and Winestead drains flowed into it lower down. Keyingham outfall was still, therefore, the one most affected by the continued silting. By 1795 all the advantage gained by the removal of the clow in 1772 had been lost, and the following few years were occupied by very active debate as to the best method of remedying the drainage. It seemed that the North Channel would have to be abandoned, but this met with the opposition of those interested in the drainages and havens further east. They realised that it was the Keyingham

(46) Most were lodged in the store room of a solicitor in the old part of Hull close to the river, and were ruined during a flood.

waters that kept the channel as open as it was, and feared the consequences to themselves of any diversion.

In 1795, the engineer Joseph Hodskinson was called in to advise the owners of land in the Keyingham level. His report began with the following account of drainage conditions at that time:-

> "The general Outfall, for the drainage of all the lands in Question, is at a place called No Man's Friend Clough, the state of which I examined on 31st Oct. last, 1795. I then found 4 ft. 6 ins. depth of water on the floor of the clough; there was no unusual quantity of water in the main drain, but the bed of the Channel below the Clough was so silted and warped up that the waters could not pass off. I also observed that the bed of the Channel above the Clough was likewise so silted up that in many places there was not more than 6 inches depth of water, although at the same time there were 4 ft. 6 ins. on the floor of the sluice, as I before observed. The singularity of this circumstance naturally led to an enquiry into the cause of it, and I learned from Christopher Johnson the Clough keeper, who was present, that it was the custom every autumn to admit the tide waters through the Clough to a certain height, and there detain them till the latter part of the Ebb;

when being let go, they might scour out the channel below the clough, and thereby give a passage for the land or downfall waters to pass off to the sea. The Tidal waters thus admitted through the clough into the river are always strongly impregnated with silt and sand which naturally subside and settle at the bottom whilst those waters are in a stagnant state, occasioned by the clough doors being shut ..... Thus, in course of time, the bed of the drain above the clough is raised so high that the land waters cannot get off to sea, nor can the drain itself, as formerly, contain a sufficient quantity of tidal waters to produce any scouring effect in the Channel below; as appears from the following fact.

A t the time I am speaking of, viz. the 31st October 1795, the Clough Keeper was there, for the purpose of commencing this annual operation of scouring. I afterwards viewed the Outfall again, on 14th December, and found that the channel below the clough was then as much silted up as when I first viewed it, notwithstanding he had in the 44 intervening days repeatedly tried to scour it out ..... in the manner before described.

The Course of the Channel I am here speaking of, from No Man's Friend Clough to Pattrington Haven is

4 miles in length, and winds through marshes over which the spring tides flow, and is now by the constant accumulation of silt so lessened in width as well as depth, that the upper half of it, next No Man's Friend Clough, is not more than three-quarters of the width of the channel above the clough, and the sediment and silt that occasions it is of so firm a texture that after it has lain some time no scour that can be obtained will remove it.

The rainy season having set in previous to my second view of the outfall, I had an opportunity of observing what effect the bad state of it has upon the lands which depend upon it for their drainage. Notwithstanding the waters in the main drain were then as low as the present state of the drainage will permit them to be, yet I observed that several hundreds of acres of very valuable land were then under water. ..... the Evil is daily increasing and unless some effectual remedy is shortly applied, the period is not very distant when the valuable tract of land in question will be of little or no value ....."(47)

Hodskinson suggested three possible ways of improvement. First, the river above the clow and the channel below it

(47) Report of J. Hodskinson, Engineer, Feb. 1796. Hull City Reference Library.

could be cleared of silt and deepened, but this would be very expensive and provide only temporary relief. Second, a new outfall could be cut across Cherry Cobb Sands. Third, all the outmarshes along the North Channel could be embanked, and the Keyingham, Ottringham and Winestead waters joined to pass through a new clough near Pat~~t~~rington Haven. It would appear that Constable, the largest landowner in the level, favoured the second suggestion, but others with interests in the Winestead Level and Patrington Haven were anxious that the water should continue along the North Channel. Another engineer, William Chapman, was therefore called in to give his opinion of the two possible outfalls. One of the questions he was asked was: "Suppose the water of this drainage be carried off any other way than by the present outfall, how will the drainages of Ottringham and Winestead and the haven of Pattrington be affected thereby?"(48)

Chapman favoured the new outfall across Cherry Cobb Sands, because he felt that if the clow were placed near Patrington haven, the Keyingham fleet would be lengthened so much and its gradient so reduced that it could not then drain the carrs.(49) His recommendations were accepted by the

(48) Report by W. Chapman on the Keyingham Level, June 1797. Hull City Reference Library and Institute of Chartered Engineers' Library.

(49) Ibid.

owners of land in the level, but opposition was still strong from the group which was concerned with the future of the other drainages and Patrington haven. Colonel Maister, who had interests in Patrington haven, therefore employed James Golborne (Engineer of the Bedford Level) to report on the possibilities of continuing the Keyingham drainage in that direction.(50) Golborne considered that there would be adequate gradient for the drainage of the carrs that way if the accumulation of silt were removed. To this end, he recommended the use of a "Spade Machine" to stir up the mud which the water would then carry off. He had no doubt that if the Keyingham waters were diverted, "the loss of No Man's Friend Clough would only be the forerunner of the loss of Ottringham Clough; the loss of Ottringham clough will precede the loss of Winestead Clough, and the loss of Winestead Clough with the before-mentioned other two cloughs will very materially injure if not totally destroy the Haven of Pattrington".

By this stage, it was no doubt clear to those concerned with the Keyingham drainage that they faced two alternatives: either to obtain adequate drainage for themselves and compensate the other areas for any damage which resulted, or

(50) J. Golborne, op. cit.

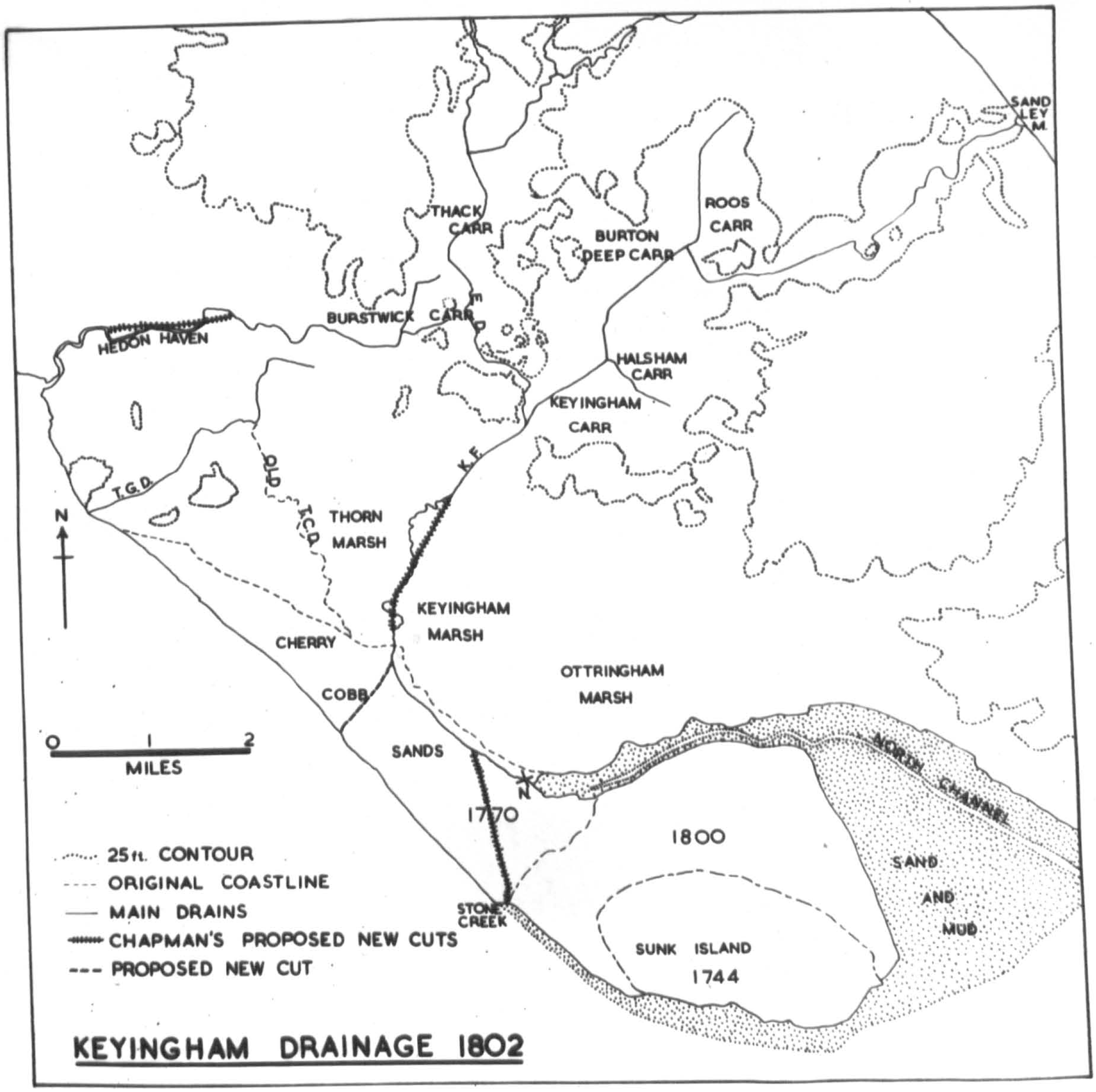


Fig.46. Sandley M.-Sandley Mere;E.D.-Ellyfoot Drain; T.G.D.-Thorngumbald Drain;Old T.G.D.-Old Thorneycrofts Drain;K.F.-Keyingham Fleet;N.-No Man's Friend Clow.

to continue with an inadequate system. It is not surprising, therefore, that after a half-hearted attempt at improvement by using the spade-machine, in 1802 the second Keyingham Drainage Act was obtained which sanctioned the improvements suggested by Chapman.

Fig. 46 shows the changes that followed the act. A new outfall was cut between the lands belonging to Constable and those of the Sons of the Clergy in Cherry Cobb Sands to a new clow known as Stone Creek Clow. The fleet was straightened where it crossed Ryhill and Keyingham marshes, by cutting across the meanders. In addition, the Hedon fleet waters were returned to Hedon haven. Chapman's condemnation of the original diversion of these waters into the Keyingham fleet was emphatic: "the sudden floods from the high ground above Bramer, Elsternwick etc. would always override the waters of the Eastern drain and prevent their discharge until the upland floods had run off ..... There must have been some very particular cause to induce the first planners of these drains to carry their waters through the neck of rising land between Ryhill and Ridgmond to discharge by a circuitous passage to the Humber, and contrary to the true principles of drainage, to unite with and impede the exit of the waters that require a free outlet from much lower grounds, when a shorter and less expensive course offered itself to Hedon

Haven, both for that purpose, and the drainage of the low grounds in its course"[51]. In order to take this water again, the old lower part of the Hedon fleet had to be cleared out.

The diversion of the Keyingham waters was completed by about 1805, and led to the third period of change when the North Channel was gradually abandoned. Before the diversion, the Ottringham drain which had been straightened and improved in 1761, and the Winestead Drain which had been improved under an Act of Parliament in 1774, seem to have been working efficiently.[52] Patrington haven was kept sufficiently open to be an important local port for the export of grain which was sent to both Hull and London.[53] Since the Ottringham drain was the furthest west, it was the first to be affected by the silting of the North Channel. In 1807, an Act of Parliament was obtained which enabled the drain to be extended to a new clow near Keyingham Stone Creek clow.[54] This appears to have restored the efficiency of the drain without any difficulty. It seems likely that the Keyingham

(51) W. Chapman, op. cit.

(52) Letter from W. Chapman, 1800, and Report of James Creassy, Engineer, on the Drainage & Improvement of the Keyingham Level and the Adjoining Country, 1801. Hull City Reference Library.

(53) A system of impounding water at high tide to release at low tide was used. Letter to Keyingham Level Proprietors from W. Chapman, July 1800.

(54) Hull City Reference Library

Drainage contributed towards the cost of the new works, as an acknowledgement that the diversion of their waters may have encouraged the silting. Certainly, in 1806, Winestead Drainage received £600 from Keyingham Drainage[55], and no other explanation can be given for such a payment. The Winestead area does not appear to have been troubled by silting until some years later. The first indication of this was in 1819, when a meeting of the Commissioners and Proprietors of the level resolved "that the present state of the Drainage is ineffectual"[56]. It was decided to seek improvement by scouring the North Channel, a process that was continued at intervals during the following thirty years.[57] In the mean time the silt in the channel was embanked and more silt accumulated east of Sunk Island, so that by 1850 the Winestead Drainage was affected almost as badly as the Keyingham level had been fifty years earlier. In that year, the Commissioners of the Drainage appealed to the Lords of the Admiralty: "That within the last thirty years in consequence of embankments made by the different Proprietors on each side of the Channel it has become more contracted and the outfall of the Winestead Drainage seriously

(55) Minute Book of the Winestead Level Drainage, 1811-1857, with the Clerk to the Drainage.

(56) Ibid.

(57) The scouring was done by holding back the fresh water for a time. Winestead Minutes, Jan. 1828

affected"[58]. In 1850, the new accumulation of silt east of Sunk Island was embanked, and about the same time a new clow for the Winestead Drainage was built at the point where the old North Channel joined Patrington Haven. A further enclosure was made in the east of Sunk Island in 1897 and a new clow was then built to extend the Winestead drain beyond Patrington haven, then no longer used.

Nineteenth Century Conditions. Unfortunately the agricultural writers of the nineteenth century largely ignore the small areas of carrland in the valleys of South Holderness, so that it is difficult to know the extent to which the late eighteenth and early nineteenth century changes led to their improvement. Rather poor pasture occupies the lowest parts of these valleys at the present day, and probably they were used in the same way during the last century. In that way they provided summer pasture for the horses and cattle of South Holderness. Tithe maps show that some better-drained parts were ploughed, and there no doubt rape and oats were grown as in the Hull valley carrs.

There is much more description of the reclaimed siltlands. All writers emphasised their fertility. Strickland stated: "On the banks of the Humber, from Paul nearly to Spurn Point, there are thirteen to fourteen thousand acres of warp-land,

(58) Ibid.

of a strong clayey loam, the productiveness and fertility of which can hardly be equalled"(59). Cobbett was even more emphatic:-

"I have seen the vale of Honiton in Devonshire, that of Taunton and Glastonbury in Somerset: I have seen the vales of Gloucester and Worcester, and the banks of the Severn and Avon: I have seen the vale of Berkshire, and that of Aylesbury in Buckinghamshire: I have seen the beautiful vales of Wiltshire; and the banks of the Medway, from Tunbridge to Maidstone, called the Garden of Eden; I was born at one end of Arthur Young's "finest ten miles in England". I have ridden my horse across the Thames at its two sources; and I have been along every inch of its banks, from its sources to Gravesend, whence I have sailed out of it into the Channel; and having seen and had ability to judge the goodness of the land in all these places, I declare that I have never seen any to be compared with the land on the banks of the Humber, from the Holderness country included, and with the exception of the lands from Wisbeach to Holbeach, and Holbeach to Boston. Really, the single parish of Holbeach, or a patch of the same size in the Holderness country, seems to be equal in value to the whole of the county of Surrey, if we leave

(59) H.E. Strickland. A General View of the Agriculture of the East Riding of Yorkshire, 1812.

out the little plot of hop-garden at Farnham"(60).

Strickland gives the impression that in 1812 most of the siltland was arable, for he discusses in detail the methods of cropping, but scarcely mentions grassland except to say that it will support "the finest grazing pastures"(61). Of the arable he says:-

> "the farmers, on first ploughing up a piece of fresh warp, take two crops, spring fallow for rape to be eaten off, wheat or oats, oats, fallow for wheat, then drilled beans: but Mr. John Lee, a very active and intelligent cultivator of warp-land, prefers the following method of taking up fresh land, as his crops are less injured by the grub and wireworm, to which this land is extremely subject, than by the usual method; viz., plough thin in autumn, let to lie till the following June, harrow well, then plough a little deeper, sow turneps or rape to be eaten off, two crops of oats, fallow and drill wheat with seeds .... A great part of Sunk Island having been embanked from the sea in the year 1799, was left to the present tenants to crop as they thought proper for the first six years after ploughing up and to fallow the seventh; after which they were restricted to three crops and a

(60) W. Cobbett. Rural Rides. Everyman's Edition, Vol. 2 April 1830, p.249.

(61) Strickland, op. cit. p.15

fallow. The system has hitherto been, 1st year, plough up and sow rapeseed; 2nd, a crop of rapeseed; 3rd, wheat; 4th, oats; 5th wheat; 6th, oats."[62]

In addition to rape and cereals, potatoes were important[63], and cabbages played a part in the rotation at Salthaugh[64]. The latter provided winter feed for large long-fleeced Holderness sheep, which wandered over the saltmarsh except at spring tides. "These outgrowths are not considered as of any great value to the occupiers, farther than as they afford an occasional relief to the cultivated pastures which receive the sheep for a week or ten days during spring-tides"[65]

The tithe maps show that by the 1840s a considerable proportion of the siltland was under grass. (Fig. 47) The prize report on the farming of East Yorkshire in 1848 by G. Legard also made it clear that grassland was more important during the first decades of the century than Strickland's account suggested: "..... the warp-land, within the last few years, was nearly half of it in grass, but the losses caused by the introduction of those epidemic diseases amongst cattle and sheep, by the importation of foreign stock, has

(62) Ibid p.118

(63) Ibid. p.150

(64) Ibid. p.158

(65) Ibid. p.166

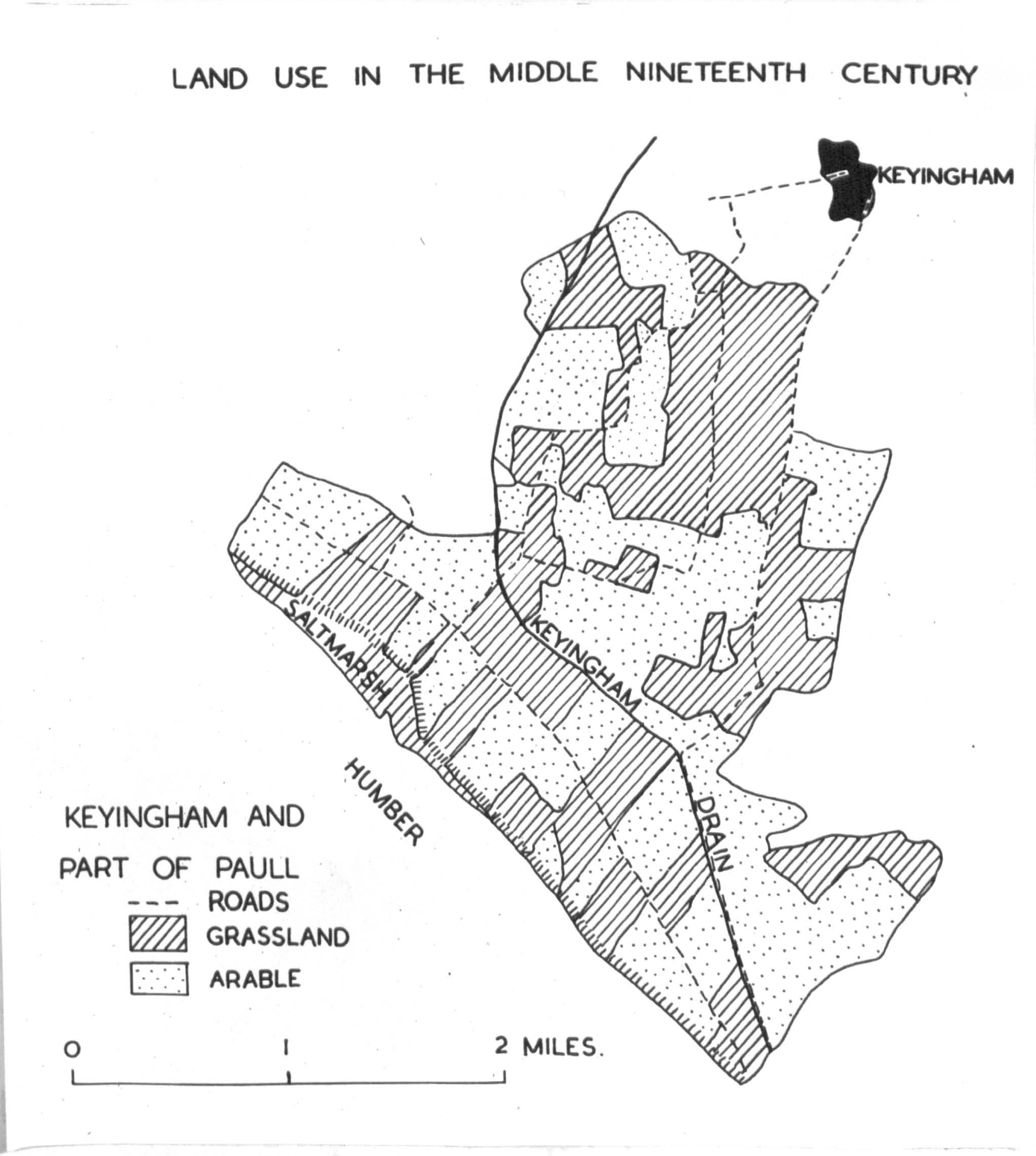


Fig.47. Based on the Tithe map and award.

been so great, that a large quantity of this grass is getting ploughed up each year".(66) Legard pointed out that the proportion of sand in the soil varied, and while the areas with a high sand content were ideal for ploughing, the areas of heavier soil were more suited to grassland. The main crops in 1848 were rape, wheat, oats, beans and clover. The farms averaged between 200 and 800 acres in size, and at least some of the land was by then tile-drained.

In spite of its repercussions on the drainage of the valleys leading to the Humber, the silting was therefore beneficial to the district by adding to its extent of high-class arable land. Less concern was shown than in the Hull valley over the fact that the drainage of the carrs was still far from perfect because the areas affected were relatively small, and local effort had much greater scope for improvement in the siltlands. There have been few changes during the past century.

(66) Farming in the East Riding of Yorks. G. Legard, Prize Report. Journal of the Royal Agricultural Society, Vol. 9, Pt. I 1848, pp.85-136

SECTION III

THE VALE OF YORK

Chapter VIII. The Background to the Draining

The Vale of York and its southward continuation as the Vale of Trent form one of the largest stretches of alluvial lowland in England, almost equalling the Fenland in area. All the water of this area drains towards the Humber, and eventually passes through the Humber gap between the Yorkshire and Lincolnshire Wolds into the North Sea. The Humberhead alluvial lowlands extend through Lincolnshire, the West Riding and the East Riding. The section that is to be considered in detail here falls entirely within the East Riding.

The Physical Background.

The solid geology of the Vale[1] is determined by the extension of the gentle eastward dip that occurs in the southern part of Holderness. The chalk rises from beneath the boulder-clay and alluvium of Holderness to form the Wolds, which overlook the Vale of York in a much indented escarpment rising to 500 ft. O.D. near Pocklington, but only 400 ft. nearer the Humber. Narrow beds of Jurassic shales, sandstones and limestones with the same general direction of dip appear from beneath the chalk. The Jurassic outcrop in this part of Yorkshire is only two miles wide at its greatest extent, in

(1) Henceforth, the term "the Vale" or "the Vale of York" will be used to indicate that section of the Vale under consideration here, since no other general term is given to this area.

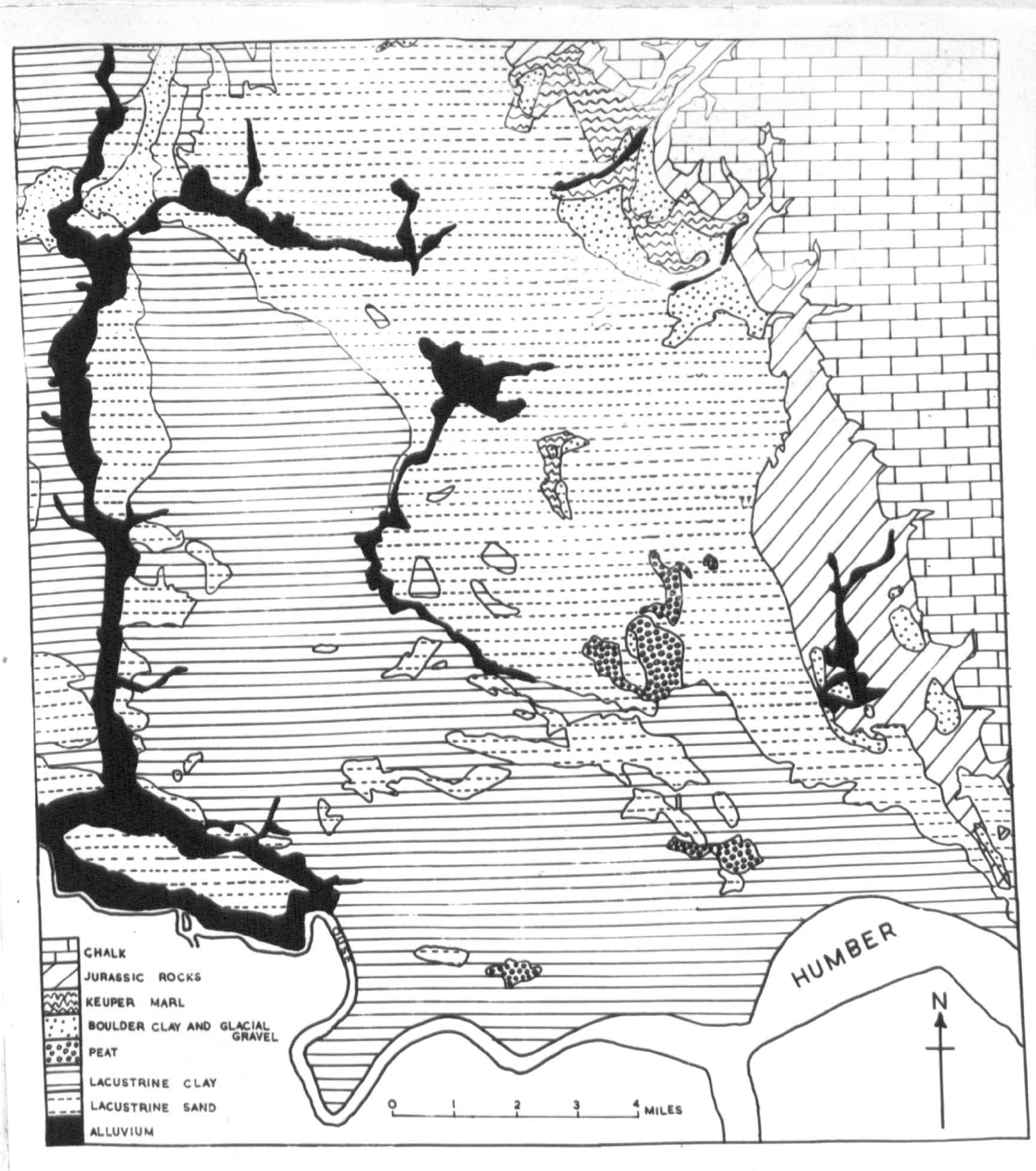


Fig.48. The Vale of York, geology.

North and South Cliff. The narrowness of the outcrop is the result of the east-west anticline that interrupted the Jurassic sea at about the position of Market Weighton. North of Market Weighton, the Jurassic outcrop almost disappears, while to the south it forms a bench at the foot of the chalk escarpment at about 50 to 150 ft. O.D. In places this bench itself has a low but very straight escarpment facing the Vale.

The Jurassic rocks south of Market Weighton and the chalk to the north rest on beds of Triassic age. Keuper marl is the highest of the series, and its outcrop occupies much of the floor of the eastern part of the Vale. Further west, Keuper sandstone outcrops. Both the marl and the sandstone offered less resistance to weathering than the chalk and the Jurassics, and in pre-glacial times were worn down to form a lowland basin. It was about this time that the Humber Gap probably first became important. Versey considers that the gap is fault-guided, and that this enabled the proto-Ouse to develop a vigorous series of subsequent streams in the Vale which captured the other main east-flowing rivers (2). The area was probably reduced to a plain of feeble relief below the present sea-level.

As the ice-sheets grew in early Pleistocene times, the

(2) H.C. Versey, the Humber Gap. Trans. Leeds Geol. Assoc. Vol. VI, Pt. I, 1940 - 45, p.26

sea-level fell. In the Vale, the immediate result was to enable the rivers to cut valleys again into the Triassic strata. This produced a surface of varied relief, now buried by later deposits. Dakyns states that: "the old surface of the Trias was much more uneven than the present surface of the country"[3]. A relic of this earlier dissected landscape still appears above the superficial deposits in the hill of Holme-upon-Spalding Moor, which reaches nearly 150 ft. above the surrounding plain and 200 ft. above the Keuper marl floor. The marl that forms the hill does not appear to differ lithologically from that of adjacent areas, so that its upstanding nature cannot be explained by differential erosion. Elsewhere within this eastern part of the Vale, the marl only appears at or near the surface along the margins of the chalk north of Market Weighton.

The Vale may have been wholly covered by ice during the earlier part of the glacial period, but this had little influence on the post-glacial landscape. More important was the last advance of the ice-sheets. While an eastern arm of the ice moved round the Moors and Wolds and covered Holderness and East Lincolnshire, another branch moved south down the Triassic vale. According to the long-accepted theory, first propounded

(3) J.R. Dakyns, C. Fox-Strangways and A.G. Cameron, The Geology of the Country between Yorkand Hull, 1886.

by Carvill Lewis in a paper read before the British Association in 1887[4], the ice moving down the Vale reached no further than the Escrick moraine, and the southern part of the vale and the vale of Trent were occupied by an enormous pro-glacial lake, called Lake Humber. The North Sea ice prevented the waters escaping through the Humber gap, and various overflows for the water further south have been suggested. Kendall[5] and Melmore[6] agree that Lake Humber covered much of the Vale, although they differ in their opinions as to the height and extent of the lake. In recent years, however, this view has received some criticism. Carruthers has suggested that in fact the vale was occupied by dead ice subject to under-melting, which produced laminated till resembling lacustrine deposits[7]. Dalton suggests that the dead ice was surrounded by marginal lakes which produced the apparent strand like deposits formed of gravels of local origin at 150 ft. and 100 ft O.D.[8]

(4) C. Lewis, 1894, pp.42-68

(5) P.F. Kendall. A System of Glacier-Lakes in the Cleveland Hills. Q.J.G.S. Vol. 58, 1902.

(6) S. Melmore. The Glacial geology of Holderness and the Vale of York 1935; and J.S. Gaynor and S. Melmore. Late Glacial Lacustrine Conditions in the Vale of York and the Tees Basin. North-Western Naturalist, Vol.II 1936 pp. 228 - 244.

(7) R.G. Carruthers. The Secret of the Glacial Drifts. Proc. Yorks. Geol. Soc XXVII 1948.

(8) A.C. Dalton. Lake Humber as Interpreted by the Glaciation of England & Wales. North-Western Naturalist 1941 p. 256.

Whichever view may be correct, the deposits left in the Vale south of the Escrick moraine are very similar to lacustrine deposits in character. They range from compact laminated clays frequently exploited for brick-making to clean yellow and soft white sand[9]. The sands are frequently only a few feet thick and rest on the clay. The clay and sand together have filled in the irregularities of the Triassic pre-glacial surface and have produced a plain of small range of altitude. The depth of superficial deposits depends principally on the relief of the pre-glacial surface. The greatest thicknesses of lacustrine deposits are between 80 and 90 ft., found near the junction of the Derwent with the Ouse and in the lower Foulney valley. More normal are depths of 40 to 50 ft. The deposits thin out towards the eastern margin of the Vale, or in places merge into the gravels regarded as old beach deposits.

In most cases the areas having a veneer of lacustrine sand are slightly higher than the areas where the clay forms the surface. There appears, however, to be no clear explanation for the distribution of the sandy veneer. Fig. 48 shows that sandy land predominates in the north and east of the vale, and clay in the south and west. A sandy zone also follows the east side of the Derwent valley and forms the island of higher ground between the two branches of the Derwent, and

(9) Dakyns. op. cit. pp. 35-37

a string of sandy mounds extends east from this island to link it with the main area of sand to the east. There appears to be some slight correlation between the areas where the superficial deposits are deepest ~~and~~, where clay now forms the surface, and the present river valleys.

Once the ice had retreated from the Humber gap and allowed Lake Humber waters to drain away, or oncethe dead ice had finally disappeared, the streams, guided by the surface relief, extended their courses across the Vale again. The Derwent extended south from the Kirkham Gorge overflow channel to follow a north-south zone of lacustrine clay which carried it into the Ouse. The streams rising in the chalk springs near Pocklington joined to form a river known by various names in its different sections, but which will here be called the Bielby Beck. This flowed due west to join the Derwent. The chalk streams near Market Weighton joined to form the Foulney which started in the same direction, but then turned south and east again in a large loop to enter a north-south trending depression now followed by the Market-Weighton canal. (This will in future be termed the Wallingfen depression, after the marsh which occupied its southern part). The Foulney must have made its way south along this depression into the Humber.

Immediately after the Ice Age, the sea stood 150 ft. or more below its present level(10). The rivers therefore tended

(10) For evidence of this from a nearby area, see R. Agar, Glacial & post-glacial geology of Middlesborough and the Tees estuary. P.Y.G.S. Vol. 29, 1954 pp.237-253.

to deepen their channels across the Vale, the surface of which is only a little above present sea-level. The Ouse and Derwent carried most water, especially at first from the melting ice-sheets further north, and they therefore carved for themselves the deepest and widest valleys. In the meantime the adjacent land must have been fairly well drained, and when tundra conditions gave way to a warmer climate, forests of birch and pine were widespread.

As the sea-level gradually rose and the coastline crept nearer and nearer, downcutting by the rivers ceased, and instead the valleys became filled with alluvial deposits. During Atlantic times, from about 5,000 to 2,500 B.C. the rate of rise of sea-level may have slowed down, and this combined with moister climatic conditions was sufficient to favour the growth of peat in many of the lowest areas such as the Ouse and Derwent valleys and the Wallingfen depression. In Barmby-on-the-Marsh, near the junction of the Derwent with the Ouse, two well-sections reveal 8 ft. and 11 ft. of peat respectively resting on lacustrine clay.(11) At River Bridge brickyard in the north of the Wallingfen depression, 6 inches of peat is found, but the thickness of peat increases towards the Humber to 20 ft. in Broomfleet carrs, and peat is also exposed from time to time in the Humber banks of this part of the river. This distribution suggests that during Atlantic times shallow

(11) Dakyns. op. cit. p.43

meres and peat fen must have occupied the Wallingfen depression and probably the whole of the Ouse valley south of the slight ridge formed by the east-west trending sandy rise (the Howden-Eastrington rise). Unfortunately there are too few borings and well-sections in the area to prove the extent of the peat. Sea-level was still lower than at present, so that tidal waters had not yet penetrated the Humber gap.

In the Fenland, Godwin found evidence of a similar period of peat formation during Atlantic times. This was followed first, by a marine transgression about 2,000 B.C. which produced the "blue buttery clay"; second, by a fall in sea-level about 500 B.C. that led to a renewed cutting of channels through the clay; and third, by a further less well-marked marine transgression and the deposition of more silt especially along the river channels (roddons). Godwin attributes the first marine transgression to the breaching of some barrier, but this was brought about largely by the rising sea-level. Since the same factors were operating in the Vale of York, we may expect a roughly similar pattern of events. The evidence from boreholes is meagre, but what there is suggest a broadly similar history to that of the Fens. At some sta tidal influences penetrated the Vale and brought about the deposition of a fine clayey silt (warp) on top of the earlie peat. It seems likely that the whole of the Wallingfen depression and the Ouse valley south of the Howden-Eastrington ridge was part of a brackish lagoon, and the silts brought in by the Humber tidal waters were deposited in its calm waters. On the other hand, the salt water and silt may not have reached the northern end of the Wallingfen depression, and peat accumulation may have continued there without interruption. No boring penetrates this area. It is also difficult on the evidence available to suggest whether there were two separate marine transgressions as in the Fens. No record is known of a higher bed of peat, separating two different silts, and roddons as marked as those of the Fens do not exist. But air photographs reveal some tendency towards roddon formation, and some well-sections distinguish two contrasting beds of warp, which fact suggests that at least a minor break in deposition may have occurred. In New Village, 4 ft. of blue clay is recorded resting on 4 ft. of white clay (the white clay is highly valued for brick making); in the east of Wallingfen 5½ ft. of yellow warp rests on 6 ft. of green warp[12]

In the Fens, Godwin considers that the last marine transgression was over by Roman times, for then settlements occur on the silts and the roddons. There is no such evidence in the Vale of York by which it is possible to date the infilling and drying out of the Humberhead lagoon, unless the absence of

(12) Dakyns op. cit. p.47

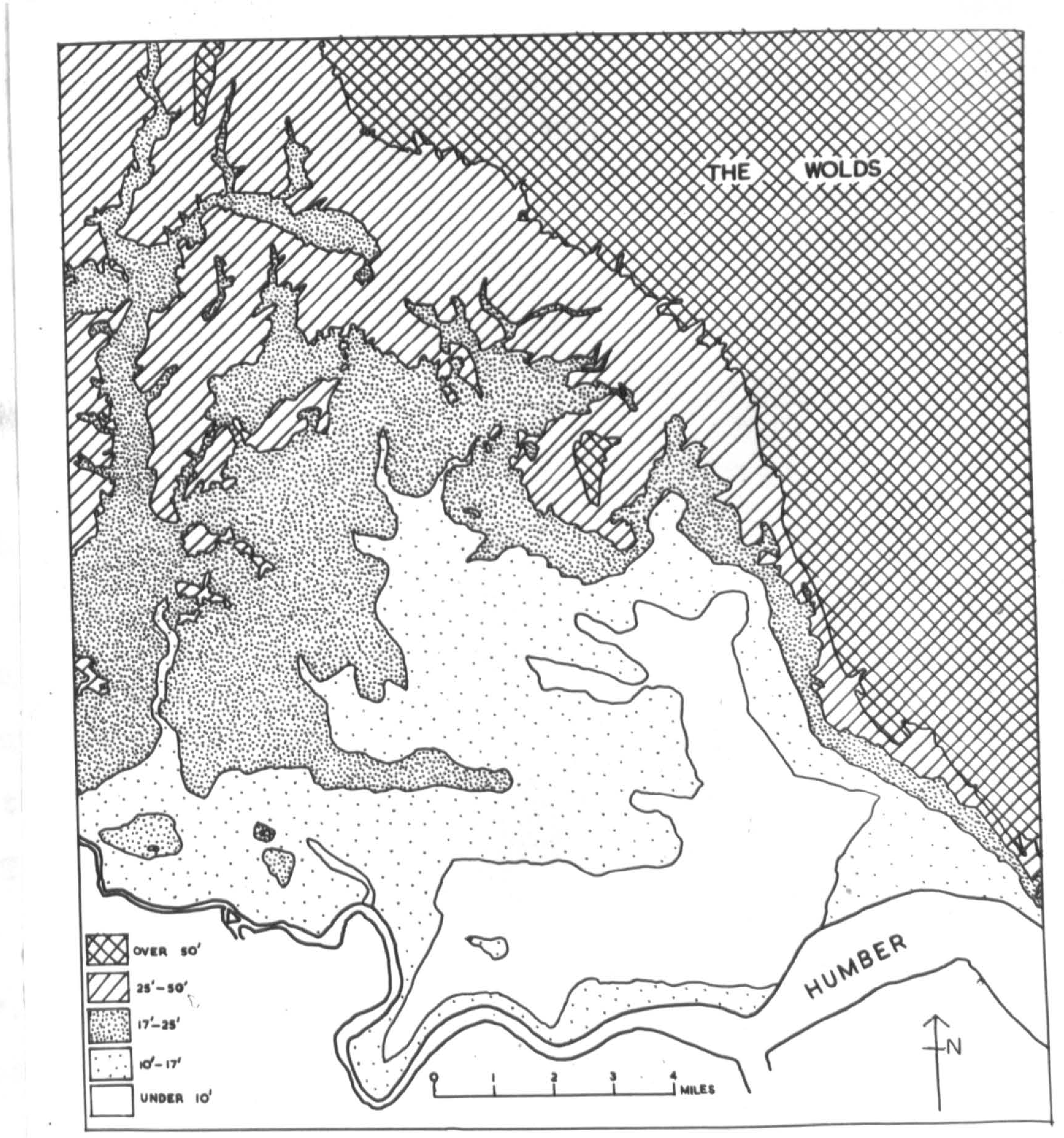


Fig.49. The Vale of York, relief. The 10 and 17ft. contours are interpolated from spot-heights, and can be regarded as giving only an approximate distribution of altitude.

of Romano-British Settlement suggests that silting was not complete by Roman times. No doubt by that time the main channel of the Ouse was well defined, but the levee which it had built on its north side was not sufficient to prevent the silt beyond being flooded at spring tides and when there was much land-water in the river. The 1500 or so years since Roman times have seen only minor oscillations in sea-level, and the general pattern in the Vale has remained unchanged. Peat gradually colonised and spread through the lowlying areas as the accumulation of silt made salt-water flooding less and less frequent. The peat became most extensive in the Walling-fen depression (although a creek still carried salt-water some way up the depression) and between the Howden-Eastrington rise and the Ouse levee.

The glacial and post-glasial history of the Vale has made it a typical area of difficult drainage. The whole of the Vale, with the exception of the Escrick moraine (just included in the north-east of the area) and Holme hill lies below 50 ft. O.D., and much of it below 25 ft. The lowest areas are less than 10 ft. O.D., and are separated from the Ouse or Humber by the higher land of the Ouse levee. (Fig. 49) Since at high water, ordinary spring tides, the level of the Humber reaches about 16 ft. O.D., it is obvious that in its natural state, most of the vale must have been poorly drained. The slight

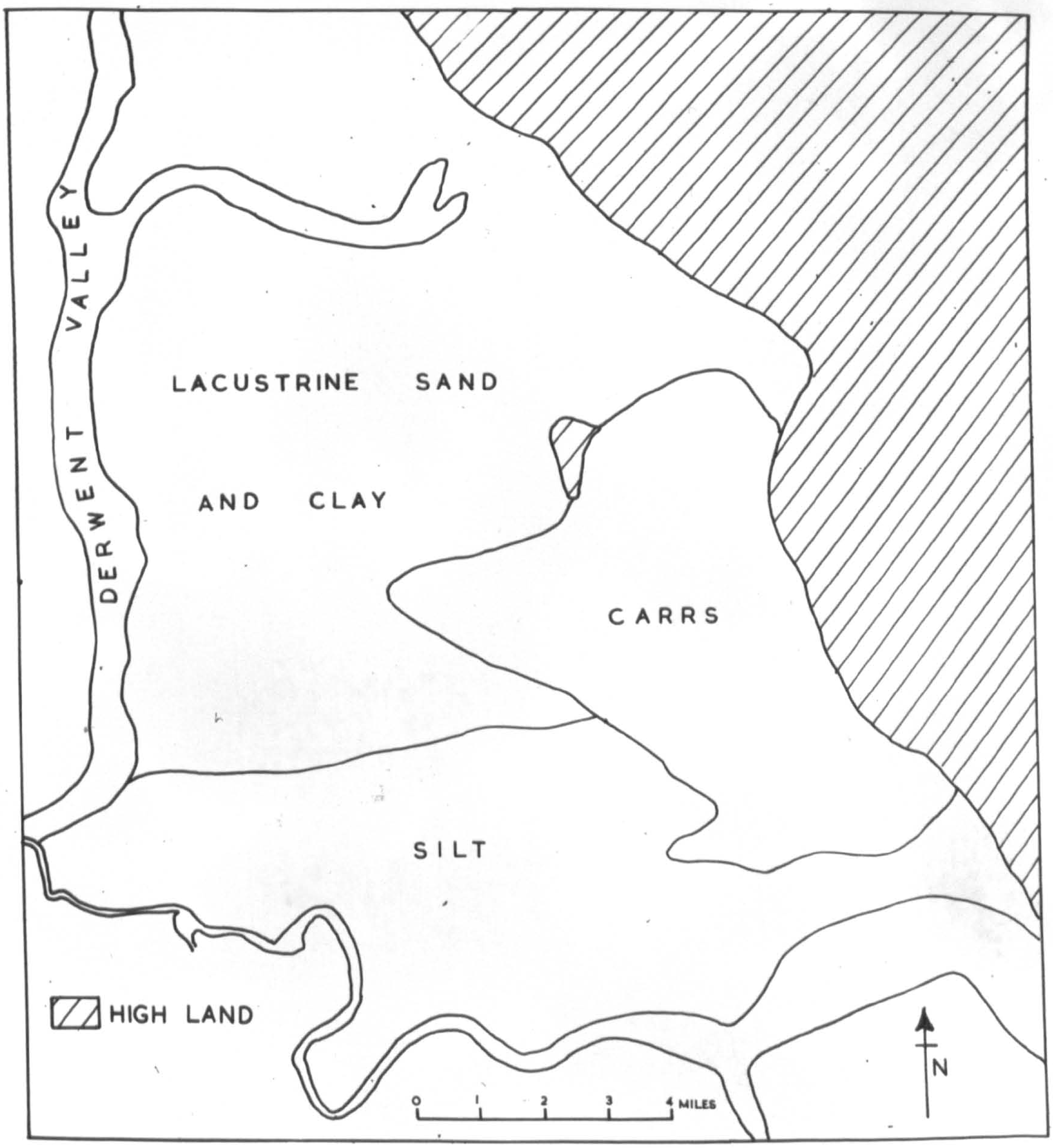


Fig.50. The Vale of York, physical regions.

variations in altitude and surface deposits, however, have a considerable influence on drainage conditions, so that it is possible to distinguish four subdivisions in the Vale, in each of which drainage problems are different (Fig. 50). These subdivisions are:-

1) The Wallingfen depression. This is all below 10ft. O.D., and contains the lowest parts of the Vale, e.g. Oxmardike marr 1½ ft. O.D.; and Hotham carrs 4½ ft. O.D. [Peat covers the warp floor in many parts.]
2) Howdenshire, the area west of the Wallingfen depression. This extends from the Ouse to the Howden-Eastrington rise. This area is slightly higher than 1) and its surface is principally warp clay. Its drainage problem is complicated by the Ouse levee which makes it difficult to lead water from the lower land to the north.
3) The Derwent valley. Early post-glacial erosion followed by later deposition has produced a flat-floored alluvial valley from ½ mile to one mile wide. On both banks there is higher well-drained land, but the valley-bottom is particularly subject to flooding owing to the slight gradient of the river and the large volume of water it carries in times of flood.
4) The rest of the vale, i.e. Spaldingmoor and the area north of the Bielby Beck, with the exception of the

section of the Escrick moraine. This land is slightly higher than the other three areas, so that drainage is a less prominent problem. But waterlogged conditions in the other areas had their results here in impeded drainage and excessively high watertables. Both the lacustrine clays and the sands produce poor soils of low fertility

Early Settlement

The waterlogged conditions which characterised such large areas of the vale made this area even less attractive than Holderness to early man. In Holderness the gravel hillocks of the moraines that stood above the general level of the surrounding land were reasonably well-drained, but there were few comparable areas in the vale. Only Holme hill and the Escrick moraine provided favourable settlement sites. Thus, for long the vale remained an empty area, a frontier zone shielding the flanks of the waves of invaders who settled the adjacent Wolds and Jurassic bench. Holme hill appears to have been occupied as an island outlier, for axes dating from Neolithic to middle Bronze Age (Food Vessel) times have been found there[13].

Even in late Bronze Age and Roman times this negative character of the Vale was retained. There was still no

(13) F. & H.W. Elgee. The Archaelogy of Yorkshire. pp. 47, 48, 51, 62 and 77

permanent settlement, but archaeological finds suggest that the people from the settlements on the adjacent higher land had at least explored parts of the area. A number of late Bronze Age palstaves were ploughed up in Hotham Carrs in the Wallingfen depression in 1867[14]. It is impossible to believe that this lowest part of the Vale would have been chosen for settlement while the rest of the vale was ignored, and it seems most likely that the palstaves were lost from a boat crossing the open water which may then have existed in this area. Roman exploration apparently led to the discovery of the warp clays at Throlam, two miles south of Holme hill, where a pottery was set up which may have supplied the Roman station at Brough on Humber during the second half of the third century A.D. (15) But there are no other traces of Bronze Age or Roman activity in the area, which suggests its unattractive nature at that time. The need to avoid the area is shown by the route chosen by the Roman road from Lincoln to York. The direct road would have carried the road through the Isle of Axholme and Hatfield Chase. Instead a longer route was adopted following the Lincoln Edge, crossing the Humber to Brough, following the Jurassic bench to near Pocklington, and then the Escrick moraine to York. The direct

(14) Elgee. op. cit. p.91

(15) Ibid. p.169

route between Brough & York would have been 7 or 8 miles shorter. Marshland was one of the few obstacles which could divert a Roman road from its normal direct course.

The area was therefore still almost empty when the Anglian invaders arrived in the fifth and sixth centuries. They were the first to settle extensively in the vale, just as they were the first to occupy the true clay-lands of Holderness. They settled especially on the higher sandy areas, where natural conditions of drainage, though poor, were better than elsewhere in the Vale. But they also settled on the lacustrine clay and the higher parts of the warp, where the mould-board plough stood them in good stead. Place-name evidence suggests that they did not settle extensively in the Vale during the first hundred years or so after their arrival in Britain. There is only one name of the early "ingas" and "ingaham" type, Everingham, about two miles north of Holme. There are a few names in "ingatun" which may indicate early settlement, e.g. Eastrington, Laxton, Knedlington and Spaldington. But the scarcity of such names suggests that most of the Anglian villages were secondary settlements dating from the seventh and eighth centuries.

The siting of the Anglian settlements suggests that two main factors determined the choice; access to water communications, and good drainage by the standards of the vale. The

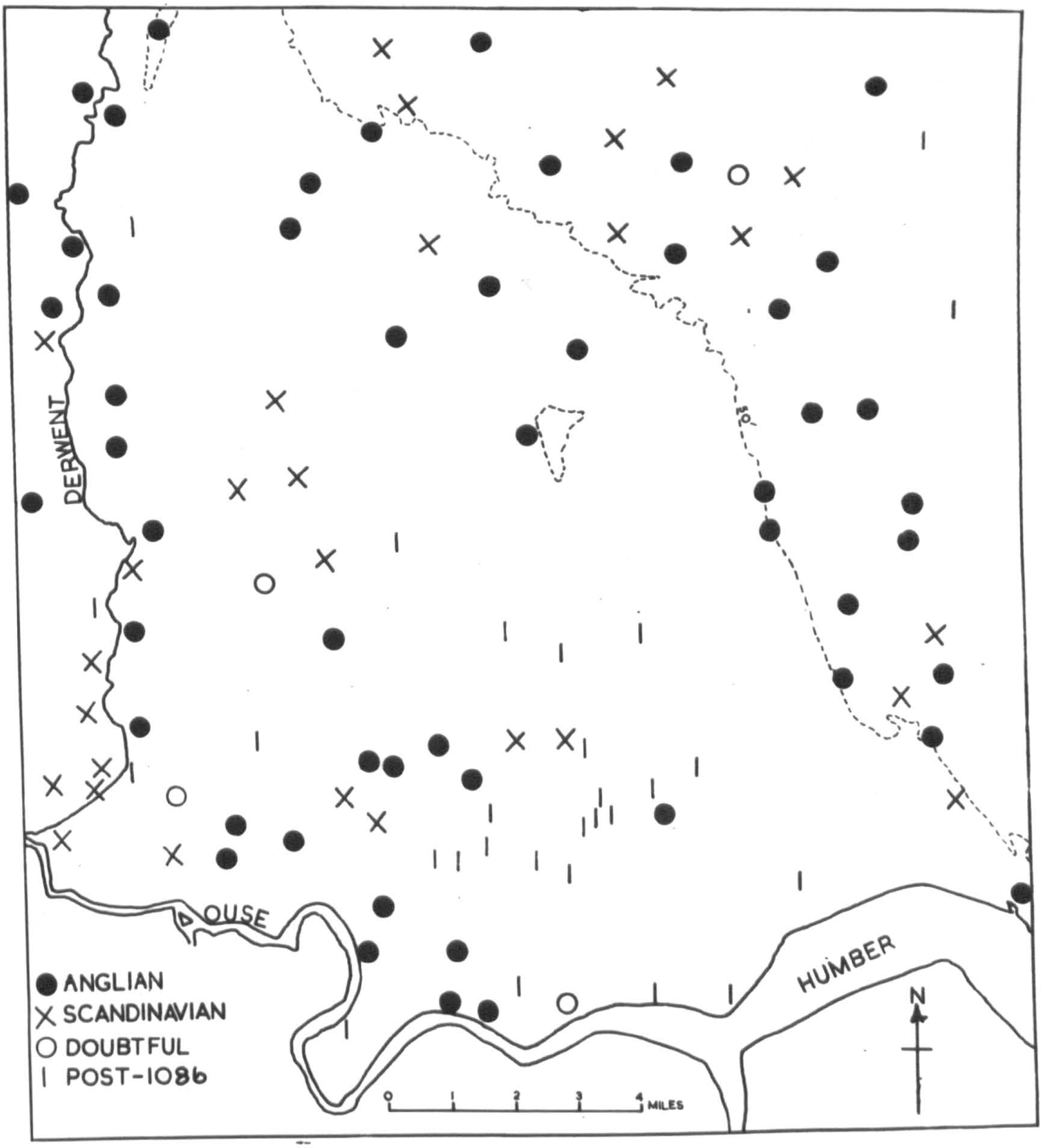


Fig.51. The Vale of York, place-names. "Doubtful" includes names where the elements could be either Anglian or Scandinavian, or where the elements are mixed. "Post-1086" indicates that the name was not mentioned in the Domesday Book or earlier.

banks of river valleys were therefore favourite sites, especially both banks of the Derwent and the Bielby Beck where sand formed the surface capping. The Howden-Eastrington rise and the western part of the Ouse levee were also chosen. Howden may have been the first and most important settlement in this more difficult area. Its name is derived from O.E. "heafod" (head) and "denu" (valley). In its most straight-forward sense, the name suggests that Howden may have been the first really firm land adjacent to the Ouse and Derwent reached by a vessel sailing up the river from Brough. The settlements on the levee downstream must therefore, following this inter-pretation, be later than Howden. On the other hand, Smith suggests that the name could be interpreted to mean "headland, spit of land"(16), and this would describe the rise on which the village stood, which must have appeared a s a tongue of firm ground rising from surrounding marshland. That settlement extended east from Howden along the rise is suggested by the names Eastrington (the farmstead of those living to the east) and Owsthorpe (east village).

Except in these areas, Anglian settlement was sparse, and the influence on the landscape small. Forest and marsh no doubt still separated many villages, and stretched back away from the cultivated strips on the higher well-drained land

(16) A.H. Smith. op. cit. p.251

near the rivers. On the clay and warp of the south, dense oakwood probably prevailed, while on the sands the woodland may have contained more birch and have been more open. Both types merged into the carr of the lowest parts where alder and sedge dominated. Along the Derwent and Bielby Beck valleys, the Angles may have cleared some of the carr in order to provide good pasture for their livestock. Many areas in these valley bottoms bear the name "ings" (O.N. eng. = meadow), which suggests that they were converted from carr-land by the time the Danish local names were adopted. The carr of the Derwent valley could be relatively easily converted to meadow, for the valley is not subject to long periods of stagnant water, but rather to sudden floods followed by a rapid fall in the level of the river. In such conditions grass flourishes. But the other continually waterlogged carr-lands no doubt remained in their natural state.

When the Danes began to settle in the area after the middle of the ninth century, they found more unoccupied land than in Holderness. Their settlements therefore tend to be proportionately more numerous in the Vale. On the sandy land they established many small settlements in stretches of unoccupied woodland between Anglian villages e.g. Storwood or Storthwaite (O.N. stor = brushwood, thwaite = clearing) near the junction of the Bielby Beck and the Derwent. But more numerous were their settlements on the lacustrine clay and warp only just above flood level, where their ability to embank and reclaim the land stood them in good stead. Many hamlets along the lower Derwent and on the Howden-Eastrington rise bear Danish names, which suggests that there was much clearing and reclamation there in the ninth and tenth centuries. Fence ditches were cut, as is indicated by a charter of 959 A.D. describing the boundaries of Howden: "These are the land-boundaries of Howden: From Ouse up to Wilbald's fleet; from Wilbald's fleet to the ditch; along the ditch to Derwent; from Derwent straight on to Caerholm; from Caerholm along the ditch all around the wood to Foulwater; along Foulwater to Old Derwent; along Old Derwent; then again to Ouse"(17). If such fence ditches existed, it is possible that primitive drainage ditches were also in use.

The higher, drier parts of the Vale had therefore already been partially settled and reclaimed by the time of the Norman conquest. The four physical subdivisions distinguished earlier had by now distinctive patterns of human occupance. The sand and lacustrine clay lands contained scattered villages still separated by wide expanses of woodland. The Derwent valley was a narrow zone of regularly flooded meadowland flanked by higher land which provided the site for two strings

(17) Farrar. op. cit Vol. I pp. 13 - 14.

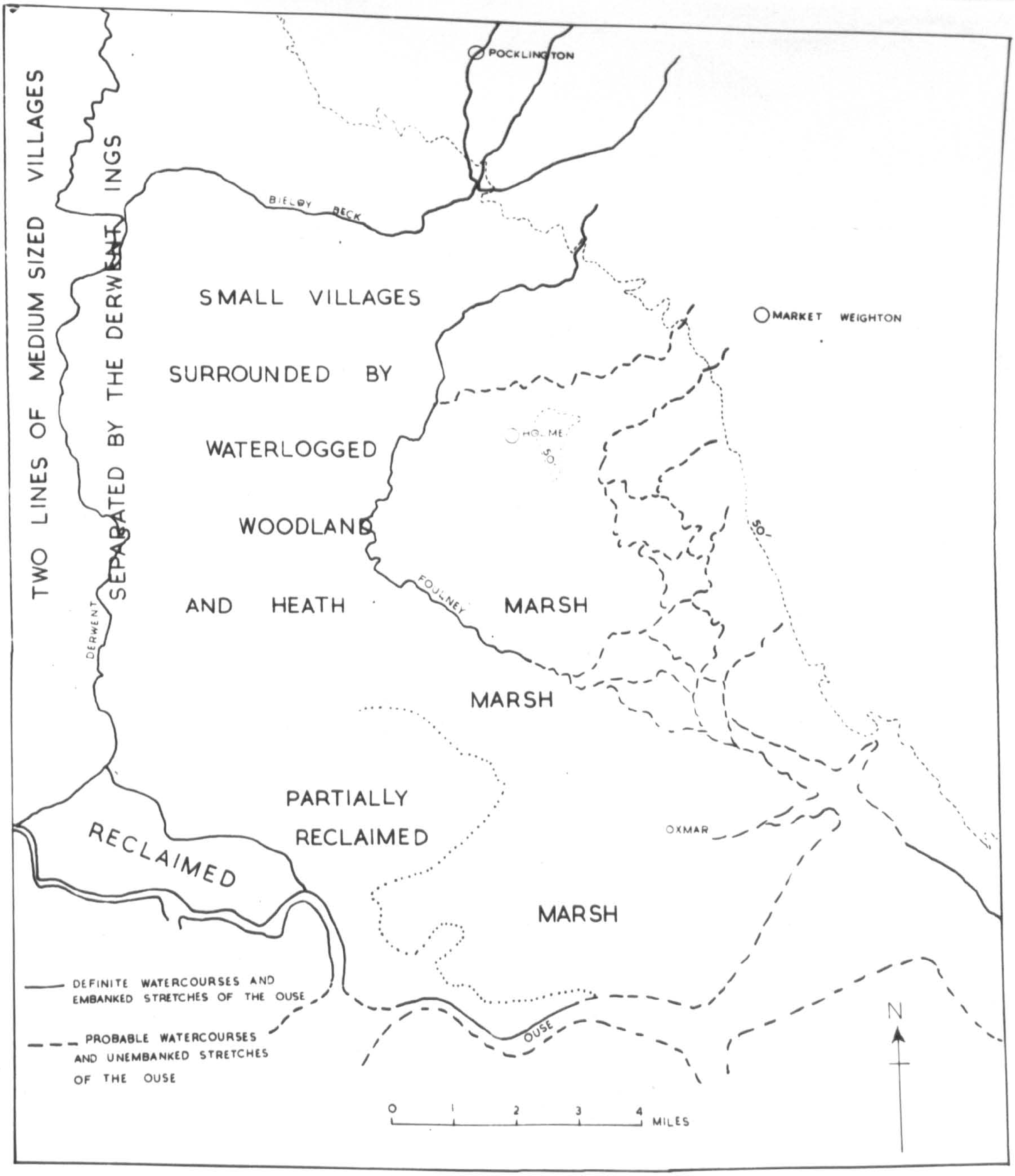


Fig.52. The Vale of York, Eleventh century conditions. The maze of channels in the Wallingfen depression is based on air photographs.

of villages with their cultivated fields. In Howdenshire the western parts of the Howden-Eastrington rise and the Ouse levee were partially reclaimed and settled, but forest and carr occupied the lower land. The Wallingfen depression remained in its natural state of impenetrable carr alternating with open meres. It opened out to the south into a muddy creek approximately in the position of the later Skelfleet drain. (The term "fleet" is normally used for a tidal waterway only, which suggests that this is most likely location of the creek. The configuration of the Humber shoreline here before the later accretions also suggests the same location for the creek, while the old channels revealed by air photographs all appear to make for the Skelfleet)

Fig. 52 summarises the probable character of the area about 1066. The Ouse is shown as embanked where riparian settlements are known to have existed. The maze of channels shown in Wallingfen are based on the air photographs of the area.

Chapter IX Early Drainage and Reclamation 1066-1700

The early reclamation and improvement of the Vale served to emphasise the contrasts between the different parts. In addition, the different problems of the four types of land were reflected in the different means of improvement adopted.

The state of reclamation and improvement prior to 1066 is confirmed by the Domesday Book, which shows that a number of prosperous manors were in existence at that time. But the same record reveals a quite different picture by 1086, for then many of the manors were waste and others had considerably reduced areas of cultivation. The change between the two dates is normally attributed to the ravages of William I's troops in the winter of 1069-70. The Vale was easily accessible to the army as it moved through Northern England, unlike Holderness which was saved by its more marginal location. T. A. M. Bishop believes that the whole Vale was reduced to waste, but that by 1086 many estates had been re-populated by an agricultural population moved from nearby less affected hill lands.(1) This was possible when a lord held both hill and Vale estates, but lands belonging to lords owning only Vale estates tended to remain to a large extent in waste in 1086. One such estate was that of the Bishop of Durham which covered the whole of Howdenshire. There, and elsewhere in the Vale, the devastation and the subsequent lack of labour, must have had repercussions on the primitive embankments and drains. These probably fell into decay, and allowed large areas to revert

(1) T. A. M. Bishop. The Norman Settlement of Yorkshire in Studies in Medieval History presented to F. M. Powicke 1948.

to the conditions that prevailed before the first Anglian settlers arrived. Forest must have started to grow up on land once cleared, and waterlogged conditions have returned to many parts of the warpland. Drainage and reclamation had to start again almost from scratch.

Medieval Improvements.

On the silt lands the greatest need was the provision of banks to prevent the waters of the Ouse overflowing at times of flood and drains to carry away the water from the land. The evidence suggests that much of Howdenshire was reclaimed between 1154 and 1304, especially during the earlier part of this period. It is believed that Hugh de Pudsey, Bishop of Durham, was the driving force behind much of this movement, and he became Bishop (and therefore lord of Howdenshire) in 1154.(2) Bishop Hugh appears to have divided Howdenshire into many small subsidiary manors, each of which later became the nucleus of a small hamlet.(3) This subdivision into small manors is suggested by the few extant records of land transactions at that time; the original grant of land in Blacktoft to Gilbert Hansard between 1165 and 1185 still survives;(4) Farrar gives the confirmation of a grant (1185-1195) of Yokefleet to Adam, son of William de Warram, which states that Bishop Hugh made the original grant to William;(5) Col. Saltmarshe quotes a

(2) The River Banks of Howdenshire, their Construction and Maintenance in Ancient Days. Col. P. Saltmarshe. E.R.A.S. XXIII, 1920, p. 7.

(3) Ancient Drainage of Howdenshire. Col. P. Saltmarshe. E.R.A.S. XXIII, 1920, p. 17.

(4) Rievaulx Chartulary. Surtees Soc. Vol. 83, p. 215.

(5) W. Farrar, Early Yorkshire Charters, Vol. II, p. 312.

a copy, which he believes to be genuine, of a grant of Metham from Bishop Hugh.(6) Each grant probably included some firm land, but also large areas of marsh, which it would be in the interest of the new owner to reclaim. Each owner acted independently in embanking his land and cutting a drain from it into the Ouse, and in this way the great burst of reclamation in Howdenshire in the late twelfth and early thirteenth centuries came about.

This process of reclamation therefore led to the eastward extension of the Ouse embankments. The pre-Conquest banks as far east as Yokefleet were probably restored by 1154. By 1295 they extended as far as Faxfleet, for in that year the first commission appointed by the Crown for the inspection of the Ouse banks was requested to inspect banks between Cawood (in the West Riding) and Faxfleet.(7) In 1304, the limits stated were Cawood to "Brungeflete" (i.e. Broomfleet), and in 1324, South Cave was given as the eastern limit. (See Figs. 53 and 55 for the location of these settlements.)

It is less easy to trace the progress of drain-cutting. Only one drain in the main part of Howdenshire is mentioned at an early period, Greenoak Goit. This was in existence by 1200,(8) therefore it seems likely that many of the others were also cut by this date. Low banks were possibly constructed on the north side of the warp land, to prevent the water from the clay land to the north troubling the area. There are no contemporary references to such banks, but several east-west trending

(6) Saltmarshe. Ancient Drainage of Howdenshire, p. 18.

(7) Dugdale, op. cit.

(8) Ibid, p. 18.

lanes are shown on the Ordnance Survey maps on the north side of the area, and these may well mark the location of such banks.

In the eastern and lower part of Howdenshire the process of reclamation and the cutting of drains is easier to establish. Three approximately parallel drains were constructed from the Foulney to the Ouse, probably between 1165 and 1200. When Gilbert Hansard was granted land in Blacktoft (1165-1185) the bounds of his new estate were given as the boundary of Yokefleet on the west, and the mill dam of the Canons of Thornton on the east. Thornton Dam drain was thus in existence by 1185 at the latest.(9) The same grant gave Hansard permission to build a mill in Blacktoft, and to lead water from the Foulney to the mill. This channel came to be called Hansardam after its originator. An agreement made in 1200 refers to it, so it must have been cut prior to that date. The third drain was Temple Dam, and there is no direct evidence of the date when it was cut. The Templars were in possession of Faxfleet by 1185, however, so it seems possible that this watercourse, too, was cut before 1200.

A watermill was situated at the southern end of each of these cuts, and the fact that all three led from the Foulney suggests that the providing of water for the mills was one of the main reasons for their construction. The amount of water which entered each channel, however, was no doubt carefully controlled by clows at the junctions with the Foulney, so that they were also able to act as drains of the areas through which they passed. The mills probably made use of the fall of

(9) It is also mentioned in a confirmation by Richard I in 1190 of gifts to Thornton. Farrar, op. cit. Vol. III, p. 42.

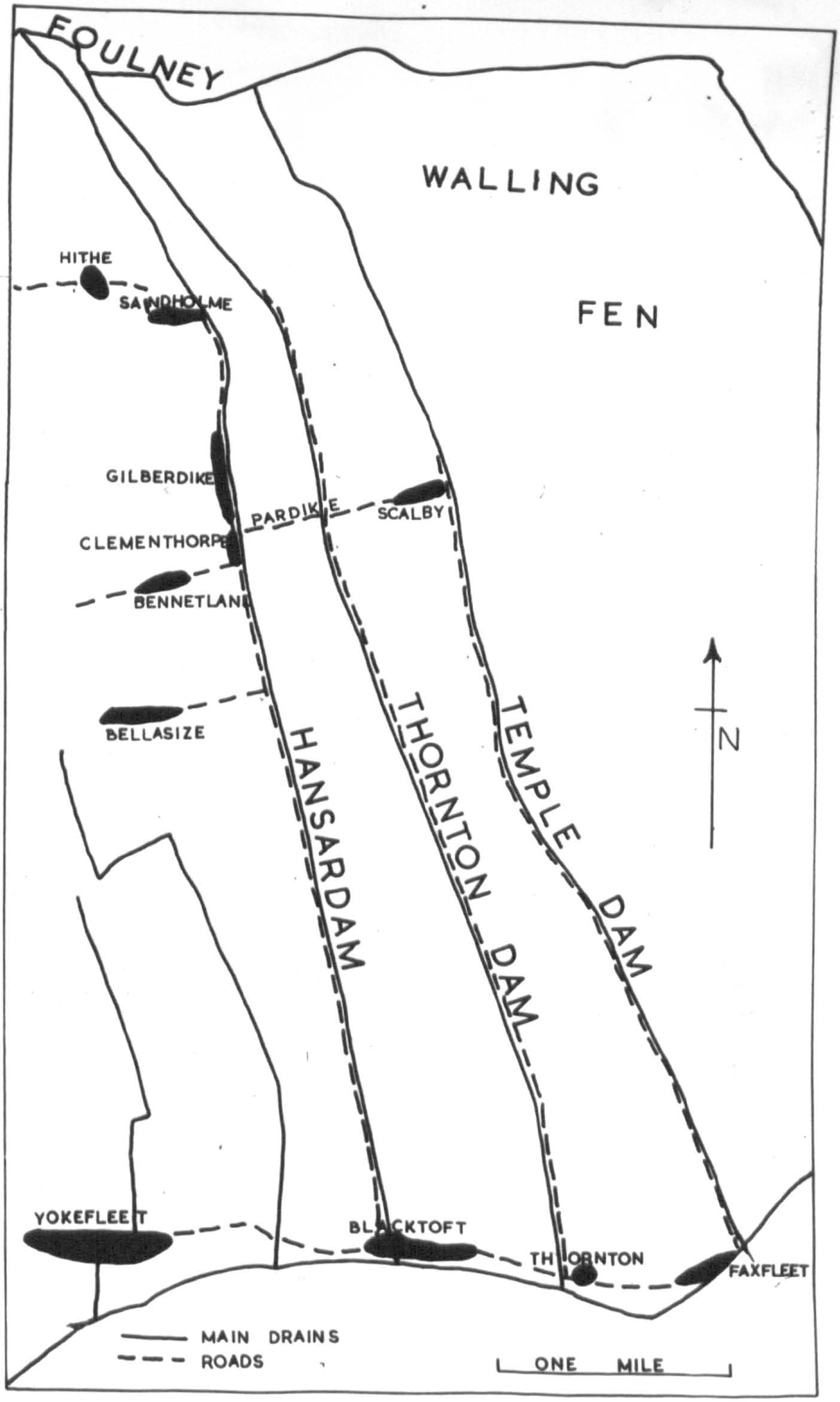


Fig. 53. Early settlements near Hansardam.

several feet from the level of the drains into the Humber at low tide.

In addition to driving the mills and providing for local drainage, the three channels also contributed to the pattern of communication and settlement in the district. In the western part of Howdenshire it seems likely that some settlement preceded the cutting of the drains, and the hamlets were situated on the highest land, and at first protected themselves from floods by banks.(10) In the east, the drains appear to have preceded settlement, and their banks provided the highest and driest sites in the district. The banks therefore became the sites of the main settlements in this part. Gilberdike is situated along Hansardam bank (Fig. 53), and apparently took its name from Gilbert Hansard. It was first mentioned in 1234,(11) so probably grew up soon after the cutting of the drain. Scalby developed along the bank of a tributary drain, Pardike, and was first mentioned in 1230. Sandholme has a similar location along a dike leading to Hansardam from the west, and was first mentioned in 1285. It was probably an outgrowth of the adjacent older settlement of Hithe. Bellasize (first mentioned in 1212) and Bennetland (1234) have similar locations on roads at right angles to Hansardam, although any drains along the roads have now disappeared.

These settlements had the advantages not only of dry sites, but also of adjacent road and water communications. The banks were probably followed throughout their length by roads, which still survive in parts. Where cross-drains linked the three main channels, their banks provided

(10) The name Balkholme suggests the process, whereby what was originally a "holmr" or meadow was enclosed by a "balk" or bank.

(11) A.H. Smith, op. cit. p. 246.

important cross-routes. In the case of Pardike (Fig. 53), the road on the bank appears to have become more important than the drain. In 1399, various inhabitants of Scalby were accused of having thrown earth into the drain and obstructed it. Their reply was that "they were repairing the road, and in fact there was no watercourse there", an argument which was accepted.(12)

The great period of the improvement of the silt land of Howdenshire was therefore the century following 1154. The fertility of the soil made the effort worth-while. The improvement took the form of small-scale individual schemes, but the total effect of the many small improvements was to bring into agricultural use most of Howdenshire.

The changes in the other three subdivisions of the Vale were less marked and they left even less evidence than the changes in Howdenshire. The Derwent valley was unaffected by the surge of improvement, for the problems involved were too great for local solution. On the lacustrine sands and clays there was little scope for improved drainage owing to the distance from the outfalls and the dependence on conditions in the intervening areas. Winter waterlogging of the soil therefore remained common. This did not prevent the land being cropped, although it contributed (together with the relatively poor soils) towards making crop yields in this district lower than in Howdenshire. The improvement which took place in this subdivision therefore was the clearing of woodland and its replacement by cultivated fields or meadow. This type of improvement could take place on an even smaller scale than the reclamation in Howdenshire. Assarting seems to have been an individual process carried

(12) Dugdale, op. cit.

out by many progressive free peasants.(13) There are few references to such local changes in contemporary documents, but clearing probably took place throughout the twelfth, thirteenth and fourteenth centuries. Bishop believes that eventually most of the individual assarts were absorbed into the common fields of the townships.(14)

In the carrs of the Wallingfen depression, improvement was confined to the cutting of a few drains, which may have had the effect of drying out the carrs more rapidly in the summer. Hansardam, Thornton Dam and Temple Dam indirectly contributed to this by diverting some of the Foulney waters. Within the carrs Ragolfdike and Langedike were cut, no doubt to replace an earlier meandering course of the Foulney, and they helped to carry away the water more rapidly. It is possible that the impetus to improve the carrs came from the decrease of waste land in Howdenshire, which compelled the inhabitants to look elsewhere for summer pasture. Thus the drains across the Wallingfen depression may have been cut later than the period of general improvement on the silts, perhaps in the latter half of the thirteenth century.

The medieval period therefore was one of considerable activity in three of the subdivisions of the Vale. The improvement was most marked and probably earliest on the fertile silts or warps of Howdenshire. It was later and probably brought less change in the carrs. It was more sporadic in location and in time on the lacustrine sands and clays. The

(13) A North Cliff deed of conveyance of 1207 illustrates the assarting movement, although the township is outside the area being considered, on the Jurassic bench: "if the grantor should wish to break any part away from the moors and marshes and convert it into arable land and meadow, it should be lawful for the grantee to do the same for as much as belongs to two bovates of land". Yorkshire Deeds. Y.A.S.R.S. LXXXIII, p. 82.

(14) T.A.M. Bishop. Assarting and the Growth of the Open Fields. Econ. Hist. Review VI. 1935. pp. 13-29.

physical contrasts between the three subdivisions are also reflected in the modes of improvement employed. On the silt lands changes were undertaken principally by the lords of the manors, in the carrs possibly by co-operative action by several townships, and on the sands and clays by individual peasants. It is remarkable that whereas Holderness owed a considerable proportion of its medieval improvements to monastic landlords, these played only a small part in the improvement of the Vale. There were only small areas of land belonging to monastic houses in the area e.g. Ellerton Priory, Selby Abbey and Swine Nunnery held land in Spaldingmoor, Thornton Abbey (North Lincolnshire) held land near Blacktoft, and the Knights Templar owned Faxfleet. These houses joined in the general trend towards improvement, but they cannot be said to have initiated the movement, nor to have played a major part in its development.

Conditions about 1400 A.D.

As a result of the medieval improvements which have been considered, the Vale was very different about 1400 A.D. from what it had been three hundred years earlier. It had a much more elaborate system of drains and embankments, a much larger area of improved land, and a number of new settlements.

The pattern of settlement which had come into being by the fourteenth century is revealed by two surveys of Knights' Fees in the county, Kirby's Inquest in 1285 and the Nomina Villarum in 1316.(15) These list the manors which make up the fees, and by comparing the list of settlements mentioned with a similar list compiled from the Domesday

(15) Surtees Society, Vol. 49, 1867.

Book, it is possible to distinguish the villages or hamlets which had appeared in the interval. All but two of the settlements shown as post-1086 in Fig. 51 originated between 1086 and 1316. The new settlements were all in Howdenshire and they fall into two main groups. First, there are five new villages or hamlets close to the Ouse, of which three are east of Yokefleet, the furthest east riparian settlement mentioned in Domesday. Even if there were no other evidence, this would be sufficient to suggest an eastward extension of the Ouse embankments by 1316. Second, twelve new settlements are situated on the south and east sides of the Howden-Eastrington rise.

This distribution of settlements indicates that by the fourteenth century most of the land above about 10 ft. O.D. in Howdenshire was reclaimed and improved. No doubt the improved area was gradually extended outwards from each hamlet, and land below 10 ft. O.D. was included, as for example the lower zone between the Ouse levee and the Howden-Eastrington rise. Howdenshire was therefore an area of arable and meadow dotted with hamlets and it probably had a relatively high density of population compared with other parts of the Vale. A Poll-Tax roll of 1379[16] unfortunately cannot be used to prove this, since it is restricted to Howdenshire and a small part of Ouse and Derwent (west of the Derwent). One indication that the area was prosperous is the fact that, in 1267, Howden church was allowed to become collegiate, in view of the large revenue from the wapentake.[17]

The fourteenth century picture of the sand and clay land, of

(16) E.R.A.S. Vol. XV, 1908, pp 1-70   (17) V.C.H. Vol. III, p. 361.

Spaldingmoor in particular, is of a mixture of long-cultivated land, recently-cleared land, and untouched woods and heaths. Recently cleared patches of land were often called "ruddings" or "riddings" from O.E. hryding = cleared land. There were frequent references in contemporary documents to such clearings e.g. Aughton Ruddings were mentioned in 1225,(18) Ellertonridding in 1227,(19) and Ketelridding, Dawriddyng and North Woderydding in North Duffield in a thirteenth century document.(20) Other field-names such as "lez Newbrokes" in North Duffield tell the same story. The frequency of such names suggests that by 1400 Spaldingmoor must have had a much more open aspect than it had in 1086. But much heath and wood remained, often separating the lands of two townships and used for common pasture and sources of fuel, e.g. the boundary between Ellerton and East Cottingwith in 1226 passed through a heath common to both townships.(21) In Aughton in 1225, there were woods called Swinescogh, Westsapale, and Estsapale and another not named.(22) A 1215 deed specifies "the Common Wood" of Spaldington.(23) Although there are sufficient references to give a picture of Spaldingmoor as an area of alternating woodland and clearings by 1400, it is impossible to obtain a very clear idea of the proportion of uncleared wood. It seems likely, however, that by that date most of the best land had already

(18) Yorkshire Fines. Y.A.S.R.S. LXII, p. 61.

(19) Ibid. p. 107. (20) Yorkshire Deeds. Y.A.S.R.S. LXIX, pp. 29-36.

(21) "the whole pasture of Thursmare to the east and south ..... shall remain in common ..... so that each party may dig his turves there and sell and give the same and use the pasture at his will and convenience". Yorkshire Fines. Y.A.S.R.S. LXII, p. 107.

(22) Ibid. p. 61.

(23) Y.A.S. Mss 599 (i) i. Notices of the Manor of Spaldington.

been converted to arable cultivation. We do not know for certain, but may surmise, that yields were low and that fields were frequently waterlogged.

The Wallingfen depression was typical carrland in 1400, flooded in winter but drying out for a few months in summer except in the lowest parts. It was used to provide summer pasture and fuel at least from 1300 onwards, for in that year the men of Broomfleet and Faxfleet complained that some water had been diverted and had caused summer flooding, so that they were unable "to dig turf in the moor of Walingfen, or depasture their cattle in the parts thereabouts".(24) There is no direct record of those who had rights in the carrs, but indirect evidence suggests that such rights were claimed by many townships scattered throughout Howdenshire, Spaldingmoor and on the Jurassic bench. A 1399 commission of sewers listed those responsible for the upkeep of many of the watercourses of the Vale, including Langedike, which crossed the carrs.(25) In the case of the other watercourses, it was the adjacent townships and lands which were responsible, but Langedike was the joint responsibility of a number of townships, whose locations are shown in Fig. 54. The most likely explanation of this distribution of responsibility is that those townships exercised common rights in the carrs through which Langedike passed.

A few brief references show that the Derwent valley remained very subject to flooding, as had no doubt been the case in 1086 also. The valley lands were used as meadowland and summer pasture.(26) There was

(24) Dugdale, op. cit. Ch. XXII. (25) Ibid.

(26) In 1331, there were 92 acres of meadow recorded in a holding in Ellerton, Aughton and Bielby, probably in the Derwent valley. Y.A.S.R.S. XLII

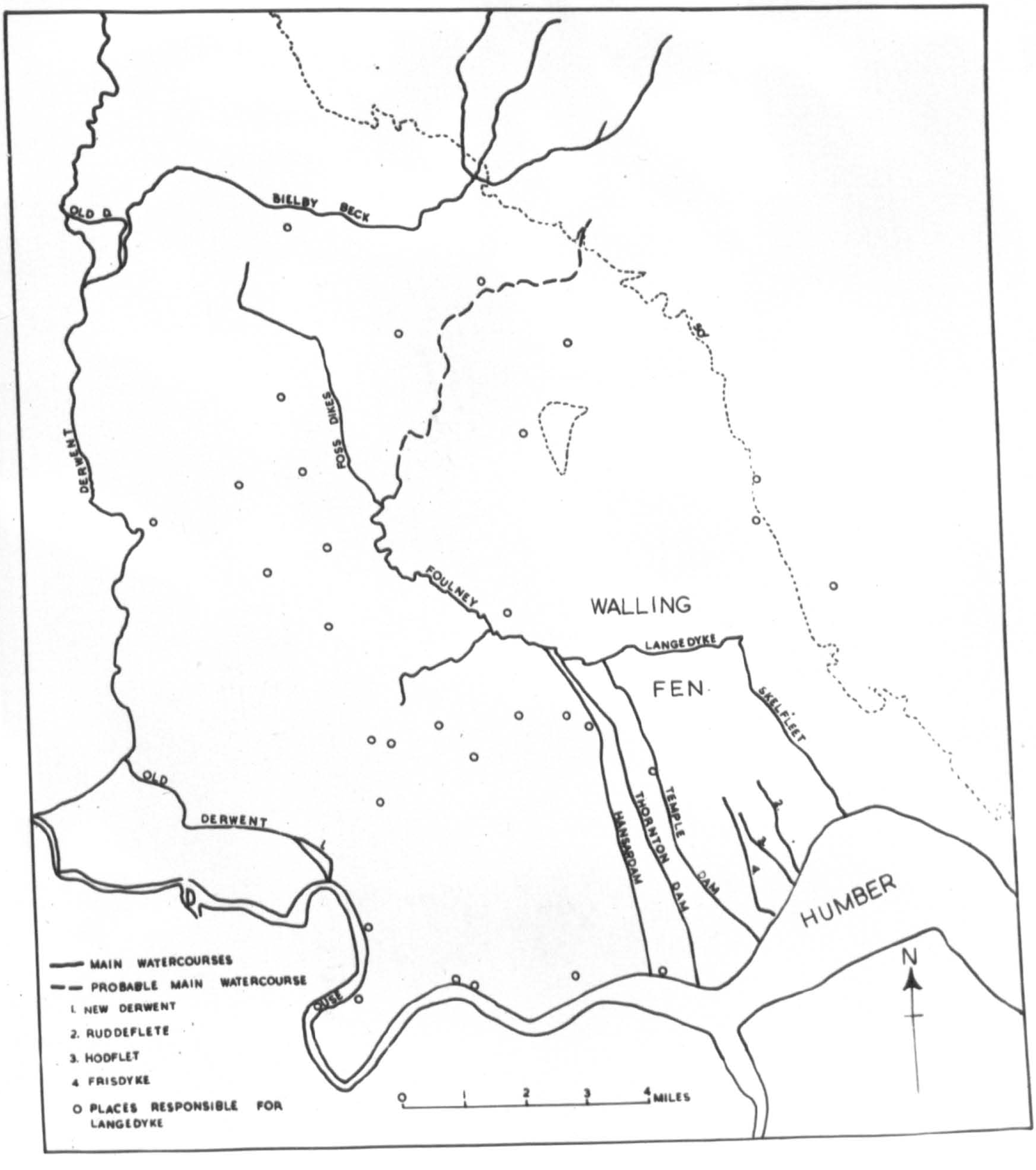


Fig.54. The Vale of York, fourteenth century conditions. Based on inquisitions quoted by Dugdale. There is a gap in the main inquisition (1399) where probably the upper Foulney, and perhaps other streams, were detailed, for where the document recommences, details of the middle course of the Foulney are given. The upper Foulney is therefore shown as a probable main drain. The three small drains (2, 3 and 4) were said to run from Wallingfen into the Humber.

a large mere known as Alemare, valued as a source of fish, at the junction of the Bielby Beck with the Derwent.(27)

The improvement and reclamation in evidence by 1400 was closely linked with the system of drainage which had been evolved. Fig. 54 shows the main drains which existed in 1399, according to an inquisition of that date. The inquisition was principally concerned with Spaldingmoor and the Wallingfen depression, and the map therefore does not show the many smaller drains of Howdenshire. The latter were the concern of individual townships, while those mentioned in the inquisition were of wider interest. The map shows that the Foulney and its four outfalls were responsible for carrying away most of the water from Spaldingmoor and the Wallingfen depression. Skelfleet was most likely still a tidal creek, for whilst those responsible for the upkeep of other drains are listed, there is no such allocation of responsibility for Skelfleet.

Changes under the Court of Sewers.

The pattern of drainage which had been established by 1400 continued relatively unchanged throughout the following 350 years. The minor changes that took place were intended to maintain the fourteenth century conditions rather than improve upon them. There may however have been greater changes in land-use.

A permanent Court of Sewers was established in 1532 as in Holderness,

(27) The mere was owned by Fountains Abbey, and in the thirteenth century the Abbot made the following grant: "The Abbot grants to Robert and his heirs two boats only for fishing in Alemar by his own fishermen of his house when he wishes to send them thither to fish ..... Be it known that Robert's men on Storthwaite shall be able to fish according to the established custom of the water of Alemar, when others of those parts fish there by the will of the Abbot." Yorkshire Fines. Y.A.S.R.S. LXII, p. 17.

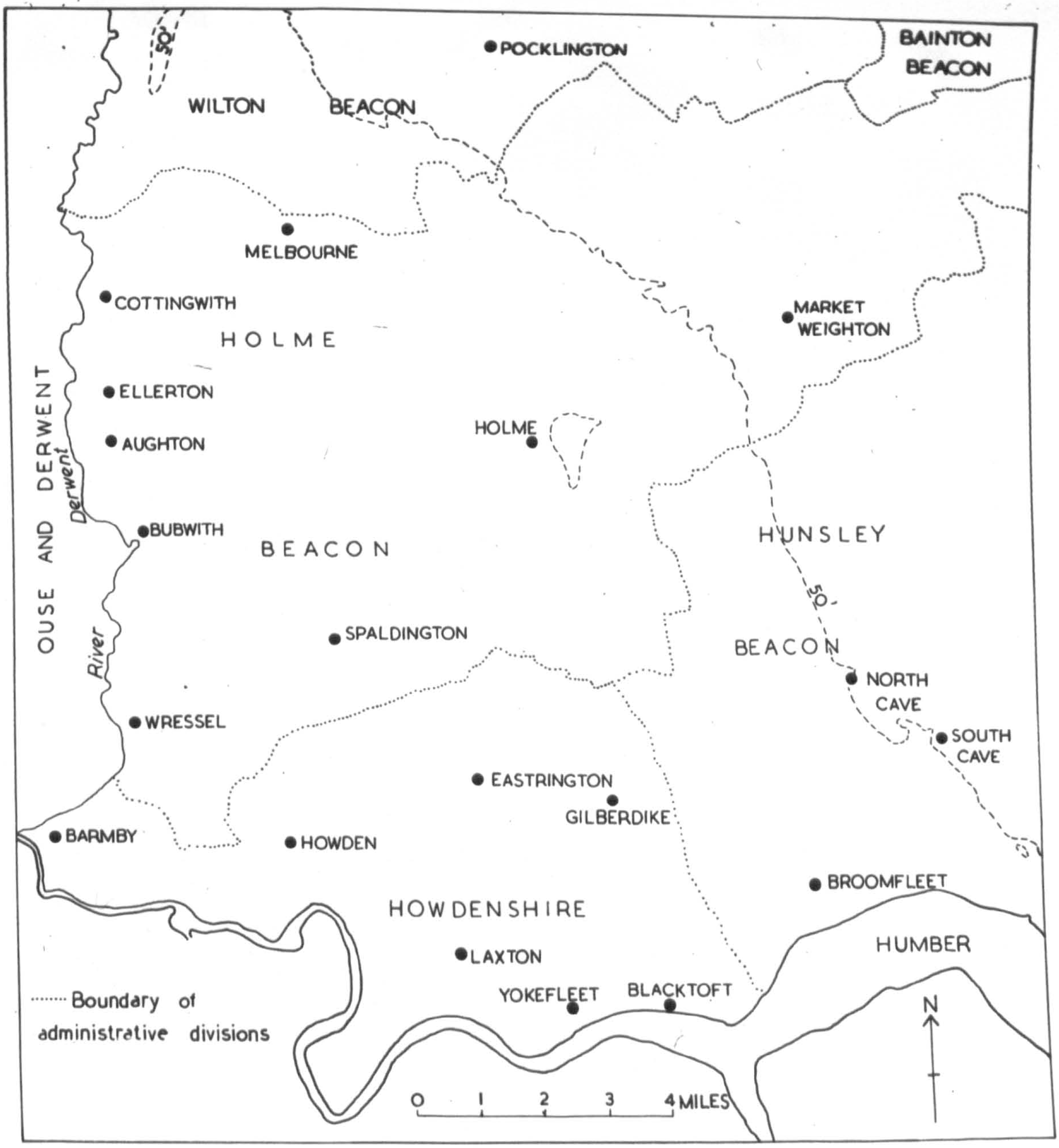


Fig.55. The Vale of York, administrative regions under the Court of Sewers, and the main settlements.

but this does not appear to have been very active prior to 1660. It was known as the Court of Sewers for the West Parts of the East Riding, and exercised its authority in five administrative regions, the bailiwicks of Holme Beacon, Hunsley Beacon and Wilton Beacon in the wapentake of Harthill, and the wapentakes of Howdenshire and Ouse and Derwent (Fig. 55). Each division had a jury responsible for administering the pains for its own drains and banks. The organisation was thus similar to that of the Court for the East Parts of the East Riding. Whereas the Court for the East Parts was a strong and active body, however, in the West Parts the Court appears to have been less powerful and less effective. Its records are fewer and less informative than those of the Court for the East Parts. By a fortunate chance, however, during the period 1660 to 1676 the two Courts were run as one, and the Vale benefitted from the fuller record-keeping normal in Holderness. An almost complete set of pains is entered in the first book of pains of the Court for the East Parts,[28] and the first minute book contains numerous references to the Vale.[29] These records are the earliest relating to the activity of the Court of Sewers in the Vale, and form a major source of information regarding the conditions in the area during the second half of the seventeenth century.

Fig. 56 shows the main watercourses in existence about 1670. It is based upon the pains[30] and provides a fairly complete picture,

(28) With the Hull and East Riding River Board.

(29) Minutes E. With the Clerk to the Court of Sewers for the East Parts.

(30) The first pains for the different divisions vary in date between 1661 and 1668.

Fig.56. The Vale of York. Drainage pattern about 1670, based on the pains and minutes of the Court of Sewers.

except in Hunsley Beacon (the southern end of the Wallingfen depression), where several drains were for some reason omitted. Other references have been used to insert some of these, but there may have been others which are not shown. On the other hand, many very small drains were recorded in Howdenshire, and some of these have been omitted from the map as they could not be located accurately.

The pattern which the map reveals is that which evidence suggested to exist in 1400, but which could not be mapped for that date as there was no comprehensive survey. The many small irregular drains of most of Howdenshire contrasted with the larger straight cuts of the eastern part of Howdenshire and the southern part of the Wallingfen depression, whilst further north there were only a few improved stream courses. The complicated pattern in Howdenshire which resulted from each township have its own outfall into the Ouse is well-marked, and in some cases this even led to two drains running parallel for a mile or more. The drains belonging to the townships on the Howden-Eastrington rise passed through the lands of the riparian settlements, but received no water from the latter. The inland township was responsible for the upkeep of the whole length of the drain and for the Clow at the outfall into the Ouse. What the pains called "hineing banks"(31) frequently followed both sides of a drain, and no doubt prevented the inland waters from damaging the land of the other townships it passed through. Other hineing banks occurred apart from the drains and may have been the

(31) The origin of the word "hineing" is not known, and it does not appear to have been used in any other part of the country.

remnants of the original system of embankments built during the medieval reclamation.

In the parts of the Vale included in the 1399 Inquisition, there had been little change by the late seventeenth century. The few additional drains shown, such as New Dike, near the upper end of the Foulney, and the several small drains leading to the Derwent, may have been cut in the interval, or they may have been overlooked by the 1399 Inquisition. There are two changes, however, which are known to have taken place after 1400, one of which was largely accidental, and the other promoted by the need to maintain an adequate drainage in face of silting.

The first, rather minor and accidental change occurred north of Howdenshire. The lacustrine clay of that area had always suffered from poor drainage, since the Howden-Eastrington rise blocked the most direct route to the Ouse. Spaldington and Brind commons originally occupied a large stretch of this land and the water from the commons "did for the most pte descend by hollow places comonly called slades over the Comon of Brind"(32) and thus into Ewdike and the Derwent. Early in the seventeenth century the commons were enclosed,(33) but the same method of drainage continued until 1655, when the inhabitants of Spaldington cut a fence ditch round their old common. Brind and certain Howdenshire townships persuaded the Court of Sewers to put this fence ditch into pain as a main drain. Brind thereafter let the old slades dry up, and a volume of water was diverted from the Derwent to the Foulney. It is possible that it was a similar process which led to the existence of other new drains in 1670.

(32) Minutes E, Aug. 1670. (33) Ibid.

The second, and much more significant change was at the outfall of the Foulney. A comparison of Figs. 5A and 54 shows that a new outfall had been opened for the Foulney waters, called Halfpenny Sike, New Dike and Hodlet, while another drain led from the lower Skelfleet to the Hodlet. By the same date, Temple Dam had become insignificant, and Hansardam and Thornton Dam were less important than they had been in the fourteenth century. They were reported to be "not well scoured nor of their ancient breadth".(34)

The new drains were cut between 1660 and 1673, because of the decay of the old outlets of the Foulney. The three western drains probably became less efficient when their mills ceased to function, but the dates when that happened are not known. The decay of Skelfleet was more serious, and was the result of increased silting in the creek and in adjacent parts of the Humber. The first indication of this was in November 1661, when the minutes reported that "whereas Longdike did within tenn years last past runne into Skelfleet River and soe to Skelfleet head, and it now appears that for want of vent at the head, Skelfleet River is very much warped up, and the ground where Longdike water did run in seems now higher than Longdike itself, and by that means the water out of Longdike could not vent itself into Skelfleet but ranne upon the Country and drowned the same."(35) This suggests that the trouble started about 1652. By 1667, Skelfleet was "of very little use to the Countrey in regard of the Constant warping upp of Humber so that the water can have noe ready passage that way".(36)

(34) Ibid. (35) Minutes E. (36) Minutes E. Nov. 1667.

The short drain leading from the lower Skelfleet to Hodlet was the first to be cut in the attempt to find an improved outfall. It was made about 1668.(37) This drain crossed Broomfleet lands, however, and the inhabitants feared the damage it might do to their crops. It was also a very devious route for the water, forming almost the mirror of the great bend in the Foulney further north. To remedy this, the other route to the Hodlet outfall by Halfpenny Sike and New Dike was opened, apparently some time between 1668 and 1673. There is no direct reference to its construction, but it was certainly open by 1673, for when Broomfleet inhabitants endeavoured to repair the Hodlet clow in that year, they had great difficulty "by reason of the great overflowing of water issuing out of two certain sewers called Newdyke and Skelfleet to the said clow".(38)

Sixteenth and Seventeenth Century Conditions.

It is possible to build up a picture of the efficiency of the drainage and of the general character of the different regions of the Vale at this time, both from records of the Court of Sewers and from other contemporary records. The contrasts between the subdivisions were still well-marked.

In Howdenshire, the early history of division between small manors seemed to have encouraged early enclosure and probably the conversion of much arable land to pasture. Leland followed Cave Causeway from North Cave to Howden about 1540. Near Scalby, he passed for about a mile "by enclosid Pasture", while between Howden and Wressle he found it was "Al by low Medow and Pasture Ground, whereof Part is enclosid with

(37) Minutes E. April 1668. (38) Minutes E. 1673.

Hegges".(39) In Saltmarshe, both pasture and arable closes existed in 1561.(40) The fact that few enclosure acts and awards exist for Howdenshire suggests that most of the area had already been enclosed by private agreement before the eighteenth century. Some open fields continued to exist(41) but these probably formed only a small proportion of the total area.

Seasonal flooding was still the main feature of the Derwent valley. Leland described how, at Wressle, "This Ryver at greate Raynes ragith and overflowith much of the Ground there aboute beyng low Medowes."(42) Alemare may have disappeared, as it is not mentioned in the pains. Here and there, banks had been constructed to protect the ings from all but the worst floods, e.g. in Woodhall, probably between 1640 and 1660, the ings were divided between three owners and embanked by them.(43) Elsewhere the valley bottomlands were held in common and banks were not raised.

It would seem that the Court of Sewers decided to lessen the frequency and severity of floods in the Derwent valley by widening the channel of the river, for in June 1666, the minutes include a petition

(39) Leland's Itinerary. Hearn's Edition. 3rd Edition 1768, p. 54.

(40) Bishop of Durham's papers, No. 5. Extracts from the Rolls of the Receptors of Howdenshire made by T. Burton. Y.A.S. Mss 599.

(41) E.g. in Skelton in 1676, the bank field (165¾ acres) and Eastfield (140 acres) were taxed for the upkeep of the drain. Minutes E.

(42) Leland, op. cit. p. 54.

(43) N.d. (probably c. 1700) petition to the Court of Sewers from various inhabitants of Woodhall refers to the embanking "about sixty years ago".

against a decree "for the wideninge of the River of Derwent w^ch in minde of man was never heretofore done".(44) The opposition was no doubt partly promoted by the desire to avoid the cost and labour of the widening, but may also have been due to a desire to see the flooding continue to benefit the meadows. Whether as a result of the petition or not, no widening was undertaken.

In the Bielby Beck valley, conditions were similar. The flow of the beck did not vary so much as the Derwent, since it was fed by chalk springs. But when the Derwent waters were high, they ponded back the waters of the beck. To this natural cause of flooding was added the effect of the two mills on the middle section of the beck, Bielby and Walbut Mills. In August 1669, the inhabitants of Bielby, Seaton Ross and Everingham complained that they had "sustained great damage for many years by the inundation of waters falling from y^e grounds belonging to the said townshipps for want of a wash nere to Bielby mill for y^e sufficient passage and conveyhance of y^e said waters".(45) A year later, a further complaint stated that sometimes the water was forced to find a way south into the Foulney.(46)

The continued waterlogged condition of Spaldingmoor is illustrated by the indeterminate drainage which existed between the Derwent and Bielby Beck valleys on the one hand and the Foulney on the other. The very slight relief made possible not only the diversion from the beck into the Foulney mentioned above, but also the diversion of Spaldington common waters from flowing towards Ewdike and the Derwent to joining the

(44) Minutes E. (45) Ibid. (46) Ibid. Aug. 1670

Foulney. Yet in spite of waterlogging, some enclosure and clearing of woodland continued for the expansion of the area of cultivated land. Spaldington and Brind commons were enclosed early in the seventeenth century. In 1620, a dispute over common rights in Holme common led to the statement "That 8 July, 19 Eliz. (1577), Bulmer was a greate timber wood of 70 acres or therabouts ..... until it was converted to Arable and pasture by the defendant".(47) The name Bulmer has disappeared, so it is impossible to locate this late sixteenth century clearing. Similar reclamation may have been going on in other parts of Holme common, for three hamlets appeared in outlying parts in the seventeenth and eighteenth centuries. Hasholme was first mentioned in 1618,(48) and although the Place-Name Society volume records no reference to Arglam and Tollingham before 1828, they were shown on a manuscript map of the Foulney drainage basin about 1770. They may therefore have come into existence about the same time as Hasholme. Péice-meal inclosure must have been easy on the large common of Holme, for there was abundant pasture for the inhabitants of the village. Similar changes may have been taking place elsewhere in Spaldingmoor, so that the seventeenth century picture showed less extensive heath and woodland than the fourteenth century. Otherwise there had been little change.

South of the Foulney, and the Spaldington fence drain was the common known as Bishopsoil. Although it was administratively part of Howdenshire, in character it was similar to the adjacent part of Spaldingmoor. Very little of the water from this common found its way into the

(47) Holme-on-Spalding Moor records. E.R.R.O.

(48) A. H. Smith, op. cit.

Foulney, and the chief outlet had therefore to be to the south. Each of the longer drains or "gotes" of Howdenshire had a stock at its northern end where it reached the edge of Bishopsoil. The stock was of such dimensions as to allow a trickle to water to pass into the drain when there was not much other water, but in winter it was probably closed. A Howden petition to the Court of Sewers explained how the system worked: "..... the water bellonging to the Common called Bppsoile hath alwayes passed by sewers through Howden and soe into the River of Owze att Howden dike ..... there is and allwayes have beene three sev'all stopps or staythes called Swanfleet, Gooseflеete and Duckfleet upon the said Bishopp Soile least the water from thence should p'judice the said Townes ..... if these stopps or staythes be taken up sev'all houses in the said townes as well much dry ground will be under water ....."(49) Unfortunately the pains do not indicate the size of these stocks, but merely stipulate that they were to be kept "of their ancient dimensions". It is clear that the stocks were controlled in the interest of the higher ground, and Bishopsoil was frequently flooded - or as the Howden petition put it "..... the waters resting until the sewer conveih them into the River".

The physical conditions of the Wallingfen depression had probably changed little between the fourteenth and seventeenth centuries, although there may have been some deterioration between 1652 and 1673 when the outfall was blocked. The depression was still a watery waste in

(49) Minutes E., Sept. 1670.

winter, drying out to provide poor pasture in summer. Leland crossed it on his way from North Cave to Howden and wrote this description:-

> "this Fenne is communoly caullid Waullyng Fenne: and hath many Carres of waters in it: it is so bigge that a 58 Villages ly in and butting of it, whereof the most part be yn Houghden Lordship 'longing to the Bishop of Duresme; and part in Harthil Hunderith. The Fenne is a sixteen miles in Cumpace."(50)

The fact that he gave the circumferance as sixteen miles suggests that he was describing the whole stretch of carr-land in the Wallingfen depression.

The carrs were divided between several commons by the seventeenth century. The part south of Longdike was known as Wallingfen, while the remainder was divided between Holme, Hotham and North and South Cliffe commons. Forty-eight villages and hamlets in Howdenshire and the adjacent parts of Hunsley Beacon held common rights in Wallingfen, but the northern commons were restricted to the use of their respective townships. The division of the carrs must have taken place at some date soon after the 1399 Inquisition. It is possible that no formal division was ever made, but after the cutting of Langedike, the Howdenshire townships tended to use the southern carrs and the Spaldingmoor townships, North and South Cliff and Hotham the carrs north of the dike. This natural evolution may have been made legal in 1425 in Wallingfen, the date of the first written records of the Wallingfen Court, and in 1456 in the north.(51) The development in the north apparently led to the exclusion of many Spaldingmoor

(50) Leland, op. cit.

(51) Holme-on-Spalding Moor records mention "an admeasurement of pasture of the comon upon holme more" in 1456, when common rights were allocated. E.R.R.O

townships from pasture rights in the carrs, perhaps as a result of the large size and power of Holme. The Spaldingmoor townships, however, had less need of the carrs than the Howdenshire townships, for they had large areas of waste of their own.

The use of Wallingfen by so many townships meant that careful control of its resources was necessary. A body known as the Wallingfen Court had therefore grown up, made up of one representative or juryman from each of the 48 townships with rights in the fen. The court met at the "Eight and forty" house in Scalby. The rules were first written down in 1425, but may have been older. In the other commons such elaborate organisation was not necessary, and there are therefore no written rules. Nevertheless, the similarity of physical conditions between the northern commons and Wallingfen was such that the conditions and uses revealed by the Wallingfen records were probably the same throughout.

The main use of Wallingfen which the records reveal was as summer pasture for livestock, and the Court limited the number of animals which each person could turn on to the common. In 1591, it was restricted to the number that "ye 48 thinketh he Can gett hay or Straw of y^{e} said Farme to keep y^{m} in the winter".(52) But in 1636, the additional rule was made "That no Comoner shall have above y^{e} number of 160 sheep gates, in horses Beasts and sheep, one half to be stocked with sheep, y^{e} other half with mares gelding and beasts, According to 7 sheep Gates to one Horse and Five sheep gates to a Beast". The second major use of the

(52) Ancient Orders and Rules relating to Wallingfen Court. Transcript in Hull City Reference Library.

common was as a source of fuel. All those with common rights were allowed to stake out a reasonable area each year where they could cut turves to a depth of one spit and no more. In addition to those two main uses, the rules illustrate several minor uses. In 1588, the cutting of wood or "whynnes" was strictly limited; in 1634, it was ordered that "No Comon^{er} shall Fish in y^{e} Marrs before Midsummer even, and that y^{e} Surveyours shall have y^{e} first draught"; in 1636, the amount of hay cut and carried away was limited to four loads per common right; and in 1647, the killing of wild fowl without the permission of the Court was forbidden. These glimpses of the uses of Wallingfen suggest that the carrs formed a valuable complement to the surrounding higher lands.

Round the mouth of the Skelfleet a stretch of land was added to the area of the Vale during the latter part of the seventeenth century. The silting which had blocked the Skelfleet continued even more rapidly when its waters were diverted, and formed a wide zone of mud-flats. In 1690, a commission found that in Broomfleet "a quantity of land formerly overflowed by the sea had been left derelict by a change in the channel of the Humber".(53) The commission gave no reason for the change in the Humber. In 1690, the silt had accumulated to such a height that it was covered with salt-marsh vegetation and was leased by the Crown for grazing. In 1706, the area was leased to Henry Washington with "full power to imbank, inclose and defend the same ..... from the overflowing of the sea".(54) No doubt banks were constructed soon afterwards.

(53) Quoted by Saltmarshe, op. cit. p. 8.

(54) P.R.O. E 367/3836.

The seventeenth century picture, therefore, is of an area which had assimilated the rapid improvements of medieval times, and was leading a balanced economic life. This well-co-ordinated life did not demand more than minor improvements over fourteenth century conditions.

Chapter X The Modern Era of Improvement 1700-1920.

Condition and Problems prior to 1760.

The co-ordinated life of the Vale that accepted each type of land as it was did not survive long into the eighteenth century. The changes that were taking place in the economic life of Britain produced instead a critical state of mind that sought ways of improving land and raising its value. To eighteenth century eyes, the Vale needed three main improvements - better communications to enable the crops to reach the growing industrial markets of the West Riding, the enclosure of much common waste land so that improved methods of farming could be used to increase yields, and the drainage of the marshlands. The period after 1700 is dominated by the slow acceptance of these necessities and the attempts to put them into practice.

For the most part, the changes prior to 1760 were small, and this period was occupied by fierce arguments for and against the various schemes of improvement. A few details for this period just before improvement confirm and elaborate the seventeenth century picture that was given in the previous chapter.

Confirmation of the prosperity of Howdenshire comes from Defoe's description of it in 1724 as "populous and rich"(1) like Holderness. He also found the town of Howden to be "subject to great inundations from the River", however. No doubt he did not really understand the cause of this flooding, which was not likely to have been due to the overflowing

(1) Daniel Defoe. A Tour through Great Britain Vol. III, Letter III, 5th Edition 1753, p. 185.

of the Ouse, but rather to the damming back and overflowing of the land-water drains when the Ouse was high. Nevertheless, the description makes it clear that Howdenshire was still subject to flooding and in need of improved drainage.

The Derwent valley also attracted Defoe's attention: "The Derwent is a River very full of Water, and overflows its Banks and all the Neighbouring Meadows, always after rain."(2) The river had been made navigable as far upstream as Malton after an Act of Parliament in 1701, but this appears to have made little difference to the flooding.

There is no known description of Spaldingmoor at this date, but the 1767 petition for the enclosure and drainage of Bishopsoil gives some indication of conditions there. The common contained 4,000 acres, of which "several Parts are overflowed with water".(3) But other parts must have been sufficiently well-drained to encourage piecemeal enclosure, for when the Act for draining and enclosing the common was drawn up, such encroachments had to be specially catered for: "All inclosures which have been made from the said waste ground or common ..... other than such as have been enjoyed for twenty years last past and upwards without interruption, shall be deemed incroachments and taken to be part and parcel of the said waste ground or Common." Fig. 57 shows the area covered by Bishopsoil common and the townships with common rights there in 1767. Howdenshire townships alone exercised common rights.

Fig. 57 also shows Wallingfen common and the townships which had common rights in it. The Wallingfen depression was more subject to flood-

(2) Ibid.

(3) Journal of the House of Commons, Jan. 1767.

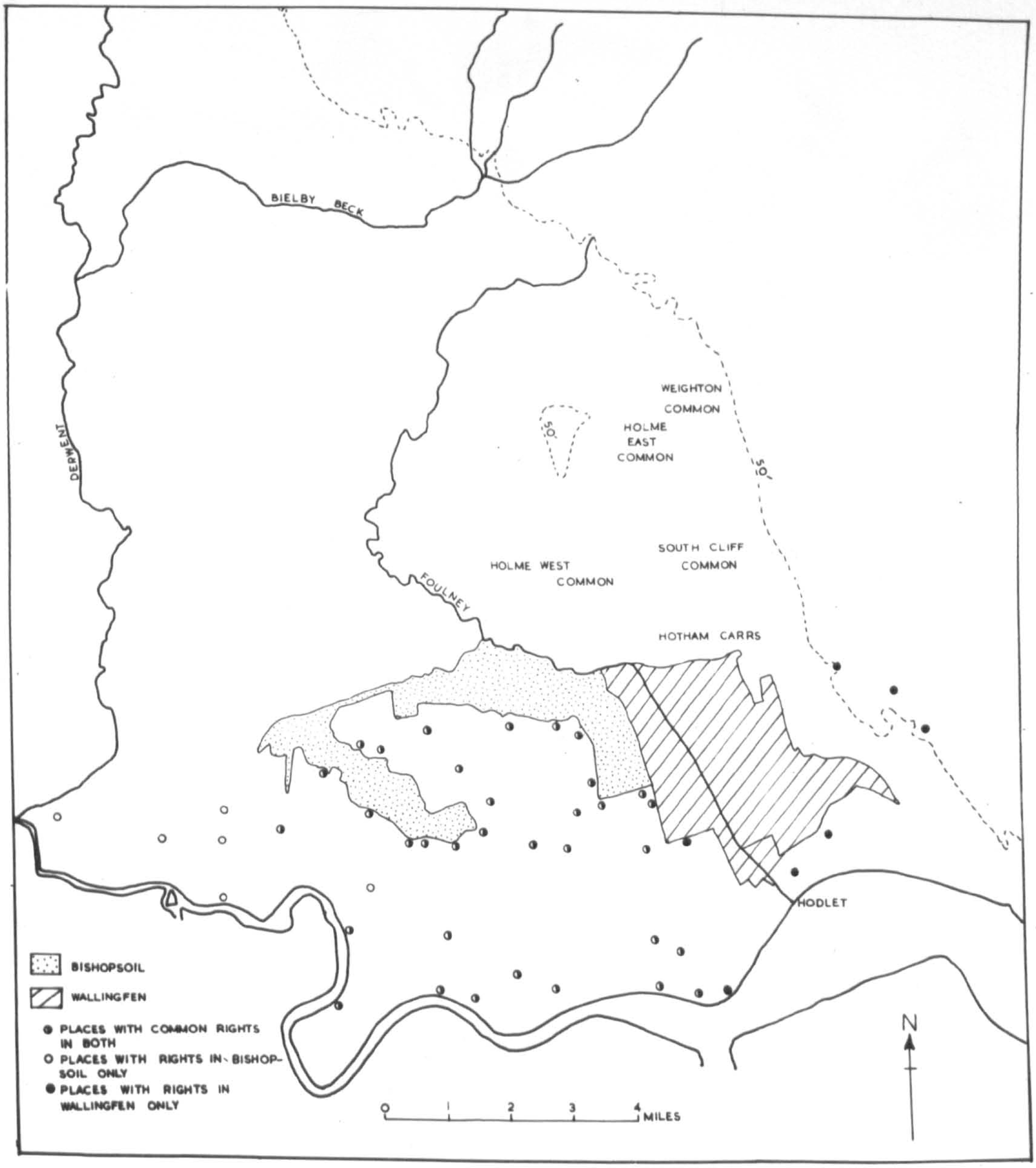
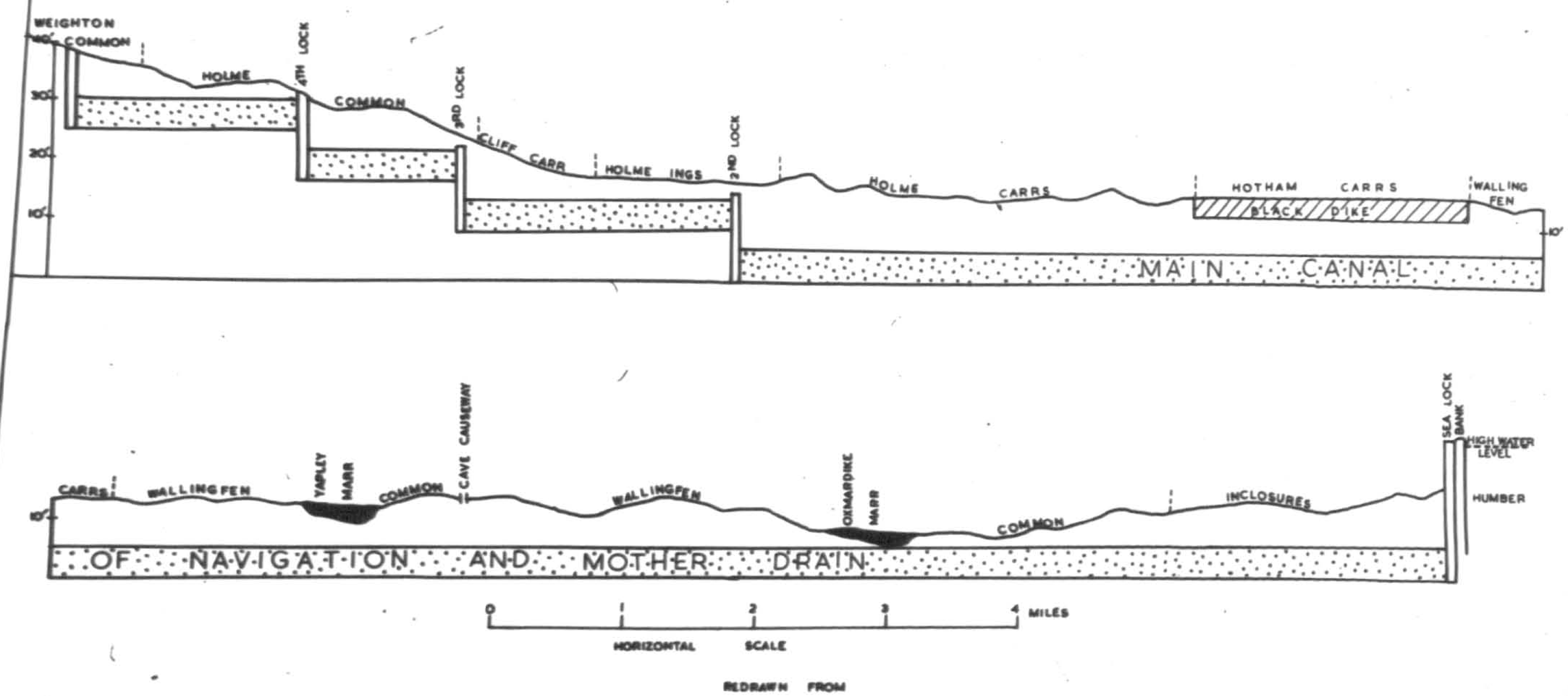


Fig.57. The commons of Bishopsoil and Wallingfen about 1760.

ing than Bishopsoil and the 1772 Market Weighton Navigation and Drainage Act refers to "20,000 acres of land ..... subject to be overflowed or otherwise annoyed with water". The two largest meres were Cowardike Marr and Yapley Marr, both shown on Grundy's section of 1772 along the proposed course of the canal (Fig. 58). Other smaller meres occurred throughout the depression. Grundy's section also illustrates the lowness of most of the depression, and the rather higher area forming "the ancient enclosed lands" of Broomfleet that separated the depression from the Humber. Hodlet was still the main outlet for the water of the area. But the silting in the embayment of the Humber that had blocked the Skelfleet outfall in the 1660's had steadily been building up a mudbank which had crept westwards to cause trouble to Hodlet by 1770. Grundy described the conditions in 1772:

> "there is a large Sand Bank in the Middle of the Humber which at low water dries many feet above the surface therof and divides the River into two channels ..... This Sand Bank lies opposite to the Outfalls of Hudlet and Fuzdike Cloughs, but does not reach the Outlet of Temple Dam Clough ..... The north Channel of the Humber lies at a great distance from Hudlet Clough, and there is and has long been a large and high sandy Beach betwixt them ..... it being very difficult and expensive to keep the Space betwixt the Clough and the Channel open and it has of late been so much warped up ....."(4)

(4) Copy with Bishopsoil Drainage Board. The large sand-bank mentioned was later embanked to form Broomfleet Island.



A SECTION ALONG THE PROPOSED MARKET WEIGHTON CANAL BY J. GRUNDY 1772

Fig. 58.

As a result of this silting, flooding may have been more widespread in the depression in the middle eighteenth century than it had been for the previous hundred years. Nevertheless, the land was still put to the same uses, especially as a source of summer pasture and fuel.

The problems posed by the desire to improve these different areas were varied. In Howdenshire and Bishopsoil, improved drainage was the main need, and this was not difficult to obtain. Even Bishopsoil, separated from the Ouse by two areas of higher land, had a fall of 16 feet to that river.(5) New or enlarged drains direct to the Ouse were required. In Spaldingmoor, the waste land was the greatest problem, so the need for enclosure was most clearly felt. But to obtain greater productivity, improved drainage was essential, and this ultimately depended on improvements in the Derwent and Foulney valleys. In the Derwent valley, there was little hope of reducing flooding by works in the lower valley only, and improvement would depend on changes in the upper section. In the Wallingfen depression, drainage was the dominant need if greater and more profitable use was to be made of the land. But there, the problem of drainage was great owing to the lowness of much of the depression and the small fall to the Humber.

On the margins of the Vale, the main problem involved in improving the financial output of the land was different. Along the foot of the Wolds there was a zone of fertile land, yielding good crops. The surplus cereals in particular found their way to the two market-towns of

(5) Journal of House of Commons, 1767.

Pocklington and Market Weighton. But these two towns were unable to compete easily in West Riding markets because of their difficulties of transport. They had to send their corn by road, as they were not on a navigable river, so found their costs higher than corn-producing areas alongside the Derwent, the Hull, and the Ouse itself. The improvement they wished to see was the construction of a navigable canal linking them with a main river. By 1765 the desire for this canal had led as far as the calling in of the engineer J. Smeaton to report on the possibility of such a canal, and he reported that the most feasible route appeared to be from Pocklington to Market-Weighton, then via the Wallingfen depression to the Ouse near Broomfleet.

It is of great significance for the later history of the Vale that this interest in a navigation canal arose at about the same time as an interest in draining the marshlands. (The first interest in reclaiming Wallingfen appears to have been shown by Mr. Louyns Boldero soon after he purchased the South Cave estate in 1748.)(6) The difficulty of draining the depression would probably have led to some delay in attempting this. But those interested in a navigation brought forward the suggestion that as the canal would run through the Wallingfen depression, it could also act as a drainage channel there. In this way they hoped to reduce the cost to themselves. Some of the big owners of common rights in the depression agreed thinking it would be a cheap way of improving their land. Thus was born the Market Weighton Navigation and Drainage Act of 1772. The pernicious effects on drainage of this dual

(6) The History of S. Cave. J. G. Hall, p. 34.

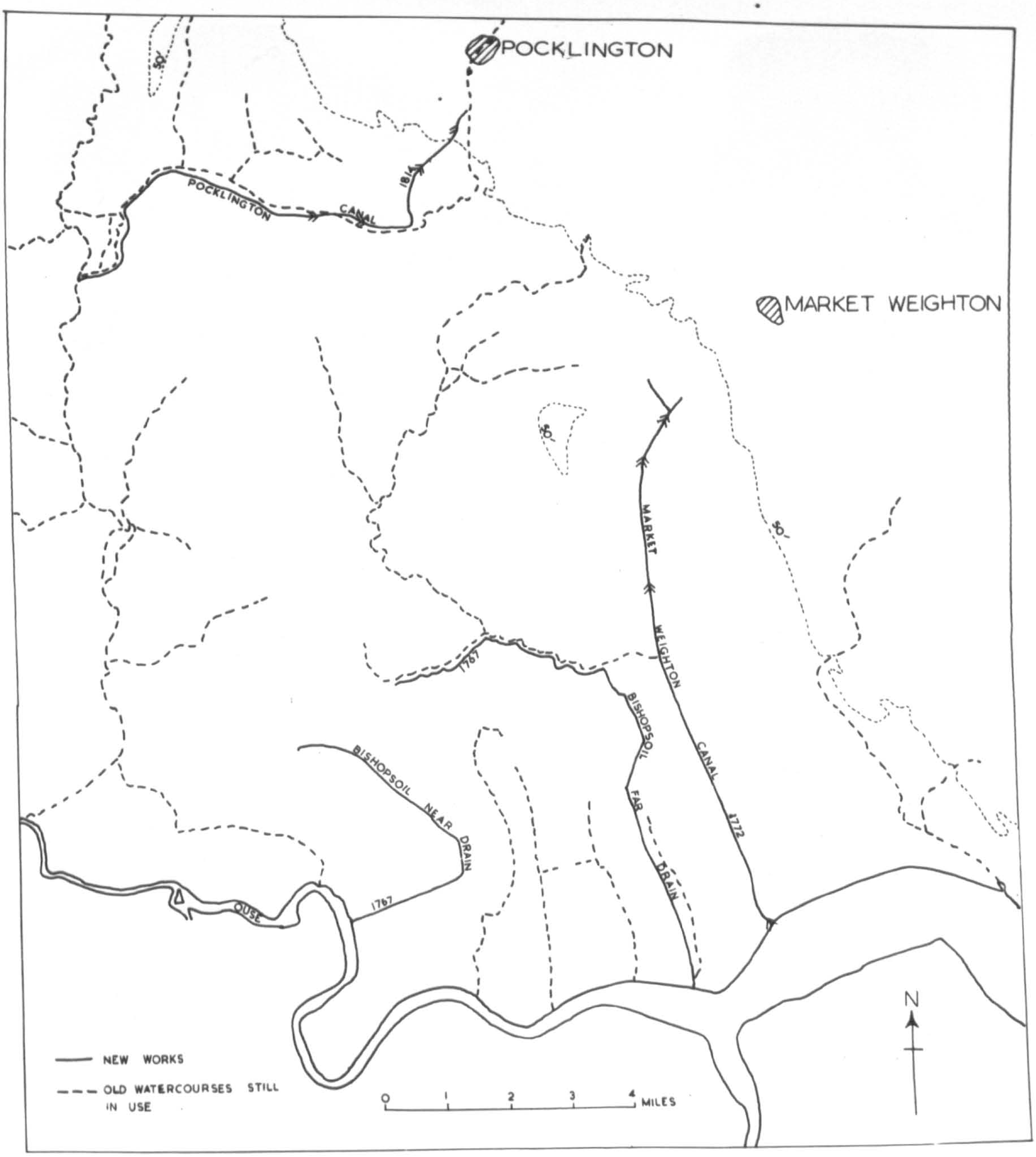


Fig.59. The Vale of York, new drains and navigable canals, 1767-1814. The date of commencement is shown near each drain or canal. The old watercourses were frequently improved about the same time.

function of the canal dominated the character of a large proportion of the Vale throughout the period until 1920.

Drainage Changes 1760-1820.

Most of the changes that took place in the Vale between 1760 and 1820 resulted from private Acts of Parliament. The changes may best be summarised under the respective Acts.

The first Act of consequence was that passed in 1767 for draining and enclosing Bishopsoil. As a result of this Act, two main drains were cut from the common to the Ouse, one from the western end to Skelton (Near Drain), and one from the eastern end to Blacktoft (Far Drain). The common was enclosed and allocated to those with common rights, and was also divided between the townships. The resulting township map therefore showed a number of small outlying territories in the area of the old common. (Fig. 60)

In 1772 the Market Weighton Navigation and Drainage Act was passed. This sanctioned the construction of a canal from the Humber at the old Fuzdike Clow along Fuzdike and then north through the depression as far as Market Weighton. The canal was constructed as far as the main road between Holme and Market-Weighton during the period 1772-1782,(7) and for the purpose of navigation had three locks. An additional two miles of canal and four locks which had been planned to carry the canal as far as Market-Weighton were never constructed for reasons of cost. A series of minor cuts carried the waters from the east and from the Foulney into the canal. The height to which the water could be penned

(7) Minutes of the M.W.D.B.

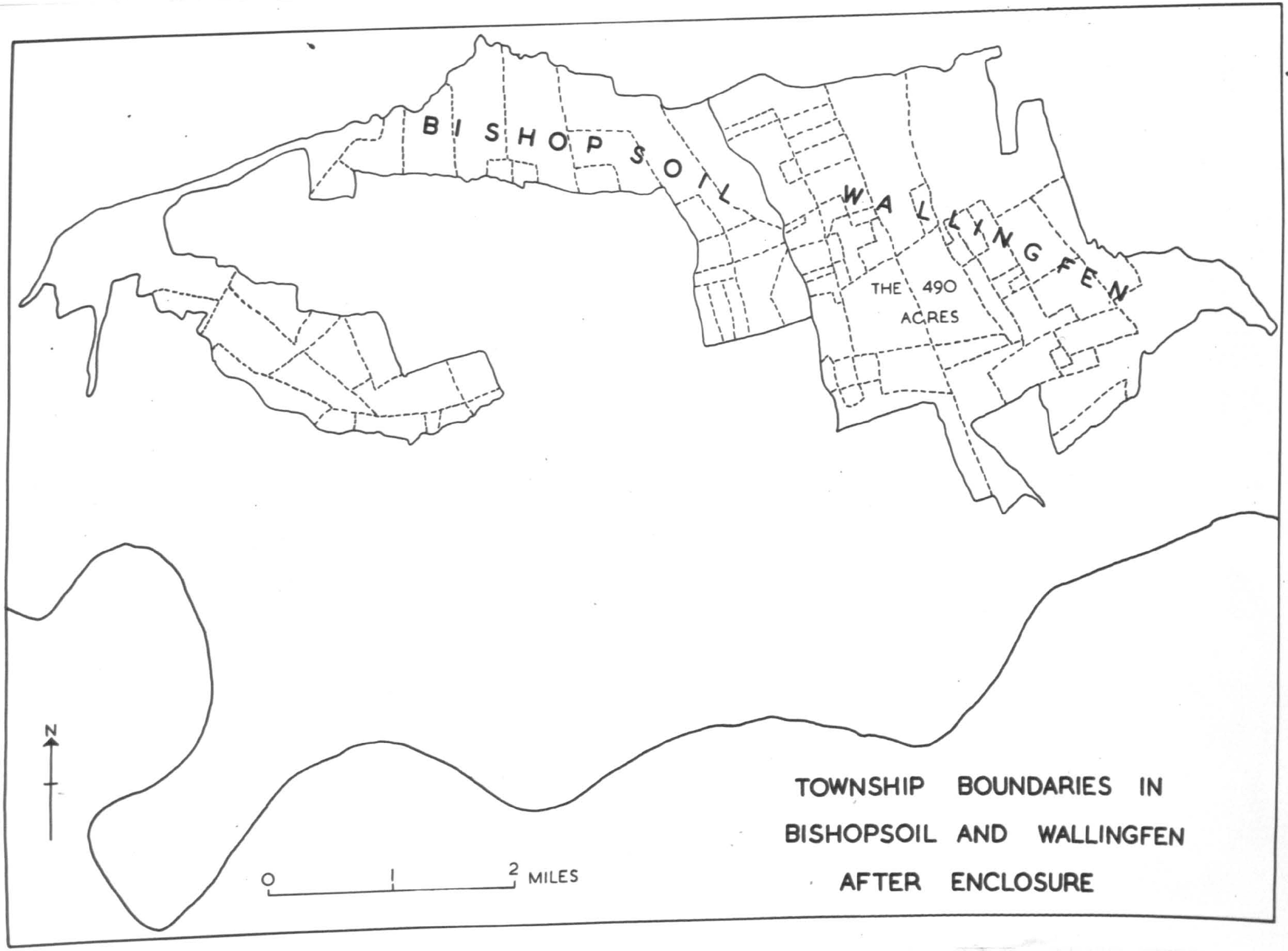


Fig. 60. Wallingfen and Bishopsoil township boundaries after inclosure. The 490 acres were extra-parochial.

for navigation purposes was limited to 3 feet below the surface of the land. The cost of the various works was carefully apportioned between drainage and navigation interests. The money for drainage came from an acre tax on the low ground, the navigation money from private investments.

Several Acts gave rise to the enclosing of the carrs of the depression. The first inclosure followed the 1772 Market Weighton Navigation and Drainage Act. This act gave the commissioners powers to inclose parts of the commons, and let or mortgage these lands if there should be any difficulty in collecting the drainage tax on common land. Difficulties arose in most of the commons, The first and largest inclosure was in Wallingfen, where the commissioners took in 490 acres alongside the canal in the northern part of the fen (Fig. 60).(8) In 1774, Holme Common was inclosed, and in 1777 the Wallingfen Inclosure Act allowed the rest of Wallingfen to be inclosed and allocated to the various townships which had exercised rights there. The allocation to townships produced an even more marked patchwork of outlying territory than in Bishopsoil.

The two Acts that affected the Derwent valley came rather later, at the beginning of the nineteenth century. In 1800, the Muston and Yedingham Drainage Act allowed the diversion of the flood-waters of the Derwent through the Sea Cut (see Chapter XII). This may have had a limited effect on the Derwent valley in the Vale by reducing the extent and frequency of flooding, although the Rye and other tributaries from

(8) The subsequent history of the 490 acres was such as to make it a distinct area. When the rest of Wallingfen was inclosed, the commissioners were granted rights to purchase the 490 acres. Owing to various legal problems, however, the area was never treated the same as the rest of the common, and remained extra-parochial and free of drainage tax. In 1938 the recently created Market Weighton Drainage Board brought a court case to enforce drainage taxes on the area and won.

the Moors still had to send their floodwaters this way. In 1815, the Pocklington Navigation Act was passed which allowed the cutting of a navigable canal from the Derwent along the Brolby Beck valley to Pocklington. This canal was for navigation only, and the beck itself remained for drainage purposes.

Outside the Market Weighton depression and Bishopsoil, the Court of Sewers retained control of drainage, and itself instituted a few improvements, particularly in Howdenshire. Drainage there benefitted from the removal of Bishopsoil water from the old 'gotes'. But that was not sufficient, and during the last decade of the eighteenth and first decade of the nineteenth centuries, numerous petitions were made to the Court of Sewers for the enlarging of specific drains.(9) The petitions were usually granted, and many of the main Howdenshire drains appear to have been enlarged during this period.

Early Nineteenth Century Conditions.

Most of the changes were therefore complete by the beginning of the nineteenth century. The records of the Court of Sewers, the Bishopsoil Drainage, and the Market Weighton Drainage and Navigation, together with accounts by Leatham in 1794(10) and Strickland in 1812(11) have been used

(9) Records of Court of Sewers for the West Parts of the East Riding. With the Clerk to the Court.

(10) I. Leatham. General View of the Agriculture of the East Riding of Yorkshire, 1794.

(11) G. Strickland. A General View of the Agriculture of the East Riding of Yorkshire, 1812.

to illustrate the conditions about that time, and the extent to which the land had actually been improved.

In Howdenshire, Leatham found that "the drains and ditches here are also inadequate and inefficient".(12) But he was evidently seeing the area before the Court of Sewers had enlarged many drains. In 1812, Strickland made no comment on the drainage, either favourable or otherwise, so it seems possible that some improvement had taken place in the interval. Strickland was lavish in his praise of the area. The soil was a "remarkably fertile clayey loam" of which "the component parts ..... are so proportioned as to enable it to produce every species of plant cultivated by the farmer in great abundance and perfection".(13) The main crops were wheat, oats, beans and potatoes, with some flax and tape-seed.

Strickland described a section of the Derwent valley which was probably typical of the whole: "At Cottingwith is a tract of marsh-meadows lying by the side of the Derwent, and occasionally overflowed by it, which annually produce a vast burthen of coarse broad-leaved hay ..... It is said to be so nutritive as to be alone capable of making fat the animals which feed upon it, and of so sweet a taste that the pigs will pull and eat it from the ricks".(13a) Since much of the rest of the Vale produced only poor hay or pasture, this meadowland was highly valued, and this may explain to some extent why attempts to prevent the flooding do not appear to have been contemplated.

Spaldingmoor was still a poor area. In spite of the inclosure of the commons and wastes, the poor soils still defeated attempts at

(12) Leatham. op. cit. p. 10. (13) Strickland. op. cit. p. 18.
(13a) Strickland. op. cit. p. 165.

improvement, and waterlogging was still a problem. Leatham found that "The drainage here is very indifferent, few of the drains are of a sufficient depth to reach the springs, by the water of which a large part of this division is starved, and rendered less productive ..... There is no want of water in this division, in many places it lies too near the surface."(14) Strickland found that "the water is with great difficulty kept below the surface", and mentioned "many sandy, barren and moory tracts, retentive of water and naturally covered with short heath, much of which has been divided and inclosed under Acts of Parliament. There, attempts have been made to cultivate and improve, but having failed in numerous instances, they are now fast returning to their unproductive state, never having repaid the expenses laid out upon them."(15) Strickland was able to report that in a few cases, however, (as, for example, on the Vavasour's estate in Melbourne) great efforts towards improvement had met with some success, chiefly by the adoption of buck-wheat as a main crop. But such areas of success on the poor sands were few.

The clay lands of Spaldingmoor had seen fewer changes than the sand. They appear to have been already completely inclosed by 1760, while the drainage activity round the lower Foulney had affected them very little. Strickland describes the soil as "a strong yellowing or greyish clay" where the normal rotation was wheat, oats, beans and fallow.(16) There may have been some transport of sand from the areas to the north in an

(14) Leatham, op. cit. p. 10. (15) Strickland, op. cit. pp. 18 & 91.
(16) Ibid. p. 119.

attempt to improve these soils,(17) but this could not be done on a large enough scale to make it worth-while.

If the improvement between 1760 and 1820 on Spaldingmoor was disappointingly small, it was even more so in the Wallingfen depression, for there expectations had been particularly high. The depression may be divided into two parts according to the extent of improvement. North of Sod-Houses Lock, the drainage led to some lowering of the water-table, for the new drains opened into the Market Weighton canal below the lock. In these old carrs where the soil was largely peaty, Strickland notes: "it has been usual to pare and burn and grow oats for several years successively; and when the crops begin to decline, to pare off a fresh slice of peat, burn again, and sow oats as before."(18)

Below Sod-Houses Lock, however, the drains opened direct into the main canal, where the level of the water was held up for the benefit of the navigation. It was no doubt to this part that Strickland referred when he spoke of areas where the water "is very imperfectly taken off". The owners of lands in these levels felt that the cutting of the canal had brought them very little benefit, and it is clear that little notice was taken of the requirement to keep the water at least three feet below the level of the land.(19)

This evidence suggests that while Howdenshire was reasonably well drained by the beginning of the nineteenth century, improvements were small in the Wallingfen depression, and negligible in Spaldingmoor. The

(17) The minutes of the M.W.D. July 1779 include an order to remove a dam in the Foulney made by the inhabitants of Gribthorpe in order to carry sand from Holme common to their land.

(18) Strickland, op. cit. p. 129. (19) M.W.D. Minutes, July 1810.

undesirable results of combining drainage with navigation were already being realised. Strickland voiced them strongly in general terms, although there is no doubt that it was the Market Weighton Canal to which he was referring. No other combined drainage and navigation existed in the East Riding, although several had been proposed.

> "The benefits arising from canals to the community at large, and to the individual proprietors of estates and occupiers of land through which they pass are numerous and great; they are not, however, unattended with inconveniences. Among these one of the first is, the consumption of land which they occasion (in many cases from thirteen to fifteen acres and upward in a mile, independently of the injury done to the adjoining lands by the escape of water through the bank). ..... The depredations and injuries committed by the men and horses which traverse them is another source of inconvenience .....
>
> "To induce land-owners to submit with patience to these and other unpleasant circumstances attendant on canals, the prospect of making them operate as drainages has not infrequently been held out to them; but this, however plausible in theory, has general been found fallacious in practice, and should therefore be received with extreme caution. The two operations, indeed, are in themselves incompatible, as the object of one is to retain the water to a certain height (frequently a level above the surface level of the land) and of the other by every practicable means to facilitate its escape."[20]

(20) Strickland, op. cit. pp. 275-6.

Mid-Nineteenth Century Conditions.

Fifty years later, about the middle of the nineteenth century, there had been a few changes, especially in the Wallingfen depression. The Prize essay on the farming of East Yorkshire by G. Legard in 1848[21] is the most valuable indication of conditions then. His descriptions frequently confirm or elaborate those of the earlier writers as well as indicating new features of the area.

By the middle nineteenth century, Howdenshire continued to be the most prosperous part of the Vale, and was particularly noted for its potato crop.[22] The fertility of the land had actually been increased during the interval by warping. This was the process of leading the silt-laden Ouse waters on to low-lying land so that the fertile silt was left behind and accumulated there. The area which had chiefly benefitted from warping was the lower part of Howdenshire between the Ouse level and the Howden-Eastrington rise. Warping was first practised in Hatfield Chase in the West Riding, and the first suggestion that it was being tried in Howdenshire was in 1823, when there were references in the Minutes of the Bishopsoil Drainage. But large-scale and effective schemes of warping were not developed until after 1848.[23] In order to carry the water and silt inland, many of the Howdenshire land-drains were temporarily converted into warping-drains. This appears to have disrupted the drainage system of the area to some extent, for in Howden

(21) Farming in the East Riding of Yordshire. G. Legard. Journal of the Royal Agricultural Society, Vol. 9, Pt. I, 1848.

(22) Ibid. p. 99.

(23) The Improvements in the Farming of Yorkshire (since 1848). W. Wright 1862, p. 14.

in 1860, a meeting of local land-owners passed a resolution calling for a revival of the Court of Sewers.[24] Prior to the widespread adoption of warping, the drainage system of the area had acted so efficiently that the Court had died a natural death in 1843.[25] Also conspiring to revive interest in the main drains was the adoption of tile-drainage.[26] In spite of the 1860 resolution, the Court of Sewers was not revived, and the further improvement and deepening of the drains was left to individual enterprise. In spite of this, however, there was no doubt that Howdenshire was still the best-drained part of the Vale.

Once again the Derwent valley showed the same pattern of flooding. In 1862, Wright described the river as "so tortuous, and its outlet so bad, that the immense body of water which it gathers in its course floods a vast area for miles in extent and for weeks together."[26] The 1848 Rye and Derwent Drainage Act had lowered the water-level in the upper part of the valley, but had had little effect upon the lower valley.

In Spaldingmoor by the mid-nineteenth century, both sand and clay lands were trying new means of improvement. On the sand, the new hope was marling. Legard described the sand lands in 1848:

"The surface soil is throughout a poor, blowing, ferruginous drift sand, chiefly covered with ling and furze, and distinguishable here and there by a few stunted Scotch fir plantations. Attempts at cultivation have been made from time to time in various parts of this unpromising tract, but all such attempts have been abandoned almost as soon as made,

(24) Ibid. p. 15. (25) Ibid. (26) Ibid. p. 11.

until of late years. Recently, however, it has been discovered that beneath this barren surface there lie beds of clay and marl; and that, wherever these beds approach near the surface, great benefit may be derived from the practice of digging out the clay and spreading it largely over the land."(27) On the lands thus improved by marling, and on the better sand lands, the four-course rotation was typical by this date. But poor drainage still troubled the area and limited further improvement. As Legard expressed it: "the first step in the process here, as elsewhere, must be drainage".

On the clay land the dependence on the Market-Weighton drainage canal as the major outfall was still the marked limitation. Legard found that on these heavy clay soils the old three-course was still the normal rotation, and he lists the obstacles to improved farming in this part as "small enclosures, fences of undue proportions largely interspersed with hedge-row timber, and lastly, want of drainage".(28) Attempts had been made to deal with the last problem by tile-drainage, but in most cases tile-drains could not succeed until the level of the water in the ditches was lowered. And "from want of a proper outfall the ditches during a great part of the winter are frequently quite full".(29)

In the Wallingfen depression, the mid-nineteenth century saw the navigation at its most prosperous, and drainage very much a junior partner in the canal. The prosperity of the navigation was based on two types of traffic, agricultural produce from and coal and lime to Market

(27) Legard, op. cit. p. 91. (28) Ibid. p. 100.

(29) Legard, op. cit. p. 100.

Weighton, and bricks and tiles from and coal to a number of brick and tile works. In 1847, the railway linking Market Weighton with York had been opened, but this did not reduce to any considerable extent the bulky traffic using the canal from Market Weighton which had remained fairly constant since the opening of the canal. The brick and tile works had grown up subsequent to its construction, attracted by the juxtaposition of good clays and good cheap transport. By 1812 "great quantities of white bricks are made ..... which are exported thence in various directions; being in great demand for superior buildings on account of their beauty of colour, accuracy of form, and durability".(30) By 1840, there were eight brick and tile manufacturers in the area and "upwards of two million tiles and a great number of red and white bricks are made here yearly, besides coarse earthenware".(31) A considerable settlement had grown up where the Cave-Howden road crossed the canal, known variously as New Village, Newport, and New Gilberdike. The traffic from this area had gradually expanded until by 1842, nearly one half of the income of the canal came from the brick and tile manufacturers.(32)

The prosperity of the navigation made it very tempting to hold the water higher than the stipulated limit, especially since for a time at least the lock keepers had interests in the brick and tile works.(33) Thus the canal to which they were contributing through their drainage

(30) Strickland, op. cit. p. 283.

(31) White's Directory of Hull and the East Riding, 1840.

(32) In the four weeks April 30th to May 28th, 1842, £34 18 6½d. in tolls were paid by this traffic out of a total of £80 16 8½d.

(33) Nov. 1855 complaint among the M.W.D. records.

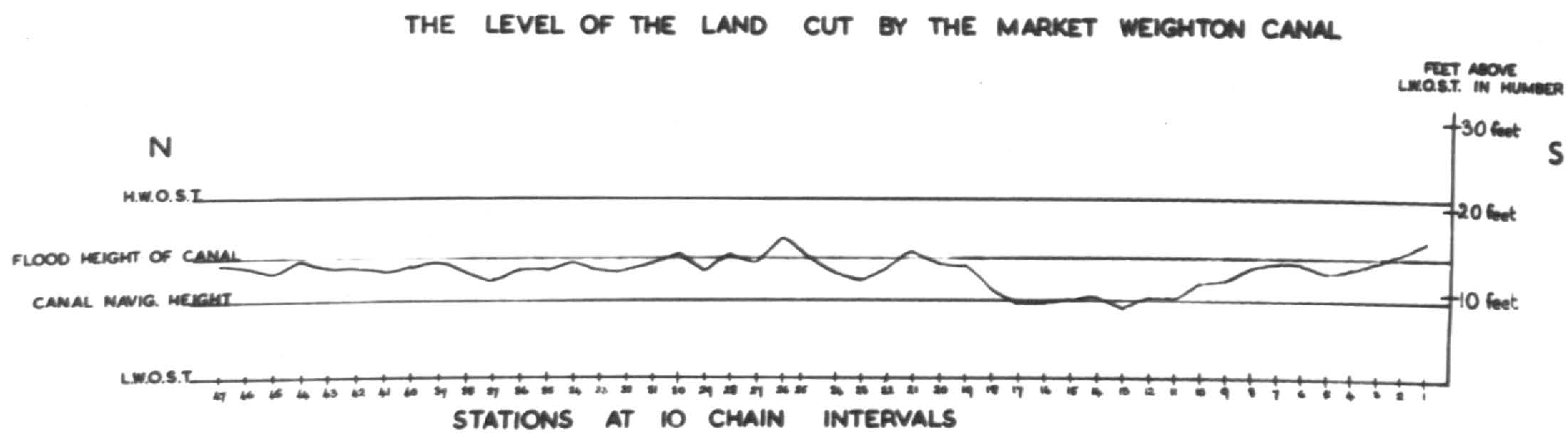


Fig.60. Section along Market Weighton canal, based on levels by E.Page.

taxes was bringing local landowners little or no relief. In winter the canal was incapable of holding all the water, so that "a large proportion of the flood water finds its way out of the Navigation, over the Banks and through the open Staunches, and spreads itself over the lowest parts of the grounds adjacent".(34) In summer, the level of water was kept up in the interests of navigation. Thus the lower areas were never free of water. Page distinguished three types of land in the level: "some of which are constantly flooded, others are so in particular wet seasons, and others although never flooded are so much saturated with water as to render them very unproductive".(35) The area constantly flooded was Oxmardike Marr, which Page found to be "at all seasons soaked in water". The levels he took give some idea of flood conditions which would have still been the same in the middle decades of the century. (Fig. 61)

The landowners did not accept this position without concern. In 1851, Mook complained about the canal, pointing out that it was "not only not three feet below the level of the Grounds to be drained, but that at a period when the water was low in the Canal, namely November last, it stood about 18 inches above the level of some of the lands adjoining it between Foulney Staunch and the Humber".(36) This complaint produced some repairs of the Humber Lock, but more drastic action than this was needed to bring about any real improvement in drainage. Those interested were by then well aware that only separation of the drainage

(34) E. Page. Ms. report on "the better Drainage of the Lands within the Level of the Market Weighton Drainage", Aug. 1831, M.W.D.

(35) Directions to Page quoted in his report, op. cit.

(36) Letter from A. Mook, agent of J. H. S. Sotheron, M.P. April 1851, M.W.D.

and navigation channels could have the necessary effect. A series of petitions and reports throughout the earlier part of the nineteenth century reveal this. In 1810, Chapman had been asked to report on the possibility of opening Hodlet to take the drainage waters from the lowlands.(37) In 1825, when Thackray was asked "whether the navigation can be scoured and deepened so as to relieve the Drainage",(38) he had added to his report a recommendation for the reopening of Hodlet. In 1831, Page had again recommended sending the lowland waters to Hodlet, and then the debate had continued for four years before the scheme was finally abandoned. The reason why nothing came of these schemes each time was the attitude of the Trustees. They had no objection to there being an alternative drain for the lowland waters, provided this did no harm to the navigation, and provided the landowners continued to pay towards the upkeep of the Market Weighton canal.(39) The Trustees were not prepared to use the money arising out of the normal drainage tax to open a new drain. The landowners either could not afford both the old drainage tax and the new, or they felt that the land could not bear the expense. Hence the land remained in its poorly drained state, little better than before 1772, and the whole surrounding catchment basin felt the repercussions in the form of stagnant water in the drains and a high water-table.

The Decline of Navigation.

It was not until 1917 that adequate drainage at last became possible

(37) Minutes of the M.W.D. Jan. 1810. (38) Ibid. June 1825.

(39) Ibid. May 1826, Sept. 1831, July 1834.

in the Foulney drainage basin. In that year, the navigation on the Market Weighton canal came to an end, and drainage interests were at last paramount. But this success was the result not so much of increased concern with drainage, as of a decline in interest in navigation. This decline was a slow process which occupied the years from 1847 to 1915, and was the result of a number of factors.

The main cause of the decline in interest in navigation was the development of alternative methods of transport. In 1840, the Hull and Selby railway had been opened,(40) and this crossed the canal about half way between the road and the Humber, and close to some of the brickyards. A little of the canal traffic may have been diverted to this railway, but the bulky nature of both coal and bricks resulted in the canal retaining its importance for these works. The York to Market-Weighton railway, opened in 1847, had a greater effect by diverting some of the agricultural produce from Market Weighton away from the canal. This tendency was accentuated when the opening of the Market-Weighton to Beverley link in 1865 put Market-Weighton in direct contact with Hull. Fig. 62 shows the general decline in income from tolls following this date (the exceptionally heavy traffic of the years 1881-4 can almost all be accounted for by material for the construction of the Hull and Barnsley railway, which crossed the canal about three-quarters of a mile north of the road.(41))

The railways also helped the decline of the Navigation in another way. In 1847, the York and North Midland Railway Company, the owners of

(40) The Beginnings of the East Yorkshire Railways. K. A. Macmahon, East Yorkshire Local History Society, 1953.

(41) This railway was opened in 1885.

INCOME FROM MARKET WEIGHTON CANAL TOLLS

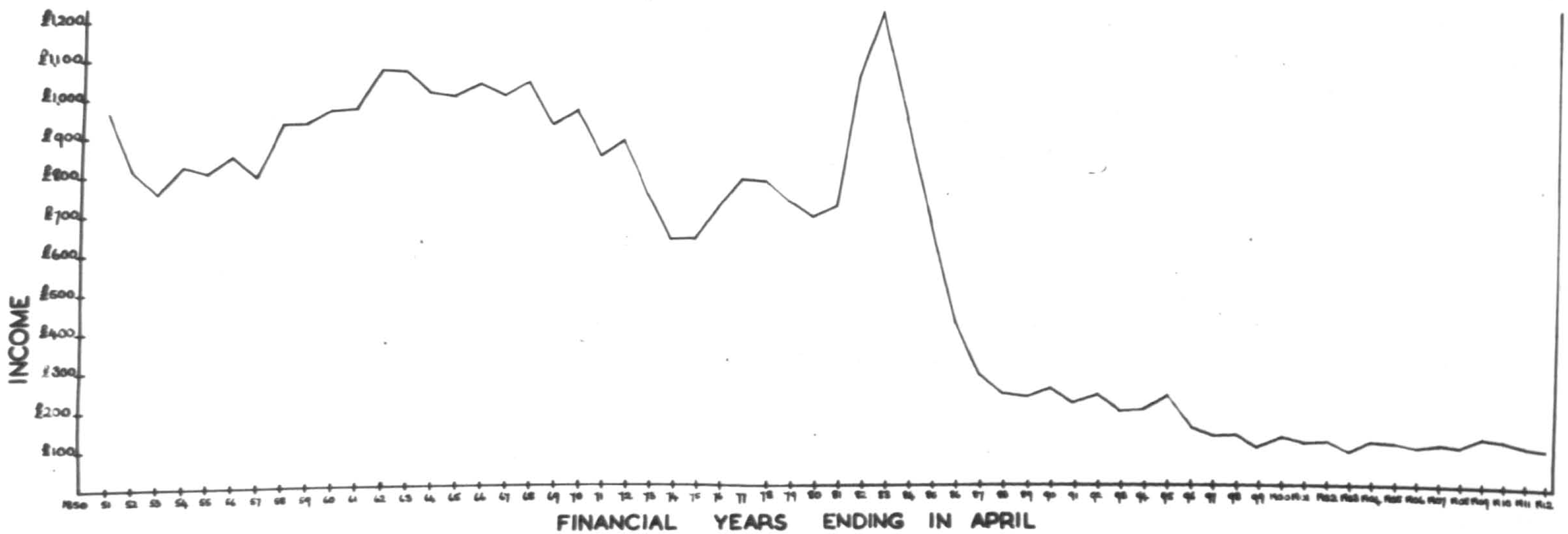


Fig.62.

brick works established themselves beside the Humber itself, and the Wallingfen manufacturers had difficulty in competing with these owing to the canal dues which they had to pay.(44) As time passed, the total output of the area, especially of bricks, appears to have declined. Income from tolls was therefore affected.

As a result of these factors, and the consequent decline in income from tolls, the navigation account was about £500 overdrawn by 1900, and the Trustees therefore proposed to obtain an Act of Parliament to allow them to dispense with the navigation and devote the canal to drainage only. That was exactly what the drainage interests desired. They had made one further attempt to obtain improved drainage in 1876, when they had asked the advice of the engineer Harker. The adoption of steam pumps elsewhere had raised their hopes of pumping the lowland water into the canal, but Harker rejected this solution because "in times of flood the canal is so full that it would not carry any additional water".(45) Instead, he had recommended a separate drain for the lowland on the east side of the Canal opening into Hodlet. The same reasons as before prevented this plan being adopted, and the land-owners had resigned themselves to continued flooding until navigation should cease. But 1900 did not in fact bring this desired end, because there were still some brick and tile manufacturers remaining who had a considerable interest in retaining the navigation function of the canal. One of the firms concerned agreed to make up the income from the tolls each year to £200, if the Trustees

(44) M.W.D. Records. Letter from a brick manufacturer, March 1836.

(45) Report on Market Weighton Canal, Harker 1876.

would keep open that section of the canal below Sod-Houses Lock, and the 1900 Act incorporated this agreement. The closing of the upper section of the canal had little influence on the drainage of the Foulney basin.

In 1917, the 1900 agreement was brought to an end, and the navigation function of the canal automatically lapsed. Yet improved drainage did not immediately follow everywhere, for the nineteenth century history had saddled the area with many drawbacks. Although the water in the canal was no longer held up in the interest of navigation, at times of flood, the level was usually such that the lowest lands had little or no fall into it. In Spaldingmoor, drains had to be deepened and the Foulney straightened before full advantage of the increased fall could be felt. On the clay areas, tile drains were necessary. Thus 1917 did not see the end of the drainage troubles of the area, but it did see the beginning of the solution of those troubles. It was unfortunate however that that beginning should have been delayed until 1917, for in that way the area lost the impetus of the years of high farming in the middle of the nineteenth century, and was faced instead with the agricultural depression of the 1920's and 1930's. Much improvement has come, especially in recent years with the aid of Government grants. But the Market-Weighton depression still contains some of the poorest-drained land in East Yorkshire.

In the rest of the Vale, there was little change after 1850. With the cessation of warping, and further private improvement of the drains, Howdenshire maintained its tradition of good drainage. The Derwent valley, on the other hand, remained the scene of frequent flooding. The physical regions of the Vale thus retained their individuality throughout the modern period.

SECTION IV

T H E   V A L E   O F   P I C K E R I N G

Chapter XI. The Background to the Draining.

Between the Yorkshire Wolds and the North Yorkshire Moors there stretches a remarkably level plain at an altitude of 65 to 100 feet O.D. Low hills occur only towards its eastern and western extremities. Although this plain is higher than Holderness or the Vale of York, its lowland character is more emphasised by the steeply rising land on all sides except towards the east, where morainic hills between 130 and 200 feet O.D. separate it from the North Sea. No early regional name was applied to this distinct area, and the term "the Vale of Pickering" was adopted by William Marshall in 1783.(1)

The Physical Background.

Other clay vales exist in England between chalk and Jurassic hills, such as the Vale of White Horse, the Vale of Aylesbury and the Ancholme valley. But three important features make the Vale of Pickering unique. First, both ends of the Vale are closed, the western by the Howardian hills and the eastern by a glacial moraine. Second, ice-margin features play a significant part in the physical geography. Third, the adjacent North Yorkshire Moors are higher, more extensive and more impervious than the Jurassic hills elsewhere in England. These three features combine to make the Vale an area of much more difficult drainage than most other clay vales. A large proportion of the abundant waters of the Moors pours south into the Vale, while a late Pleistocene ice-sheet dammed the seaward outlet of these waters and diverted additional

(1) W. Marshall. The Rural Economy of Yorkshire, 1788.

Scale: 2 1 0 1 2 3 Miles

VALE OF PICKERING : RELIEF

Fig. 63.

rivers into the Vale. The Howardian hills barred the western exit until the Kirkham overflow channel was cut to form the present sole outlet for the waters. The flow of water into the Vale frequently exceeded the outflow capacity of the Kirkham gorge and waterlogging and flooding were frequent. "Nature, perhaps, never was so near forming a lake without finishing the design."(2)

The structure of the Vale and the surrounding area is determined principally by the Cleveland anticline, which has an approximately east-west trend. The crest of the anticline now reveals at the surface deltaic grits and sandstones of Middle Jurassic age, which form the Cleveland hills over 1,000 ft. high. Some of the rivers have carved windows through the grits to reveal the underlying Liassic clays and shales. The grits dip north and south from the anticline, but it is only with the southern limb that we are concerned. Between five and seven miles south of the crest, the grits are overlain, first by a narrow bed of shaly Hackness rock (contemporary with the Oxford clay elsewhere), and then by Corallian calcareous gritstones and oolitic limestones which reach 200 ft. or more in thickness. The Corallian series forms a well-marked escarpment overlooking the Cleveland hills. This escarpment has a number of funnel-shaped embayments leading to steep-sides valleys, where rivers from the Cleveland hills pass through the Corallian hills on their way to the Vale of Pickering (Figs. 63 and 64). These valleys divide the Corallian hills into a number of isolated plateaux which slope gently southwards with the dip. In the East these plateaux are known as the Tabular Hills, and rise to about 750 ft. O.D. In the west

(2) Ibid, Vol. I, p. 7.

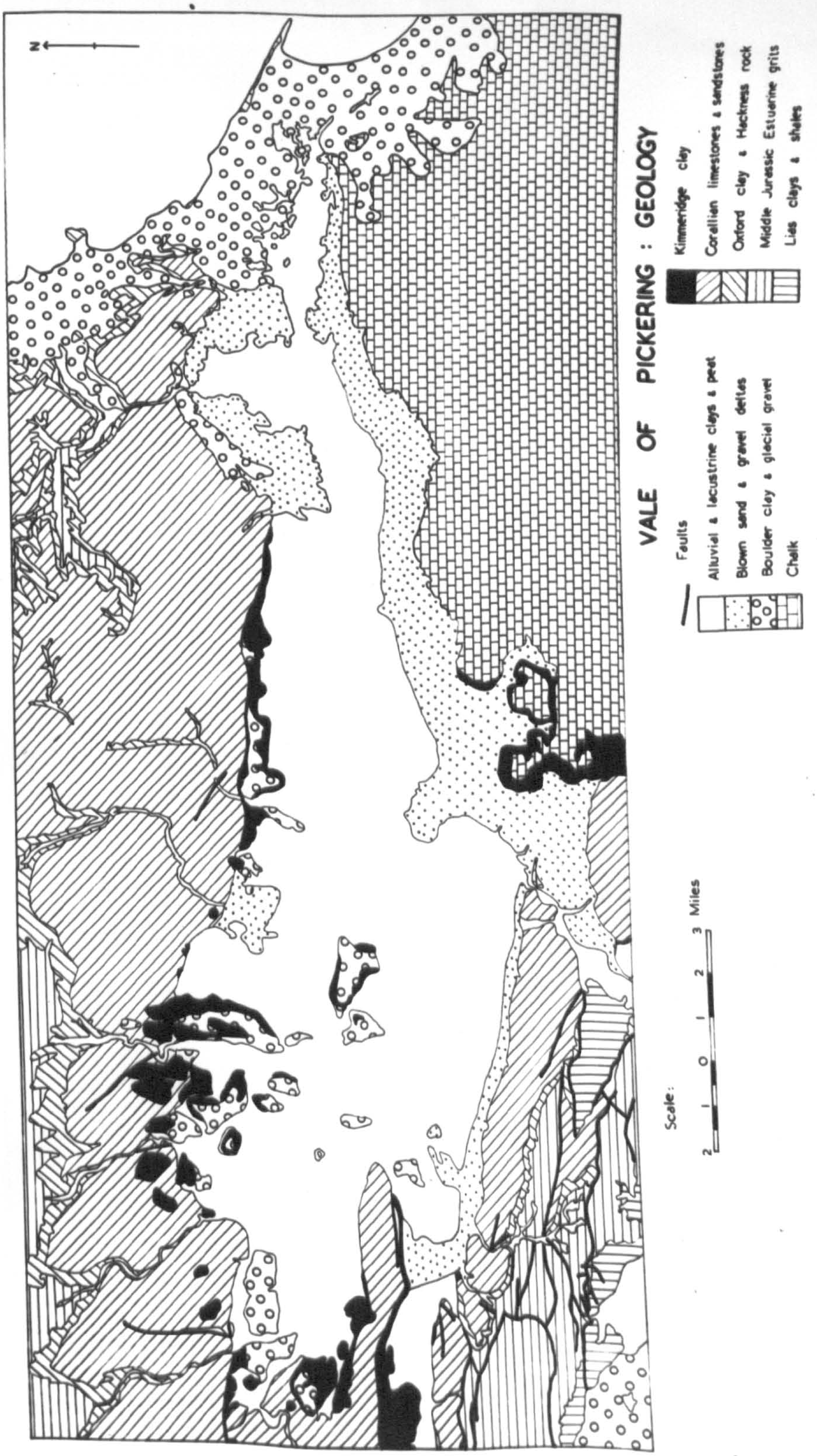

N
VALE OF PICKERING : GEOLOGY
Faults
Alluvial & lacustrine clays & peat
Blown sand & gravel deltas
Boulder clay & glacial gravel
Chalk
Kimmeridge clay
Corallian limestones & sandstones
Oxford clay & Hackness rock
Middle Jurassic Estuarine grits
Lias clays & shales
Scale:
2 1 0 1 2 3 Miles

Fig. 64

they form the Hambledon Hills which rise to 1,000 ft. O.D. (Fig. 63).

The Kimmeridge clay was deposited following the Corallian series, but in this area, instead of the Corallian dipping gently beneath the clay, the junction is abrupt. This is the result of a number of east-west faults downthrown to the north. The Kimmeridge clay is 400 ft. or more thick and it underlies most of the Vale of Pickering but is revealed at the surface only on the margins of the Vale and in the hills at the western end. (Fig. 64). Elsewhere, considerable thicknesses of Pleistocene and recent deposits mask the relief of the clay surface. In the extreme east, up to 250 ft. of Speeton clay overlies the Kimmeridge clay, but elsewhere chalk rests directly on the Kimmeridge. The chalk forms a definite and straight escarpment reaching 600 ft. O.D., while its dip-slope forms the Wolds to the south.

While this simple cuesta relief dominates the eastern part of the region, the western part is complicated by a marked change in the direction of dip and considerable faulting. The chalk strike swings round from east-west near the coast to north-east - south-west near Malton, and then to the north-north-west - south-south-east direction which prevails as far as the Humber. The chalk scarp near Malton, in the section where strike and dip are changing rapidly, is very much indented (Fig. 63). From its foot extends a broad zone of much-faulted Liassic, Corallian and Middle Jurassic limestones, grits and shales, in which a north-north-east dip appears to be most general. This forms the area known as the Howardian Hills, which rise to about 250 ft. O.D. near the Wolds, but 500 ft. at the western end. These hills are separated from the Hambledon

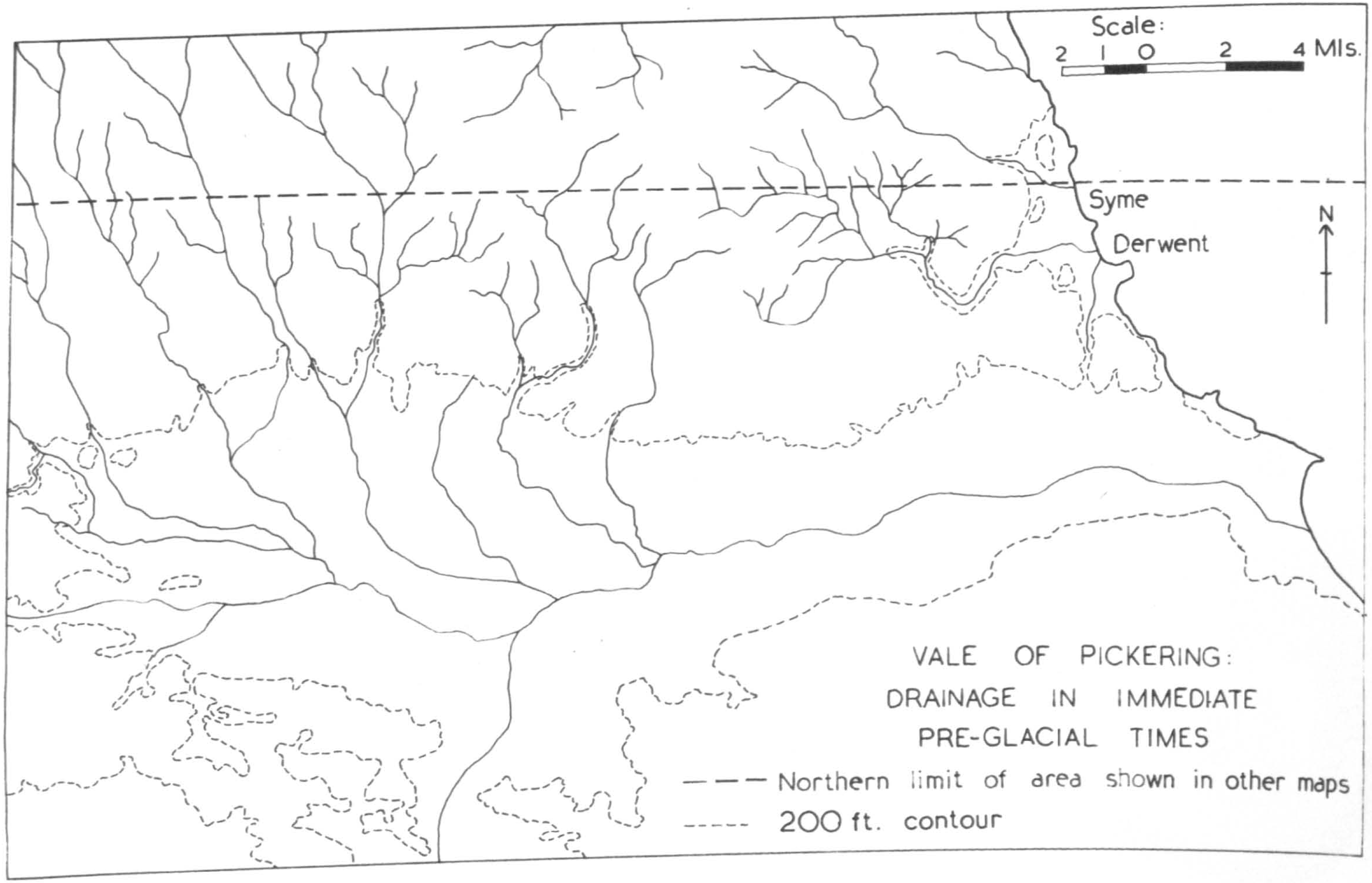

Scale:
2 1 0 2 4 Mls.
Syme
Derwent
N
VALE OF PICKERING:
DRAINAGE IN IMMEDIATE
PRE-GLACIAL TIMES
Northern limit of area shown in other maps
200 ft. contour

Fig. 65

Hills by the narrow Coxwold-Gilling gap, a miniature rift-valley with a floor of Kimmeridge clay at about 200-225 ft. O.D. The Howardian Hills thus hem in the Kimmeridge clay vale at its western end.

In late Tertiary times, it is likely that drainage was closely adapted to structure. Consequent streams flowed from the crest of the Cleveland anticline into the Vale of Pickering, except in the east where the Syme and Derwent flowed directly into the sea (Fig. 65). The waters which gathered in the Vale found their way eastwards to the sea by the proto-Rye. It is possible to make an approximate reconstruction of the relief of the Vale at this time from the data obtained by well-borings etc.(3) This data is plotted in Fig. 66, which shows that much of the Kimmeridge clay surface is below present sea-level. If, therefore, this deep valley had been cut by late Tertiary times, and land and sea-levels were in their present relationship, an estuary must have occupied much of the Vale. Alternatively, the deep valley may have been cut in early Pleistocene times when sea-level had fallen through the abstraction of much water and its conversion into ice. Whichever theory is correct, by the time the later ice-sheets reached this area, the eastern half of the Vale was occupied by one wide, deep valley, while the west had a rolling surface of shallower valleys and intervening hills.

The hills which surround the Vale of Pickering had the effect of shielding it from the advance of the last main ice-sheets. The Stainmore

(3) C. Fox-Strangways. The Geology of the Oolitic and Cretaceous Rocks South of Scarborough, 2nd Edition, 1904 and The Geology of the Oolitic and Liassic Rocks to the North and West of Malton, 1881. Wartime Pamphlet on Underground Water Supplies in East Yorkshire and Lincolnshire.

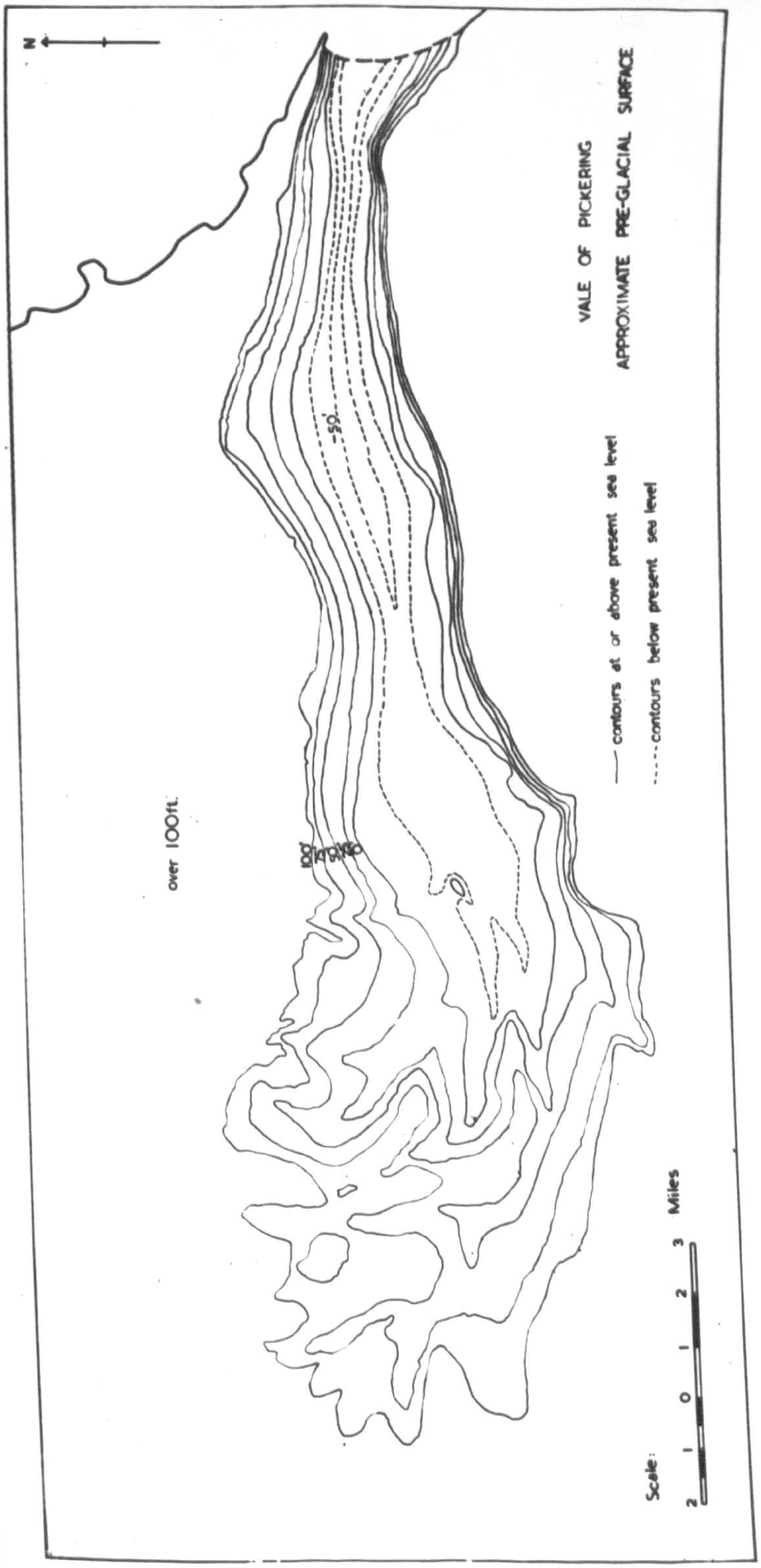

N
VALE OF PICKERING
APPROXIMATE PRE-GLACIAL SURFACE
contours at or above present sea level
contours below present sea level
-50'
over 100ft.
100
Scale:
2 1 0 1 2 3 Miles

Fig. 66

ice moved down the Vale of York and sent a small lobe into the Coxwold-Gilling gap. But the Howardian Hills blocked any large-scale penetration of the Vale of Pickering. On the east, Cheviot ice moved down the coast, hemmed in by Scandinavian ice over the North Sea. This ice covered the eastern extremity of the Cleveland hills, but the Corallian scarp proved too difficult a barrier to surmount. South of Scarborough, coastal erosion had reduced the Corallian to a low rise only, and the ice passed over this into the eastern end of the Vale of Pickering. It did not penetrate far into the Vale, for its western margin appears to have been at Wykeham, where a gravel moraine projects from the highland on to the floor of the Vale.(4) The remainder of the Vale appears to have been free from ice. The patches of boulder-clay and gravel at the western end of the Vale may be the remnants of an earlier glaciation.(5)

When the ice was at its greatest extent, there came into being a series of ice-margin lakes and overflow channels, described in detail by Kendall.(6) The lakes in Eskdale, north of the Cleveland axis, overflowed by the deep Newton Dale channel into the Vale of Pickering (Fig. 67). The Syme waters were dammed back to form Lake Harwood, which overflowed by Harwood Dale into Lake Hackness, formed by the damming of the lower Derwent. This lake in turn overflowed by the Forge valley and a channel along the margin of the ice into the Vale of Pickering. The Vale was thus receiving large additional amounts of water at a time when its

(4) P. F. Kendall. A System of Glacier Lakes in the Cleveland Hills. Quarterly Journal of the Geological Society 1902, p. 559.

(5) Kendall does no more than mention these. Ibid. p. 499.

(6) Ibid. pp. 471-571.

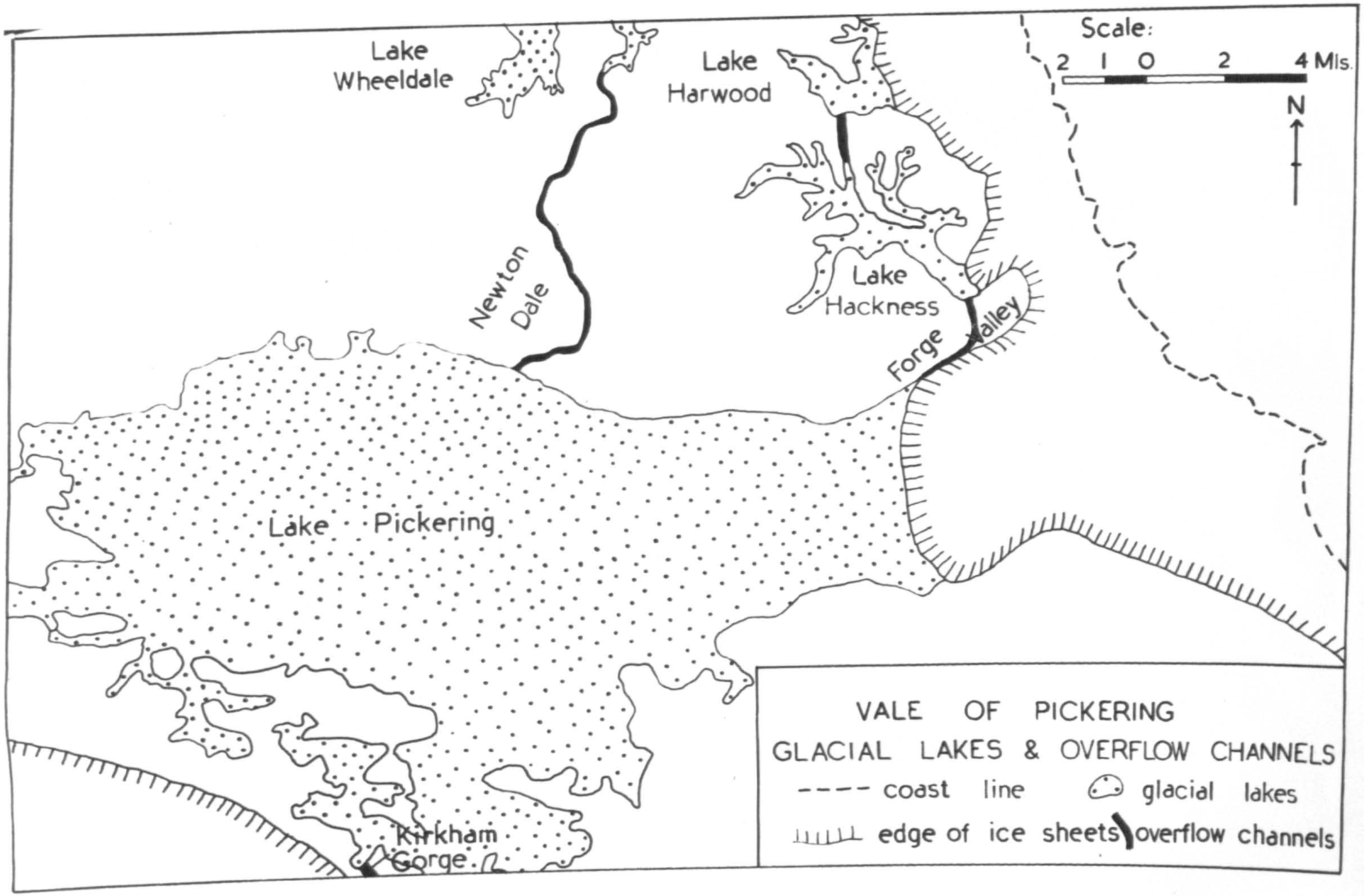

Scale:
2 1 0 2 4 Mls.
N
Lake Wheeldale
Lake Harwood
Newton Dale
Lake Hackness
Forge Valley
Lake Pickering
Kirkham Gorge
VALE OF PICKERING
GLACIAL LAKES & OVERFLOW CHANNELS
coast line
glacial lakes
edge of ice sheets
overflow channels

Fig.67

original outlet at Filey was blocked by ice. The Coxwold-Gilling gap was similarly blocked by the Vale of York ice-sheet, so that the water accumulated in the Vale to form the largest glacial lake of all, Lake Pickering. When the water in this lake reached the level of a col in the Howardian Hills, probably produced by a tributary of the Rye, it overflowed. The overflow was rapidly cut down to form a deep channel, the present Kirkham gorge, linking Lake Pickering to Lake Humber.

The very great volume of water using the various overflow channels gave rise to such rapid erosion that when the ice retreated some of the rivers did not return to their old courses. Two permanent results of the late glacial epoch in the Vale of Pickering are the continued inflow of the Syme and Derwent waters, and the continued use of the Kirkham gorge as the outfall for all the waters of the Vale. Both contribute much towards making the Vale a problem drainage area. It is fortunate indeed that Newton Dale had not been cut so deep as to divert the Eskdale drainage into the Vale permanently.

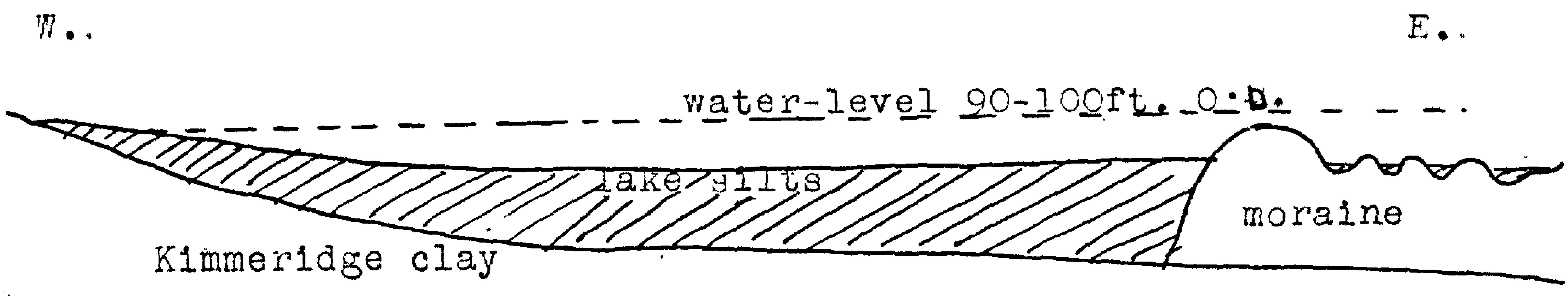
The retreating ice left behind a zone of morainic country at the eastern end of the Vale of Pickering, culminating in marked morainic hills near Filey. The minimum height of the Filey moraine is 130 ft. O.D., so that for the Kirkham gorge to have remained the outfall for the Vale, it must have been cut to below 130 ft. by the time of the retreat of the ice. It appears that a lake reaching to between 90 and 100 ft. O.D. was in existence in the Vale some time after the retreat of the ice,(7) so that the Kirkham gorge may well have had a level between 80 and 90 ft. O.D. at this time.

(7) J. G. D. Clark (Ed.) Recent Excavations at Star Carr, 1954.

When the ice was at its maximum extent, frost shattering of the unglaciated highland loaded the rivers with much gravel and silt which they deposited in Lake Pickering. The coarser gravel was normally deposited at the point where the rivers entered the lake. The Newton Dale and Forge Valley rivers carried particularly large amounts of gravel owing to their rapid downcutting and large volume, and this was dropped to form gravel deltas where they entered the lake. The Rye and its tributaries did not carry so much gravel, but they, too, dropped their coarser deposits where they entered the lake. The finer muds circulated and filled in the deeper parts of the lake. By the accumulation of deposits, parts of the lake became shallower than others. The western end started as the shallowest part owing to the pre-glacial relief, and it was also the area best served by rivers and therefore received a considerable alluvial veneer. The deeper eastern part was fed by fewer streams, and there was therefore less sand and gravel. Infilling depended on mud, but the amount was sufficiently great to fill in the old deep pre-glacial valley to a considerable extent. When the ice retreated from the Wykeham end-moraine, the lake waters spread across the pocked surface and left the same type of mud there. The record of the recent excavations at Star Carr refers to "a chocolate silty clay" found in the deepest hollows in the moraine, in which pollen grains were so infrequent that it was impossible to date it accurately.(8) It is difficult to suggest what else this could be but the mud that was being deposited throughout the Vale. The small amount found at Star Carr results from

(8) Ibid. p. 35.

the short period during which conditions were favourable for deposition. It is possible that the accumulation of mud was such that by this date the floor of the lake west of the moraine was higher than the floor to the east.



The details of the composition of the overlying muds and peats and of their pollen counts, available for the Star Carr site, make it possible to suggest the evolution of Lake Pickering in post-glacial times, although many more investigations would be required before a strictly accurate account could be drawn up.

In Star Carr, between six and seven feet of calcareous muds and silts were found to overlie the pockets of "chocolate silty clay" and morainic hummocks. The evidence suggests that when these muds and silts began to be deposited the level of the lake must have been considerably above 71 ft. O.D. (about 90 to 100 ft. ?), and it is therefore likely to have still covered much of the Vale (Fig. 63a). Only the marginal deltas and the higher land of Ryedale would have stood above this level as dry ground. The ice was at this time creeping further and further away, and the pollen remains in the muds suggest the spread of tundra

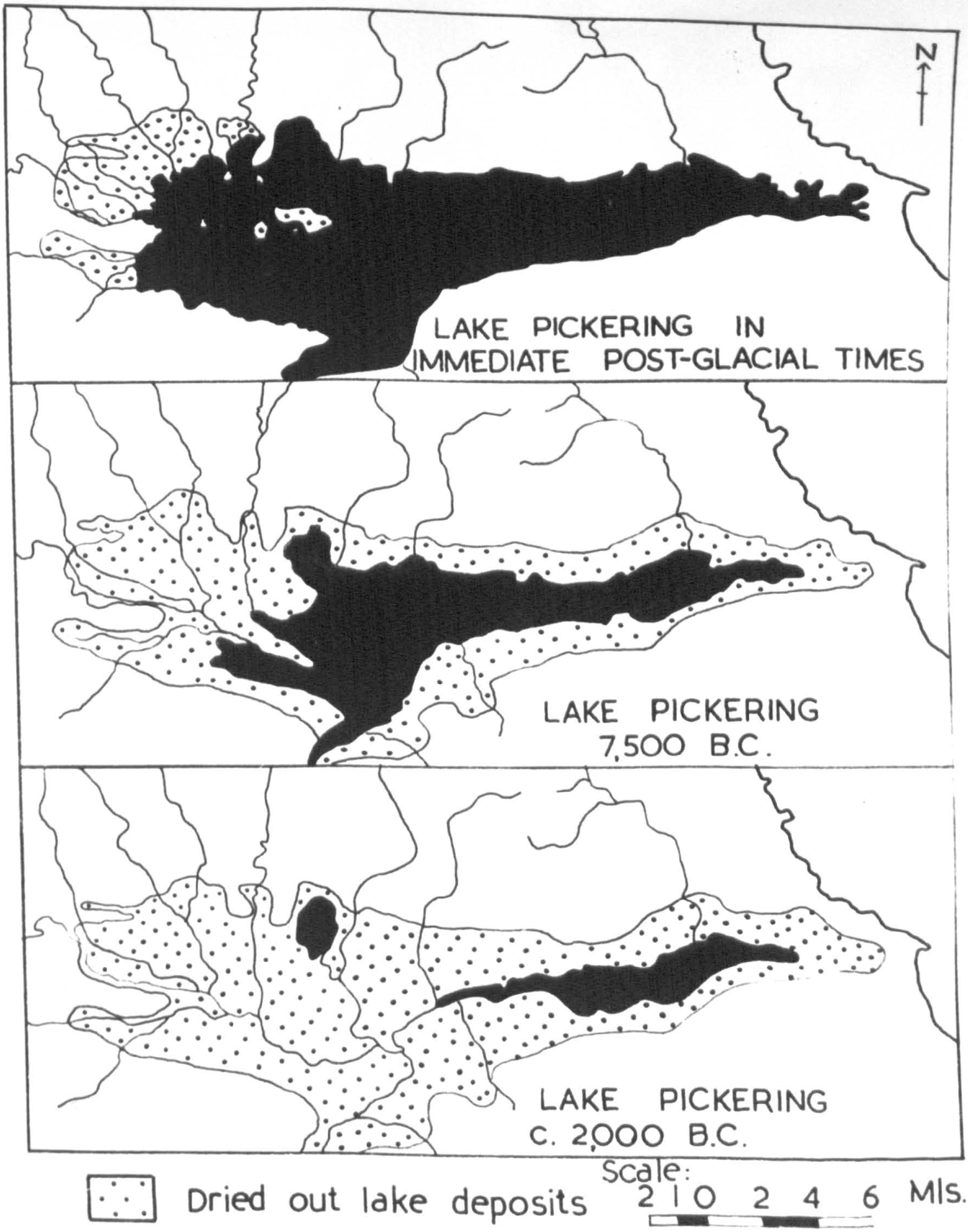

N
LAKE PICKERING IN
IMMEDIATE POST-GLACIAL TIMES
LAKE PICKERING
7,500 B.C.
LAKE PICKERING
c. 2,000 B.C.
Dried out lake deposits
Scale:
2 1 0 2 4 6 Mls.

Fig.68

and steppe vegetation to the surrounding land, represented by grass and sedge pollen. The lake waters were colonised by aquatic creatures.

The water-level continued to fall slowly, and the floor of the lake was raised by the further accumulation of mud and silt. By about 7,500 B.C., the date of the Mesolithic settlement in Star Carr, the lake stood at about 75 ft. O.D. This lower level may have been the result either of the continued cutting down of the Kirkham gorge channel, or of a reduced inflow of water. Boreal climatic conditions were marked by relatively low rainfall and strong drying winds, and could explain a reduced inflow. But whatever the cause, the lower level of the lake meant that its area was more restricted, and considerable parts of the Vale (especially in the west) had become dry land (Fig. 68b). The areas well above water-level, such as the adjacent Wolds and limestone hills, appear to have supported birch-woods and grasses; the wetter low-lying land was occupied by alder, and round the margins of the lake was a zone of reeds and waterlilies. It may have been about this date that the blown sand deposits gathered at the foot of the scarp of the Wolds, carried there by strong northerly winds.

About 5,000 B.C., the onset of the milder, damper conditions of the Atlantic period gave rise to a gradual change in the lake deposits. Reed-swamp flourished and spread from the margins towards the centre. It left its trace in the form of organic matter mixed with the lake muds, called by Clark "coarse detritus mud". The colonisation by reed-swamp was a slow process, depending on the depth of water, but it appears to have reached all parts of the lake by the third millenium B.C. Carr woodland, dominated by alder, willow and birch, spread in behind the reed-swamp and most of the shallower parts of the lake were converted in this way into dry land. By about 2000 B.C., the lake area was restricted to that shown in Fig. 68c; the shrunken Lake Pickering probably still covered the lower part of the morainic zone where there had been no early silt infill, and a zone extending along the deepest part of the old pro-glacial valley; Lake Costa occupied an embayment of the original lake where little silt was received, for various obstacles diverted the silt-laden waters of the Seven and Pickering Beck, and the Costa itself was derived from a large spring at the Corallian-Kimmeridge fault junction, and was therefore silt-free.

In the succeeding years, carr woodland was probably replaced by normal damp oakwoods over much of the dried-out floor of the Vale, but in lakes Costa and Pickering, reed-swamp and carr continued to dominate into historic times. The Star Carr evidence suggests that in Lake Pickering there was a slow continuous rise in the level of the water-table "perhaps the result of climatic conditions or merely the blockage of the lake overflow".(9) This rise in water-level meant that the normal sequence of vegetation from reed-swamp to dry species did not take place; carr continued to be the dominant vegetation and peat continued to accumulate. The growth of peat at the eastern end of the Vale has been sufficiently great to raise it above the level of the central part and produce something approaching the normal gradient of a river valley.

(9) Ibid.

But in the eighteenth century the gradient was still not sufficient to prevent waterlogged carrs and meres existing in this stretch of the Vale.

The scene set by the physical evolution of the Vale therefore presented a difficult series of problems to would-be improvers. The floor of the Vale stood at or just below 75 ft. O.D. throughout much of its extent (Fig. 63). Gradients were almost imperceptible except at the western end, where the unevenness of the Kimmeridge clay surface was only lightly masked by the thin silt cover. Water poured from all directions on to this plain. Springs at the foot of the chalk scarp and along the faulted junction of the Corallian with the Kimmeridge rocks provided a fairly regular flow of water, but the rivers brought down large amounts of flood water from the impervious grits after rain. The Rye, Riccal, Dove and Seven flowed into the western part of the Vale and meandered towards the Kirkham gorge. The floods to which these rivers were subject frequently overtopped their banks, but the gradient towards Kirkham was sufficient to draw this water off after the flood had subsided. In the central part of the Vale, the main rivers from the north were the Costa, Pickering and Thornton Becks. These flooded less frequently, as the Costa was spring-fed, the Pickering Beck had only a small catchment area on the Cleveland hills, and the Thornton Beck rose on the Corallian hills. When the western rivers flooded, however, the waters of these central streams were often ponded back and the floor of the Vale flooded. The Derwent was the major river of the eastern end of the Vale, and it experienced even greater floods than the Rye owing to its very large catchment area in the Cleveland hills. Its waters poured into the meres and carrs of the eastern vale, from which the gradient towards Kirkham was slight. The floodwaters therefore passed away only very slowly.

It is possible to divide the Vale into four main sub-regions on the basis of its physical characteristics (Fig. 69). These are:-

(1) The western end or Ryedale. This is the highest part of the Vale and has the most varied relief. Kimmeridge clay islands appear from beneath the mantle of lake silt, which seldom exceeds 50 ft. in thickness. The silt contains a larger proportion of coarser deposits than that farther east. Flooding was frequent in the lower parts but the flood water drained away fairly rapidly.

(2) The central part or the Marishes. Here the surface is almost completely level and between 68 and 75 ft. O.D. The silt mantle is thicker and the finer deposits predominate. Floods resulted from the ponding back of local water, but at other times the gradient was sufficient to carry away the water slowly.

(3) The eastern end or the Carrs. This is again very flat and about 75 ft. O.D. The underlying moraine is covered by silt and peat deposits. Floods were heavy and frequent and waterlogging and meres were characteristic of the whole area.

(4) The higher marginal areas:-

(a). Newton Dale delta, about 75 - 100 ft. O.D., and consisting chiefly of coarse gravels.

(b) Forge valley delta, divided into two by the Derwent but otherwise similar to (a).

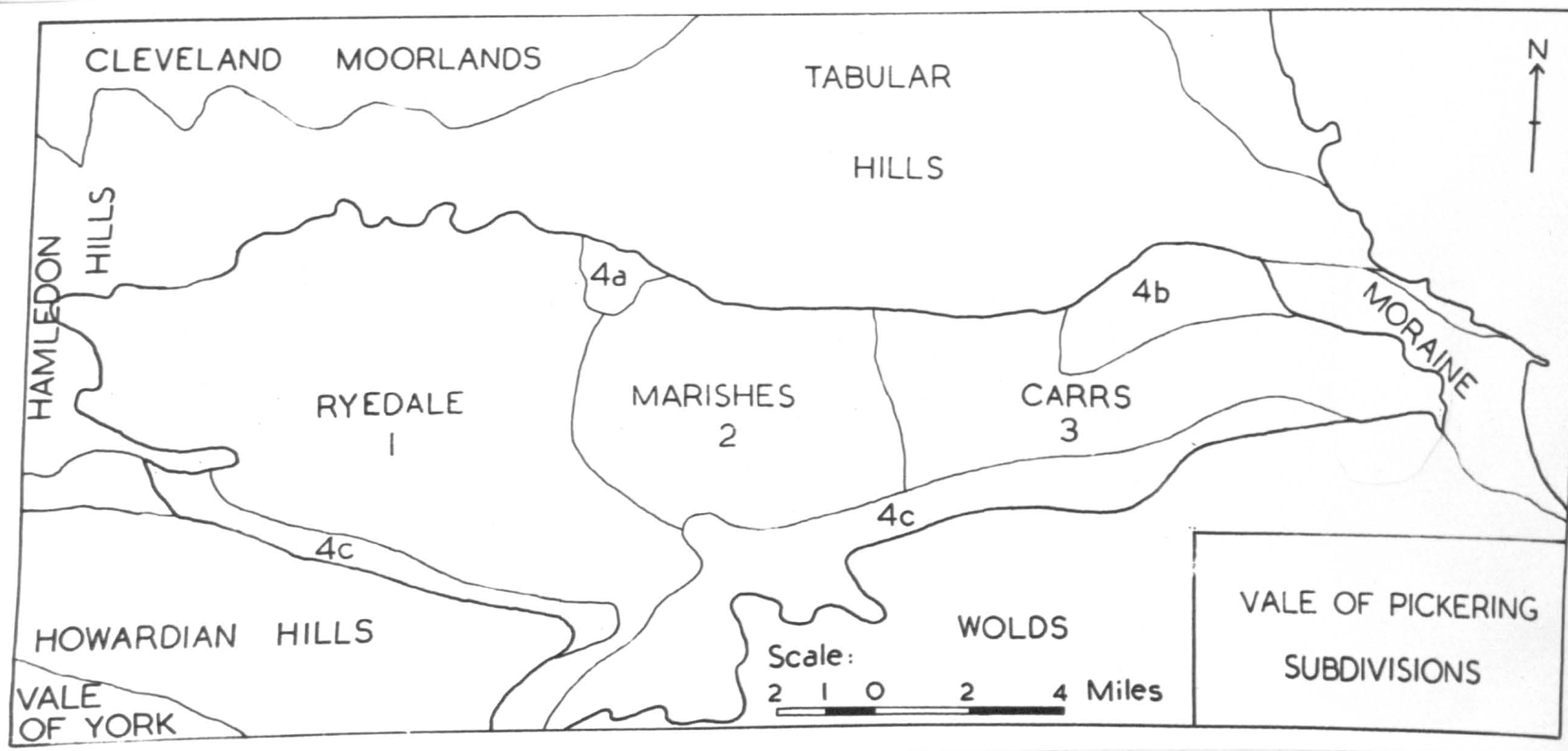

CLEVELAND MOORLANDS
TABULAR HILLS
HAMLEDON HILLS
N
4a
4b
MORAINE
RYEDALE 1
MARISHES 2
CARRS 3
4c
4c
HOWARDIAN HILLS
VALE OF YORK
WOLDS
Scale:
2 1 0 2 4 Miles
VALE OF PICKERING SUBDIVISIONS

Fig.69

(c) The southern margin of blown sand between 75 and 100 ft. O.D.

Early Settlement.

It was not until a relatively recent date that the four subdivisions of the Vale became marked by differences in human geography. Most of the early peoples shunned the marshes and tangles of vegetation that covered the Vale, just as they shunned the marshes of Holderness and the Vale of York. The Vale of Pickering differed from the other two areas, however, in being surrounded by chalk and limestone hills that were favoured by early man. Partly as a result of this, and partly because it was relatively narrow in places, the Vale was probably more frequently traversed and better-known by early man than the other two areas, which had pervious outcrops on one flank only.

The earliest known settlers in the area were the Mesolithic people whose dwelling site at Star Carr near Seamer has recently been excavated. The site was occupied from about 7,500 B.C., when a sheet of water still covered most of the Vale. The settlement was on the flank of a small island which rose a few feet above the level of the lake. Birch branches were piled on the adjacent reed-swamp to form a platform by which the area of the settlement was extended as near as possible to the water's edge. (Fig. 70). A causeway of birch branches led from the settlement across the zones of reed-swamp and waterlilies to open water, where skin boats were used. The site appears to have been inhabited in winter and in spring. In summer the inhabitants no doubt wandered through the birch woods of the surrounding hills, hunting wild animals, among which deer were evidently the most numerous.(10)

(10) Ibid. p. 13. Remains of 80 red deer, 33 roe deer, 11 elk, 9 oxen and 5 pigs, together with various water-fowl, were found on the site.

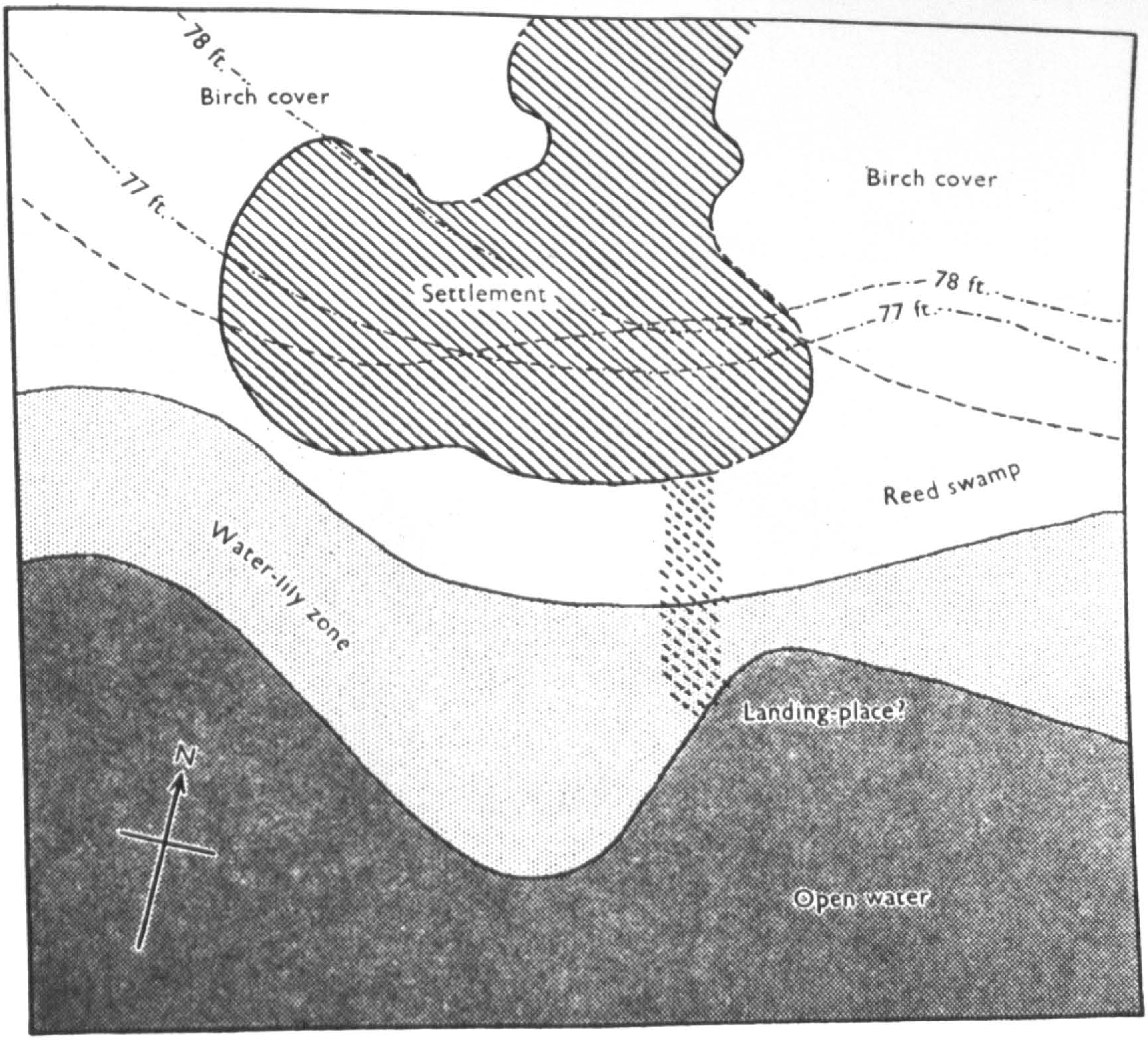


Fig. 8. Reconstruction of immediate surroundings of the Star Carr site.

Fig.70. Reproduced from Clark.

Similar settlements may have existed elsewhere in the Vale, but no others have yet been discovered. The dependence on hunting and collecting kept population numbers low. Although the only known settlement site was in the Vale, it seems likely that the Vale itself provided only a small proportion of the needs of the Mesolithic peoples, in the form of fish and water-fowl. The adjacent hills were probably already a richer source of food, and this characteristic became more marked as the climate became milder. The reed-swamp which spread across the lake and the oak and alder forest that colonised the dried-out silts were not attractive to Mesolithic man. On the other hand, relatively open woodland probably existed on the chalk and limestone hills, where hunting would have proved easier and more profitable. Although there is no evidence to prove where later Mesolithic man lived, we may postulate a tendency to desert the Vale and seek the adjacent hills. There the hunting and collecting economy probably survived until about 3,000 B.C.

Neolithic peoples arrived about 3,000 B.C. and probably absorbed the earlier peoples. They were chiefly pastoralists, and the same conditions that favoured the wild animals that Mesolithic man hunted also proved suitable for the flocks and herds of the newcomers. Thus Neolithic settlement was principally on the Wolds (see Chapter III) and on the dry Corallian hills. Thus the Vale of Pickering was surrounded by these settled areas. It is doubtful whether any use was made of the carrs and meres of the Vale, but Neolithic stone-axes have been found in several parts (Fig. 71). The most likely explanation of such a distribution is that routes existed across the Vale, linking the settlements on the

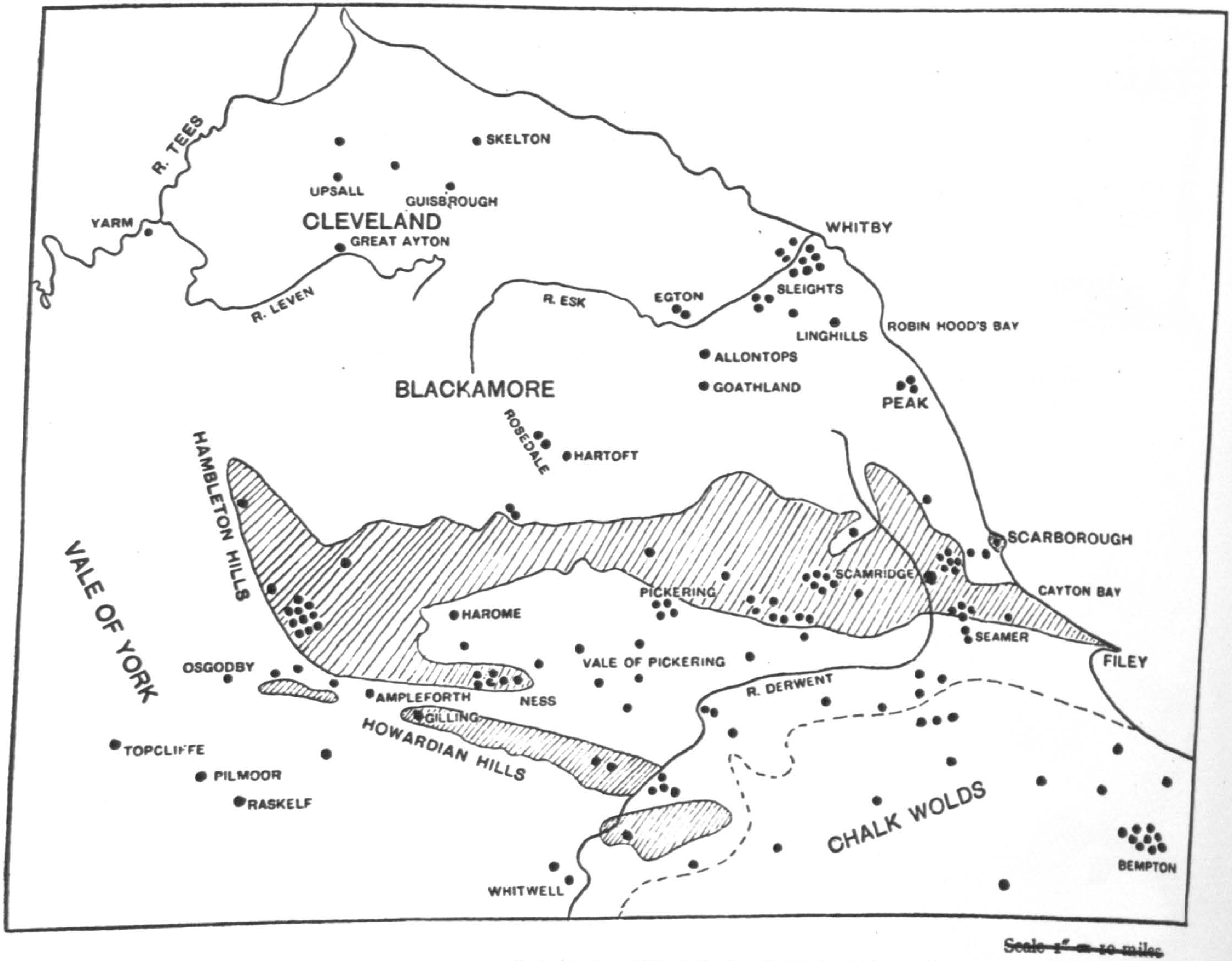


FIG. 7. DISTRIBUTION OF STONE AXES IN NORTH-EAST YORKSHIRE

● = Axes. ● = Hoard in East Ayton long barrow.
- - - Chalk outcrop. Shaded areas indicate limestone.

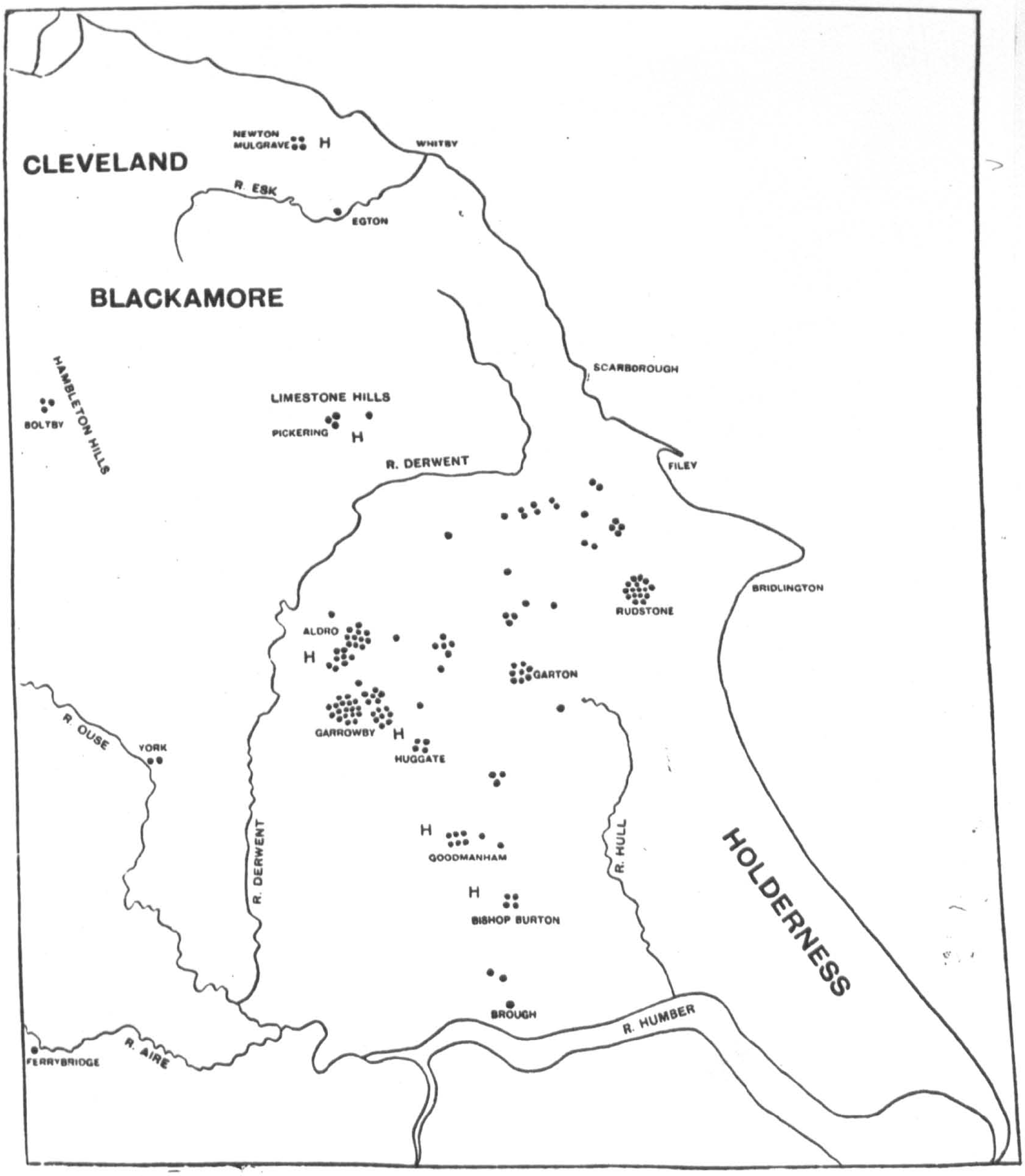
Fig.71. Reproduced from Elgee.

north and south sides. For example, two axes have been found at Seamer, and one of the easiest north-south traverses of the Vale passes through Seamer, taking advantage of the narrowing of the true carrlands to about half-a-mile. Another obvious route is across Ryedale from island to island, and there is a marked scatter of axes in Ryedale. Elsewhere, it may have been possible to journey by boat from one shore to the other, and the isolated axes found in the carrs may have been lost during such journeys. This was therefore a period when the Vale of Pickering appears to have been much more frequented than either the Hull valley or the Vale of York.

While Neolithic finds provide evidence that the Vale could be crossed if necessary, those of the early Bronze Age emphasise the barrier effect of the marshes and meres. About 2,000 B.C., "Beaker Folk" from Central Europe invaded the area and settled chiefly on the Wolds where their round barrows and beakers are numerous(11) (Fig. 72). In spite of the similar conditions on the Corallian hills, however, there are few beaker remains there. The Vale evidently acted as a barrier, shielding the Neolithic peoples who still occupied the Corallian hills from conquest by the Beaker peoples on the south side.

As the years passed, the habits and pottery of the invaders changed through a mingling of the beaker culture with the neolithic culture of the conquered peoples of the Wolds. The beakers became more bowl-shaped, a form known as the food-vessel. This change in form helps in tracing the events in the region. Food-vessels are much more common than beakers

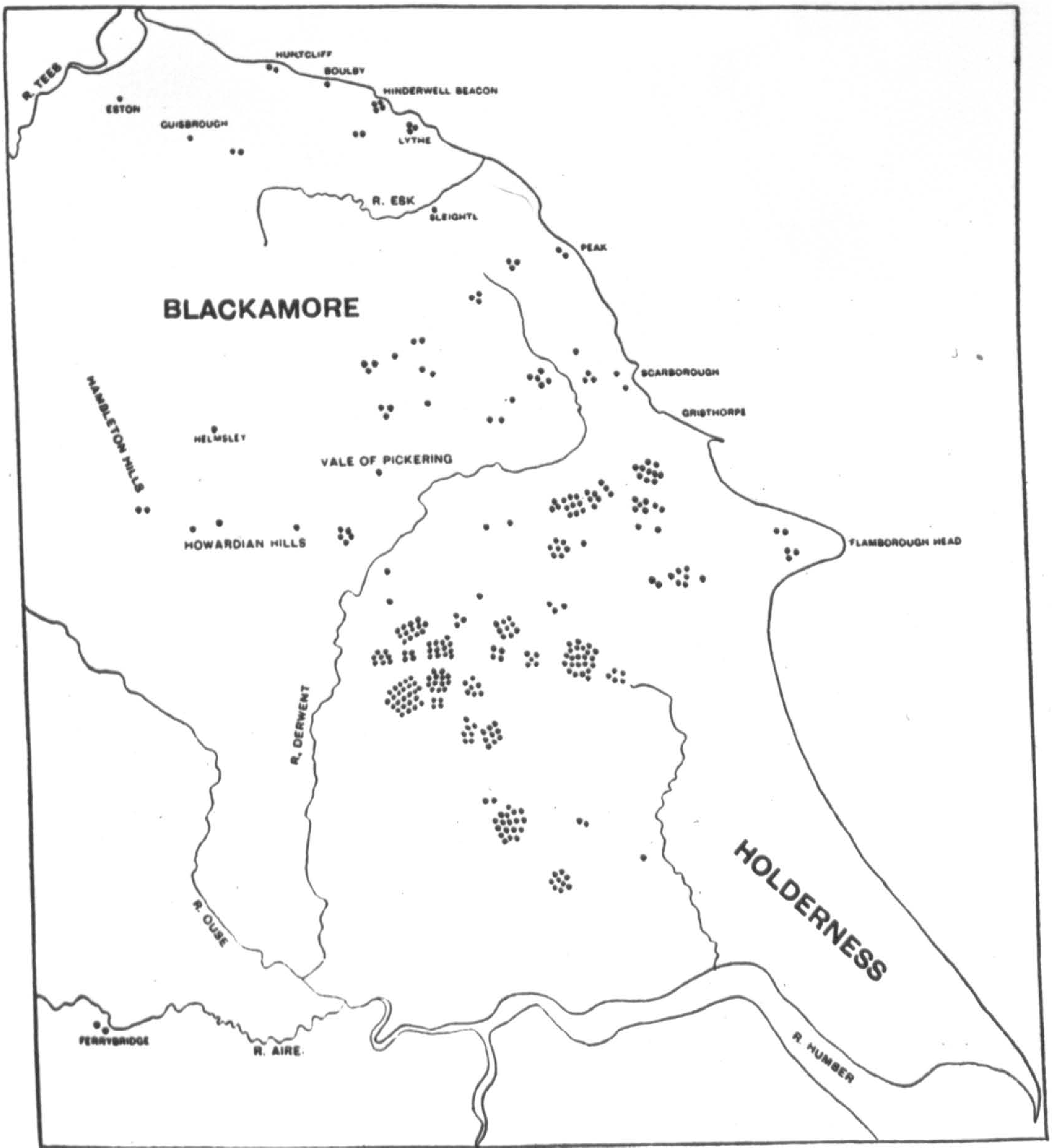
(11) F. Elgee. Early Man in North-East Yorkshire, 1930, Chapter VII.



~~Scale 1" = 11 miles~~

FIG. 17. DISTRIBUTION OF BEAKERS IN EAST YORKSHIRE.
● = Beakers. H = Handled Beakers.

Fig.72. Reproduced from Elgee.

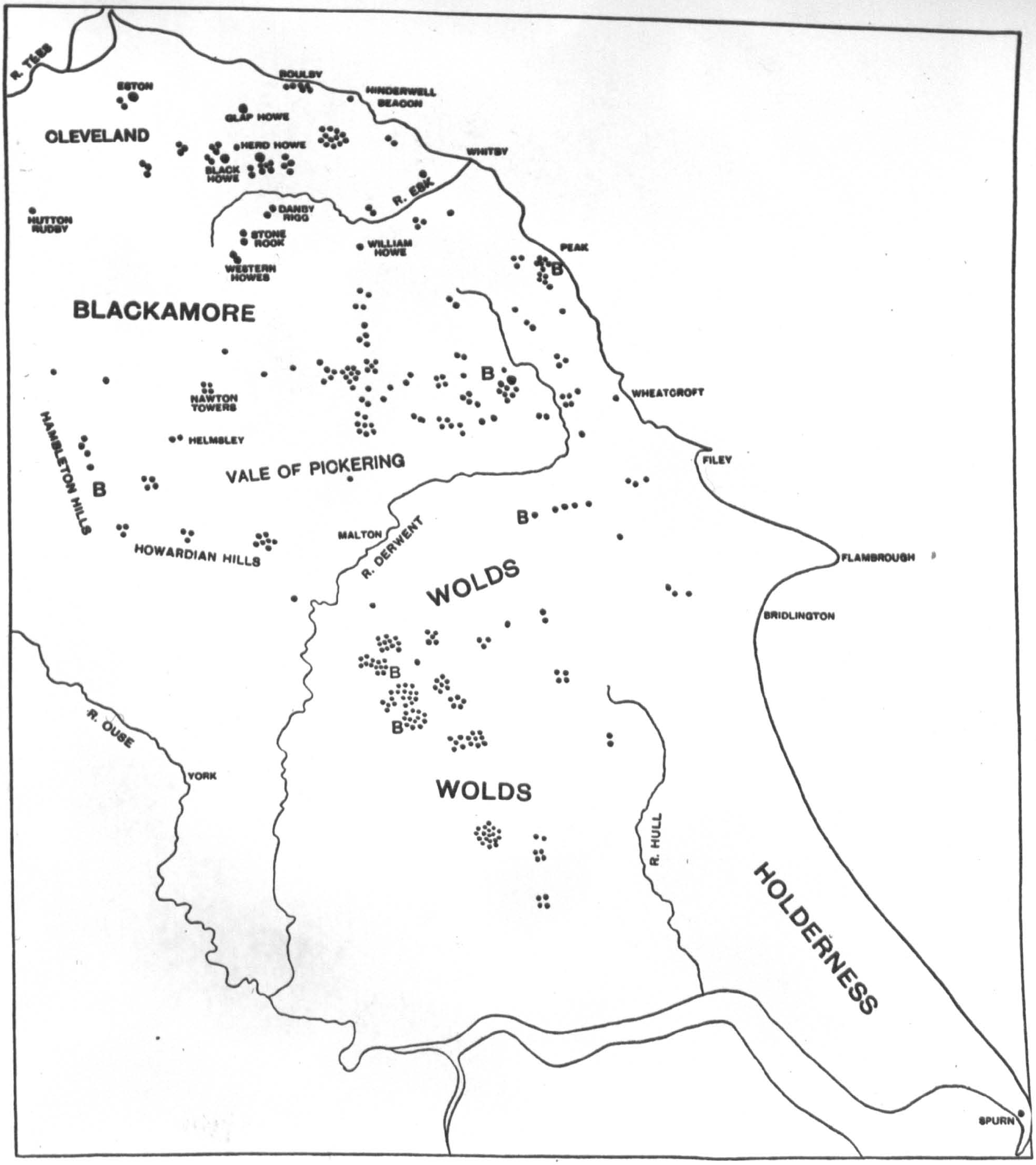


~~Scale 1" = 10 miles.~~

FIG. 28. DISTRIBUTION OF FOOD-VESSELS IN EAST YORKSHIRE

• = Food-Vessels.

Fig.73. Reproduced from Elgee.



~~Scale 1" = 10 miles.~~

FIG. 32.

DISTRIBUTION OF URNS IN EAST YORKSHIRE

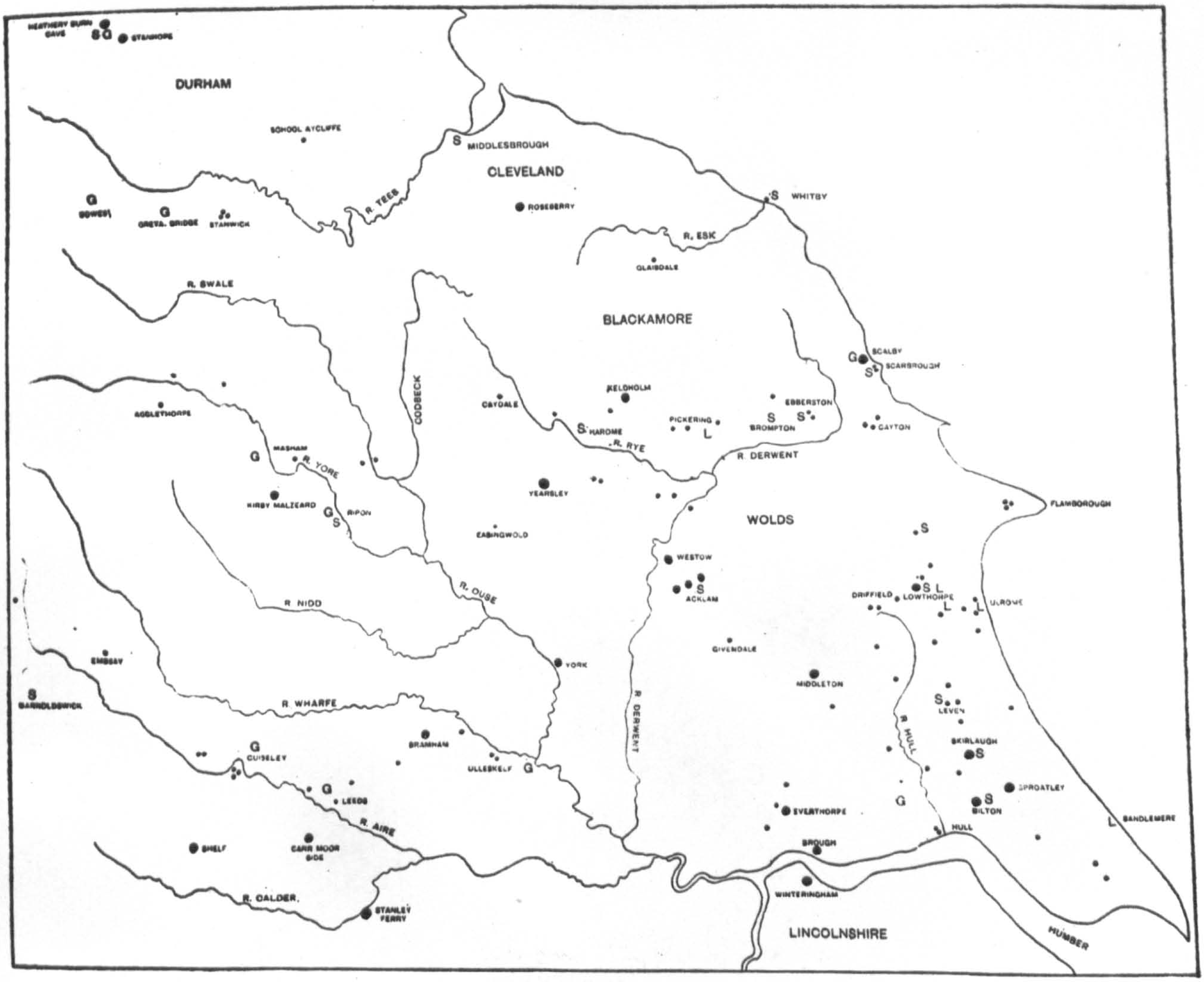
B = Bronze Implements. ● = Urn. ⬤ = Many Urns in one barrow

Fig.74. Reproduced from Elgee.

on the Corallian hills (Fig. 73), which suggests that, after the Bronze Age people had been settled on the Wolds for a sufficient length of time for the pottery change to take place, they started to move into the Corallian hills. This secondary settlement may have been the result of a rapid increase in population on the Wolds and excessive pressure of population on the land there. Fig. 73 suggests a high density of population on the Wolds. When the pressure became great, means of crossing or circumnavigating the barrier formed by the marshes of the Vale of Pickering were soon found.

A further evolution of customs ushered in the middle Bronze Age (1,400-800 B.C.), with another distinctive pottery form. This was the cinerary urn. Urns are widely distributed on the Wolds and on the Corallian hills (Fig. 74), for grazing and primitive agriculture still held the population to such dry, lightly-wooded areas.

The next wave of invaders, the late Bronze Age peoples who arrived about 800 B.C., preferred a different type of land. We have seen in Chapter III how they chose to settle on the drift lands of Holderness rather than the previously favoured Wolds, and north of the Wolds they showed a similar preference for the northern margin of the Vale of Pickering rather than the adjacent Corallian limestone dip-slope (Fig. 75). They probably entered the region from the coast between Scarborough and Filey. They chose the junction of the Corallian with the silt of the Vale for their settlements, and also occupied the Newton Dale and Forge valley deltas and some of the gravel-capped hills of Ryedale. As in Holderness, they included among their numbers some lake-dwelling peoples, and at



Scale 1" = 10½ miles.

FIG. 55

MAP SHOWING THE DISTRIBUTION OF THE LATE BRONZE AGE CULTURE IN YORKSHIRE AND SOUTH DURHAM

• = Socketed Axes. ● = Hoards of Socketed Axes, etc. S = Bronze Swords.
G = Gold Ornaments. L = Lake or Pile Dwellings.

Fig.75. Reproduced from Elgee.

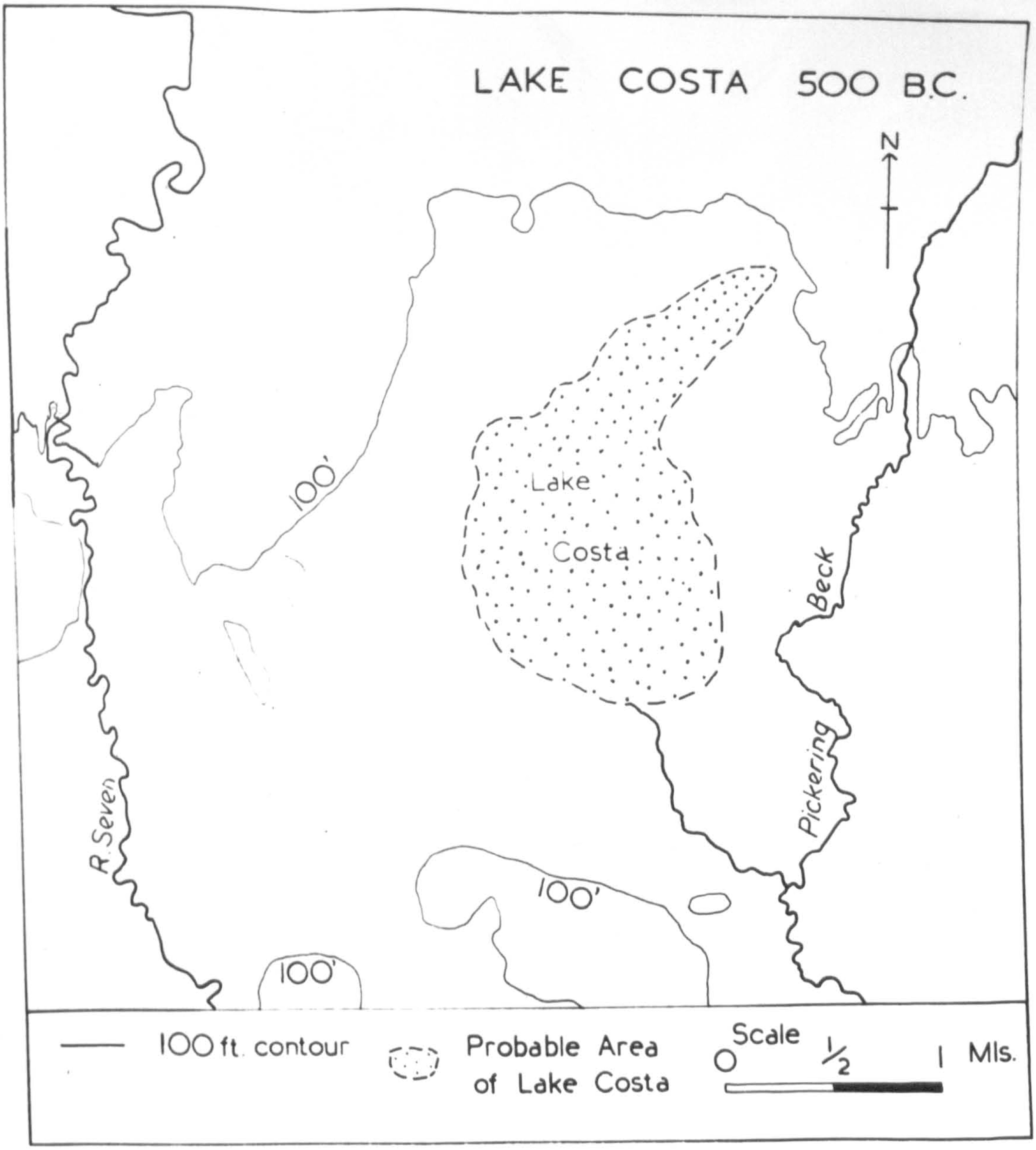

LAKE COSTA 500 B.C.
N
100'
Lake
Costa
Beck
Pickering
R. Seven
100'
100'
100 ft. contour
Probable Area
of Lake Costa
Scale
0
1/2
1
Mls.

Fig.76

least one lake-dwelling was established. This was in Lake Costa (Fig. 76), along the banks of the present Costa Beck, but its exact site is not known.[12] The surrounding siltlands were probably still under dense oak forest, with alder along the streams and in the damper patches.

The late Bronze Age peoples therefore did not displace the urn peoples, who continued to live on the Wolds and Corallian hills. But about 400 B.C., came an invasion of Iron Age peoples from the Seine valley, who preferred the same type of country as the urn peoples. They conquered the urn peoples, some of whom remained as the lower stratum of the new society, while others fled. The distribution of urns suggests that those who fled retreated to the moorlands of the Cleveland hills; there are found many urns which Elgee classifies as being of a later type than those most common on the Wolds and Corallian hills.[13] The fact that they chose the moorlands rather than the Vale of Pickering was probably a reflection of their preference for more open vegetation cover.

From about 400 B.C. until the time of the entry of the Romans into the district, therefore, three distinct groups of people with different cultures lived side by side, occupying different types of country. The Wolds and the Corallian limestone hills supported the grain-growing peoples equipped with iron implements. The northern

(12) J. Spink. Lake-Dwellings in the Vale of Pickering. Proceedings of the Yorkshire Geological and Polytechnic Society, Vol. XIII, 1895.

(13) Elgee, op. cit. pp. 86-88.

margin of the Vale of Pickering, and Ryedale, were occupied by people with a bronze age culture who grew grain and kept livestock. The Cleveland hills had a population of pastoralists who endeavoured to eke a living from the inhospitable moorland. Alongside these was the still uninhabited centre and eastern end of the Vale of Pickering.

The Romans no doubt left the three groups to follow their own ways of life, while they commanded the area from their military station at Malton. The station was situated on high ground beside the Derwent where the river begins the section of its course through the Howardian hills. This site had not then its present significance as the gateway to the Vale of Pickering, but it commanded the Wolds to the east and the Howardian hills to the west, and several roads radiated from it (Fig. 77). The Vale of Pickering marshes made it more difficult to reach the Corallian hills and the northern margin of the Vale from Malton, but at least one Roman road (Wade Street) crossed the Vale a short distance west of the station. This ran from Amotherby via the rise on which Habton stands, Barugh hill, and Riseborough hill, and so on over the limestone hills to a military camp at Cawthorne on the crest of the Corallian scarp north of Pickering. Little is known about Roman Malton, but archaeological evidence suggests that it was an important military centre.(14) Along the roads radiating from it were several villas and other signs of settlement (Fig. 77). These are all on the limestones, sandstones, and chalk of the Howardian hills and the Wolds, and it is evident that the

(14) P. Corder and J. L. Kirk. Roman Malton, A Yorkshire Fortress and its neighbourhood. Antiquity 1928, pp. 69-82. Mary Kitson Clark. A Gazetteer of Roman Remains in East Yorkshire. Roman Malton and District, Report No. 5, Y.A.S., 1935.

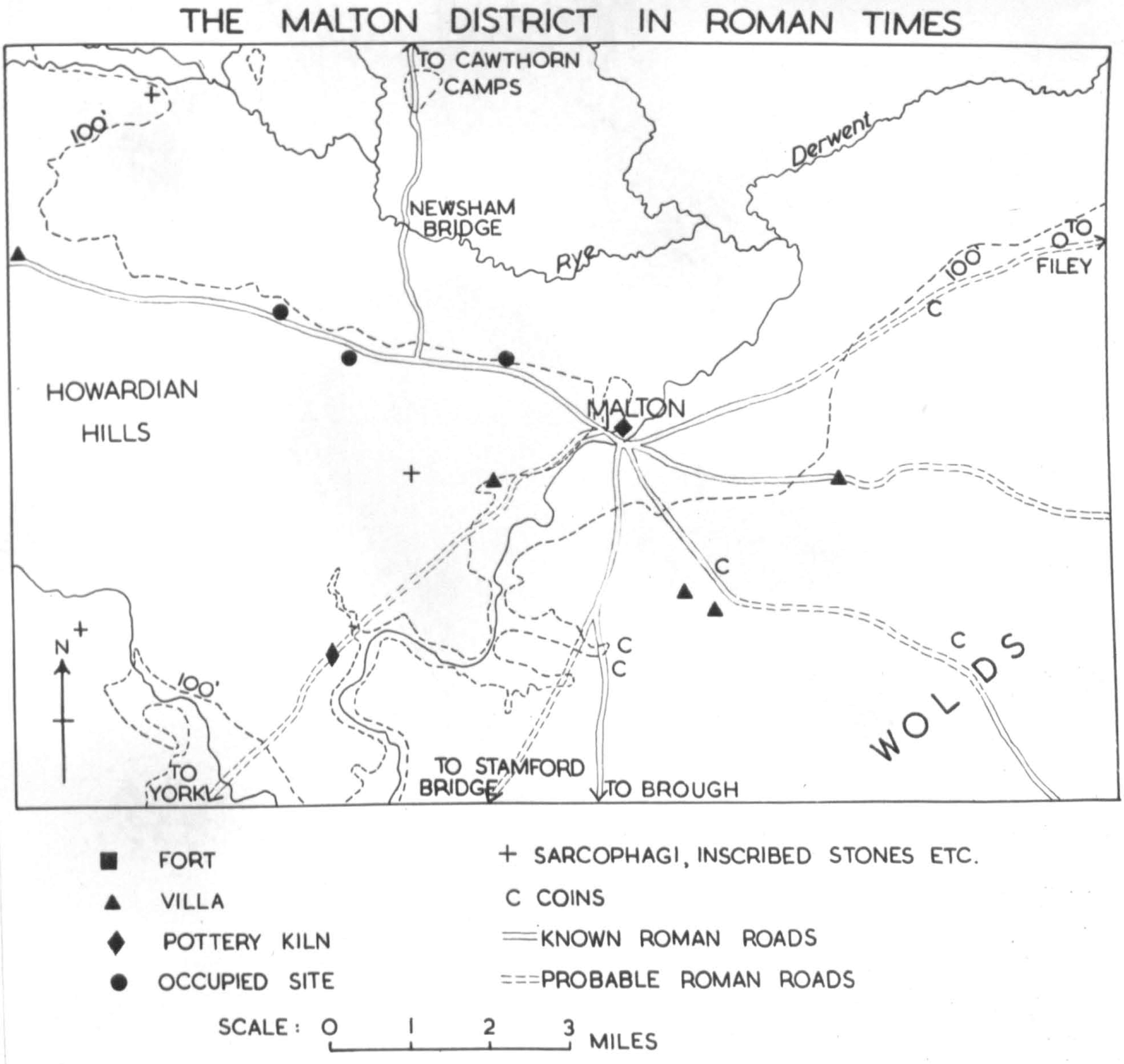


Fig.77. Based on Corder and Kirk.

~~that the~~ Romans were not interested in the siltlands which stretched up to the outskirts of Malton.

The Anglian settlers who entered the area from the fifth century A.D. conquered the earlier peoples and no doubt assimilated some, while others fled before them into the Cleveland hills. The Angles were not attracted by these moorlands and appear to have avoided them completely. The region which they found most attractive was the zone at the junction of the limestone and chalk with the silts and peats of the Vale of Pickering. There were placed most of the early villages, indicated by several "ing" names. These villages had the advantages common to all spring-line settlements - dry sites, easily available water, and varying types of land within easy distance. Active clearing of the woodland remaining on the limestone slopes for the creation of arable fields no doubt took place, while in the Vale forest clearing extended the area of meadows. Other settlements occupied the gravel-capped hills of Ryedale and extended the forest clearings which the late Bronze Age peoples had begun there. Later, a growth of population seems to have led to a spread of settlement. Villages with later types of names occur on the silt floor of the Vale in Ryedale e.g. Harome, Ryton, Habton and Butterwick. (Yedingham, an early type of name, is found in the Marishes, but for long it was also known as Little Mareis, which may be the earlier and correct name). Settlement not only moved down on to the valley floor, but also up the dip-slope of the Corallian hills. A string of villages occurs close to the crest of those hills, of which the names appear to be consistently later in type than those of the spring-line villages.(15) These may have grown out

(15) Lastingham, although close to this string of Corallian crest villages, is in fact on the Hackness rock at the foot of the scarp.

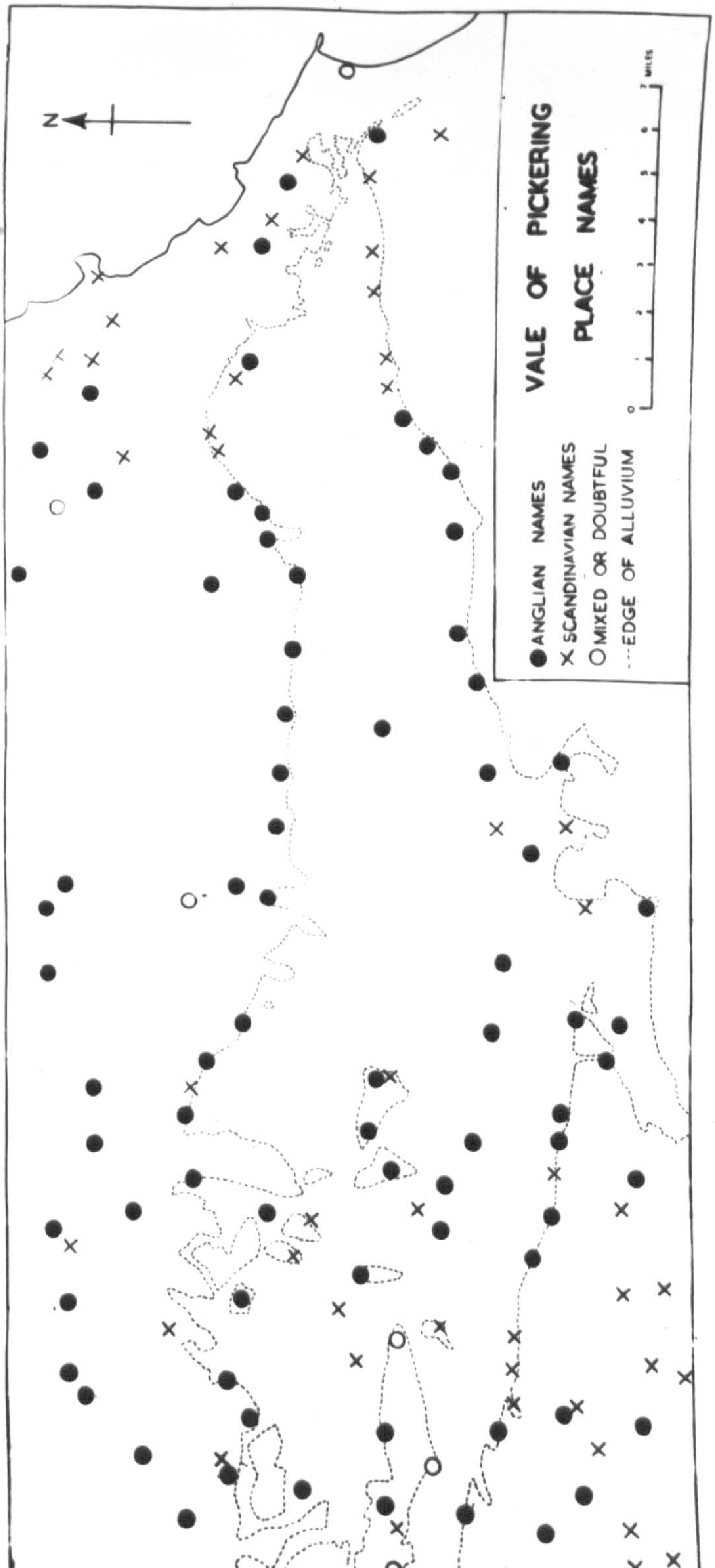

N
VALE OF PICKERING
PLACE NAMES
ANGLIAN NAMES
SCANDINAVIAN NAMES
MIXED OR DOUBTFUL
EDGE OF ALLUVIUM
0
7 MILES

Fig.78

of hamlets which were at first subsidiary to mother villages at a lower level. The "budding-off" process is suggested by the name Gillamoor, a village on the Corallian crest, which Smith suggests is related to Gilling, at the western end of the Vale. Both names are derived from the Getlingas.(16)

When the Danish peoples arrived during the ninth century A.D., they found no large areas appropriate for reclamation and settlement but unused by the Angles, as was the case in both Holderness and the Vale of York. Danish settlement was therefore of two kinds. Where the Anglian villages were few and scattered, the Danes filled in many of the gaps. This happened especially in the Howardian hills and Ryedale. In Ryedale, new hamlets grew up both on the islands, e.g. South Holme and Edstone, and on the silts e.g. Brawby and Muscoates. The other type of settlement was by taking over and renaming Anglian villages, which happened when the Danes were especially numerous. This is a feature of the eastern end of the Vale of Pickering and the region behind Scarborough (Fig. 78). There, Danish place-names are numerous and Anglian ones are rare, though there seems to be no reason why the Angles should not have settled there as elsewhere. Both there and in Ryedale there are a few Norse names among the Danish names, the result of settlements established in the early tenth century by Norsemen who had spent some time in Ireland (e.g. Irton = the farm of the Irish; Normanby = the village of the Norwegians). Trade-routes linking the east coast with Ireland probably passed near the Vale.

(16) A. H. Smith. The Place Names of the North Riding of Yorkshire. E.P.N.S. Vol. V.

Neither the Anglian nor the Danish place-names give much indication of the character of the land at the time when they were adopted, for most are not descriptive, but compounds of personal names. The few names which indicate forests or forest-clearings, however, are concentrated on the Corallian limestone hills, e.g. Pockley, Helmsley, Loskay house and Hindenley. Riseborough is a compound of O.E. "hris" = brushwood and "beorg" = hill. In the Vale, Harome is derived from O.E. "harum" = amongst the stones. Since it stands close to the upper limit of the alluvial deposits, it seems quite possible that the soil there is gravelly. North and South Holme refer to water-meadows and Butterwick is the "dairy farm with rich pastures". Salton is derived from O.E. sealh = willow, and Misperton possibly from O.E. mispel = medlar tree. This suggests that some damp woodland may still have existed on the silt, but the meadows enriched by the floods were most valued. It was probably the meadows which led to the growth of hamlets on the floor of the Vale, where cattle were no doubt the mainstay of the economy, and only restricted areas round each hamlet were ploughed.

While the western part of the Vale therefore appears to have been settled and widely used for meadowland by 1,000 A.D., the eastern end remained a negative area of meres and carr, of which the margins only may have been used as sources of fuel and summer pasture. It is unlikely that either Angles or Danes made any improvements in this area. Between the meadows of Ryedale and the carrs, however, there lay the intermediate zone of the Marishes. Although this area is too low for permanent settlements to have existed before river embankments were constructed, the numerous local marsh names derived from Scandinavian personal names suggest that this area was used and probably partly improved by the Danish and Norse settlers.(17) Perhaps rudimentary banks were constructed, sufficient to prevent the smaller floods of summer overflowing the area. The land was probably used as pasture for sheep and cattle during the drier parts of the year. Almost all the local names end in the suffix "mersc", which was also popular in the lower Humber area and which suggests that to Danish eyes the two tracts were very similar - areas of fertile clays or silts that would provide good summer pasture, but which often required some embanking before they could be brought into full use.

By the beginning of the eleventh century, therefore, a start may have been made in tackling the drainage problems posed by the Vale. Certainly, by that date, the physical characteristics of the subdivisions of the Vale were provoking varying human responses.

(17) For lists of local names, see A. H. Smith, op. cit. pp. 84 and 95.

Chapter XII. The Draining of the Vale.

The Domesday Book provides a useful confirmation of the eleventh century conditions in the Vale. Meadow is frequently mentioned in the settlements of Ryedale, e.g. Kirby Misperton had 12 acres of meadow, Salton 12 acres, and Great and Little Barugh 7 acres. Woodland entries are mostly restricted to those settlements owning land on the adjacent slopes. Domesday also confirms the existence of improved land in the Marishes. Various marshes, e.g. Chiluesmarsc, are mentioned as part of the soc of Pickering, which suggests they were of some value. Loftmarishes and Little Merse (Yedingham) were listed separately, and in both there was land for one plough. Arable farming is unlikely to have taken place without banks to protect the land against flooding. The evidence therefore suggests that there had been considerable progress in embanking and reclaiming the Marishes by 1066. There were several mills on the larger rivers, including one at Malton.

As in the Vale of York, the wasting which followed the Norman Conquest was serious, and it seems possible that in the Marishes the banks were allowed to go to ruin. Medieval reclamation therefore had possibly to start almost from the beginning again.

Medieval Improvements.

As in the Vale of York and Holderness, there was considerable reclamation activity during the medieval period. Improvement was most marked in the marishes, but also affected the carrs and Ryedale to a lesser extent.

The carrs in the North Riding were within the Forest of Pickering, and their use was therefore restricted by the forest regulations. A large proportion of the East Riding carrs, in Flotmanby, Folkton, Staxton, Binnington and Potter Brompton, were held by Bridlington Priory, and the Bridlington chartulary contains a number of references to these.(1) The references suggest that the main uses of the carrs were as sources of fish and fuel, while some areas round their margins were improved during the period.

Almost all the grants to Bridlington Priory of land in the district mention turbaries and fisheries in the marsh.(2) Two fishermen are mentioned by name in Flotmanby. Folkton turbary provided 50 cartloads of turves a year to the Priory, and Binnington turbary 20 cartloads. A family which granted the Priory all their turbary rights in Binnington received in return "yearly 9,000 turves of reasonable size, according to the diversity of summers, in dry land where they can go with carts for carrying without danger".(3) The carrs may also have been used as pasture, e.g. a 1273 agreement concerning land in Flotmanby refers to "the pasture marsh". But the lack of any direct reference to pasture in the carrs suggests that they may not have been valued very greatly for this purpose. The East Riding townships which owned carrland also had large areas of chalk downland, which provided better summer pasture, especially for sheep.(4) The carrs may have provided summer pasture for

(1) Abstracts of the Charters and other Documents in the Chartulary of the Priory of Bridlington. T. W. Lancaster, Leeds 1912.

(2) e.g. Ibid. pp. 82, 85, 102. (3) Ibid. p. 130.

(4) The grant (t. Ed. I) of pasture for 300 sheep in Folkton surely represents Woldland. A grant in Staxton of "a place for a sheepfold" was in Deepdale, a Wolds valley.

working cattle however.

Several areas, either along the southern margin of the carrs, or close to the banks of the Derwent where silting had raised the level of the land, were improved for use as meadow during the period. In 1306, an agreement was made that "that plot which is called Newenge in Staxton shall henceforward be enclosed for meadow each year and enclosed by fosses from the middle of March until Michaelmas, and that each of the aforesaid (parties to the agreement) have a certain share of the meadow in that place belonging to him according to the freeholding which he has or reasonably ought to have in that vill. So nevertheless that each of the aforesaid, after the said term, in the open time, shall have right of common in the plot with his cattle and other beasts, as he was previously accustomed to have."(5) The name New Ing suggests that this meadow had relatively recently been enclosed from the carr and improved. In Willerby there was a meadow called Ouenam or Intake(6) "lying beside Derwente", while "the meadow called Houedele ..... and another meadow called Wandele" extended to "the water called Hauereford".(7) Improvement of this type may have been accompanied by the cutting of a number of fencedikes or drains. Landsike, and Redik extending to Newdik were mentioned in Flotmanby and Twameredike in Willerby. Owing to the arrangement of the carrs, each township could cut its own drains without interfering with the others.

(5) Ibid.

(6) Ibid. p. 117.

(7) Ibid. p. 114.

In Ryedale, arable, meadow and wet pasture all existed. The arable was probably still confined principally to the higher land, either the Kimmeridge clay hills or the higher silt areas e.g. the chartulary of Rievaulx Abbey records that it was granted one carucate of arable land in Ryton.(8) Meadow probably occupied lower but fairly well-drained areas. Some meadowland was granted to Rievaulx in Harome, with the stipulation that after the hay harvest the land should revert to common pasture with the other meadows of the township.(9) Areas of marsh or carr are also recorded, and were probably in the low areas away from the main rivers. Rievaulx had rights in an area in Welburn known as marsh, which stretched alongside Hodge Beck and was used as common pasture.(10) A dispute arose over part of this pasture near Bowforth when the Prior of Bridlington accused the monks of Rievaulx of overstocking their land and trespassing on to his adjacent pasture.(11) A grant of land in Kirby Misperton to Malton Priory between 1170 and 1179 included pasture in Northker and elsewhere for 60 oxen and cows and 20 mares with foals.(12) These references suggest that the pasture of Ryedale was more valuable than that of the carrs. But the marshes of Ryedale were also used as sources of fuel; turbaries were mentioned in Bowforth,(13) and Normanby,(14) and thatch was a product of Kirby Misperton Marsh.(15) The proportions of the different types of land are not known, but the

(8) Rievaulx Chartulary, Surtees Soc., Vol. 83, p. 48.

(9) Ibid, p. 236. There was also meadow at Rook Barugh and Wimbleton, p. 41

(10) Ibid, p. 31.

(11) Ibid, p. 83.

(12) Farrar, Early Yorkshire Charters, Vol. I, p. 475.

(13) Rievaulx, op. cit. p. 83.

(14) Ibid, p. 151.

(15) Farrar, op. cit. p. 475.

impression given by these scattered references is that the more productive types of land were most widespread.

In the Marishes, too, arable, meadow and pasture all existed. A journey across the Vale in this area would probably have revealed arable land round the marginal villages, followed by common meadows on the Vale margins, followed by meadows held in severalty, and finally waste or unimproved land used as common pasture. This pattern is illustrated by a grant to Rievaulx Abbey of land in Allerston. The abbey was given "XII cim perticas terrae juxta rivulum de Alverstein, ad orientalem partem ejusdem rivuli - terram, scil, quae fuit Ricardi filiii Gil, et tendit in longum usque ad pratum ejusdem villae de Alvestein. Dedi etiam praedictus monachis totum pratum quod subjacet praedictae terrae versus Derewent, et fuit supradicta Ricardi - X cem, videl., perticatas in latum et tenduntur in longum usque ad fossatum quod dividit inter ipsum pratum et mareschum, communem, scil, pasturam ejusdem villae."(16)

Much of this unimproved pasture land near the centre of the Vale came into the hands of Rievaulx Abbey. The area was generally known as the "vastus subtus Pickering", and included the various marshes mentioned in Domesday. The approximate boundaries of the Rievaulx possessions in the Marishes after 1180 are shown in Fig. 79. Small areas were also owned by Malton Priory and Yedingham nunnery.

When the land in the Marishes was granted to Rievaulx, it must have been largely covered with carr woodland, although around the small Domesday settlements there may have been islands of cleared land. The monks must have built or improved the banks along the Rye, Costa, Derwent

(16) Rievaulx, op. cit. p. 85.

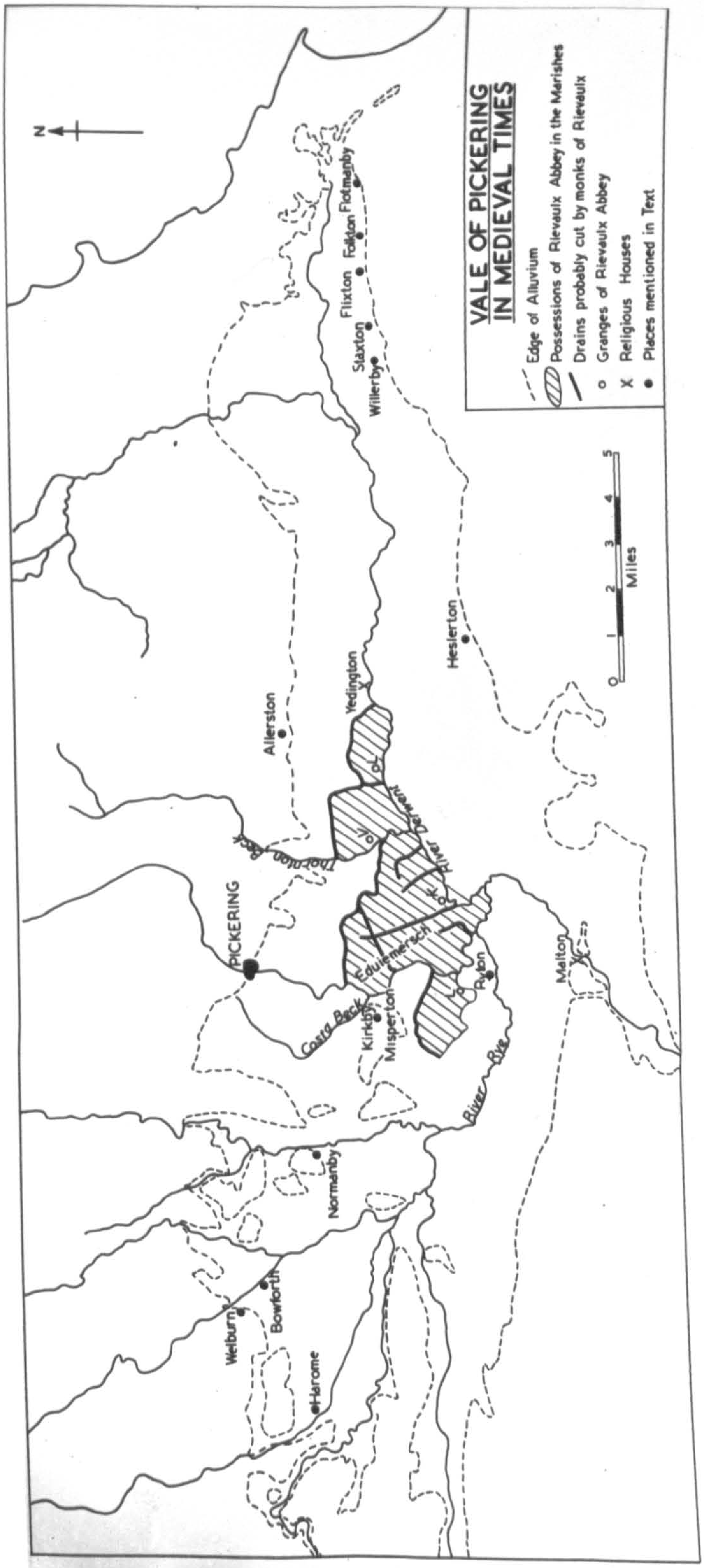

VALE OF PICKERING
IN MEDIEVAL TIMES
Edge of Alluvium
Possessions of Rievaulx Abbey in the Marishes
Drains probably cut by monks of Rievaulx
o Granges of Rievaulx Abbey
X Religious Houses
• Places mentioned in Text
N
0 1 2 3 4 5
Miles
PICKERING
Allerston
Yedingham
Heslerton
Willerby
Staxton
Flixton
Folkton
Flotmanby
Thornton Beck
River Derwent
Costa Beck
Eduiemersch
Kirkby
Misperton
Ryton
Melton
River Rye
Normanby
Bowforth
Welburn
Harome

Fig. 79

and Thornton Bock. A dike which probably functioned both as a boundary and as a drain was cut round the northern edge of the monastic lands. This is mentioned several times in the chartulary and parts of it are shown on the modern 1:25,000 maps as "Friar's Dike". A number of other drains crossing the Marishes probably also owe their origin to the monastic efforts to improve their land.

By 1380, Rievaulx had four granges or manors in the Marishes, at Loftmarreys, Lund, Newstede and Kekmarreys,(17) and these had probably been founded over 200 years earlier when the land first came into the possession of the abbey. It is impossible to be certain of the location of these granges, but a suggested distribution is shown in Fig. 79. Higher points such as Schoolhouse Hill were probably chosen, and round these therewwere arable fields. Each grange probably had sufficient workers to turn it into a small hamlet, and the arable land was probably chiefly devoted to feeding these. In Kekmarreys, however, the Hundred Rolls recorded 300 acres of arable in addition to 300 acres of pasture,(18) which suggests that there at least there may have been some grain-growing for export to the abbey. It was probably the pasture, however, which was more important, and cattle were probably the main livestock. The damp pasture would be more suitable for cattle than for sheep, for which Rievaulx had better land elsewhere on the surrounding chalk and limestone hills and on the moors. An agreement concerning Eduiemorsch between Rievaulx and Malton Abbey gave to Malton the right to keep there "boves

(17) Patent Rolls, 4 Richard II, Rievaulx op. cit. pp. 419-421.

(18) Rotuli Hundredonim, Vol. I, p. 107.

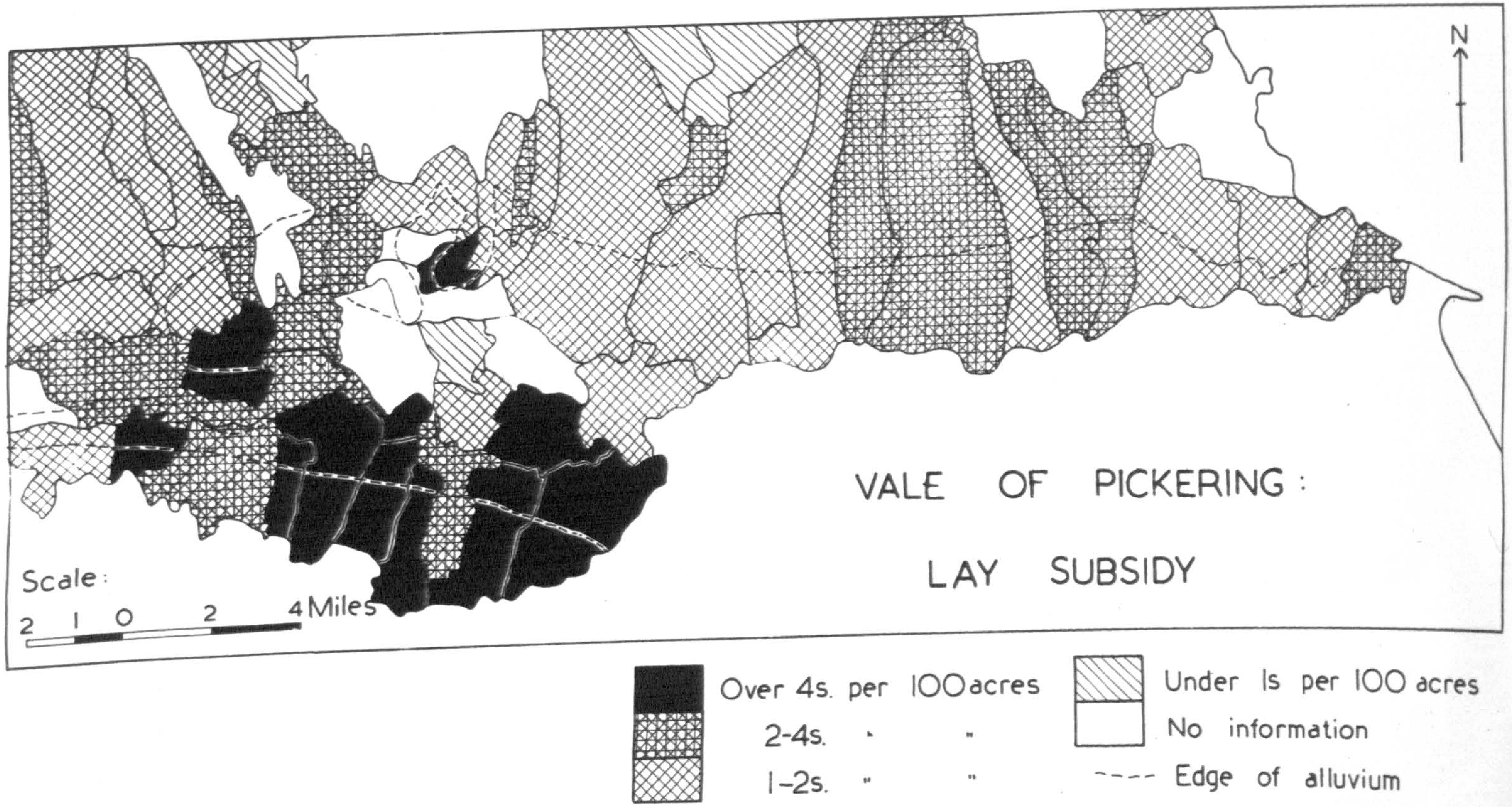

N
VALE OF PICKERING :
LAY SUBSIDY
Scale :
2 1 0 2 4 Miles
Over 4s. per 100 acres
2-4s. " "
1-2s. " "
Under 1s per 100 acres
No information
Edge of alluvium

Fig. 80

XXX, quibus colant terram suam de Maltona, et duos tauros, et XXX vaccas, quarum vituli, cum fuerint anni unius, de praedicta pastura removebantur."[19] The same predominance of cattle was likely elsewhere. In addition to arable land and pasture, some meadowland existed,[20] and there was evidently still some unimproved land for the agreement mentioned above also granted to Malton "turbas sufficienter ad proprios usus" in Eduiemersch.

By the fourteenth century, therefore, there were well-marked contrasts between the three main subdivisions of the Vale. Ryedale was an area of irregularly spaced villages and hamlets surrounded by common arable, meadow and pasture land; the Marishes area had similar land-use, but in place of villages, large monastic granges; the carrs were unimproved except on the margins and were usually held in common. The main villages and the most extensive arable fields were in the marginal zone.

The lay subsidy figures for 1301, plotted in Fig. 80, suggest in broad outline the land values which resulted from the above contrasts. The map has four principal drawbacks: (1) the figures are available for the North Riding section of the Vale only; (2) some townships were omitted along the boundary between the two wapentakes of Ryedale and Pickering Lythe; (3) the large number of religious possessions in the Vale make the figures not always strictly accurate and comparable, and in particular the Marishes area may be underemphasised; and (4) the

(19) Rievaulx, op. cit. p. 139.

(20) Meadows were mentioned in Knapton, Scampston, Wintringham and Rillington on the south side of the Derwent in 1370. C. T. Flower, Public Works in Medieval Law, Vol. II, Selden Soc., Vol. 40, CCXVII.

parishes frequently cover such large areas of varied character that the features of the various physical regions are masked. Nevertheless, the map suggests certain patterns of values:-

(a) The moors on the deltaic grits were poorer than the Vale.

(b) The eastern end of the Vale was poorer than the west.

(c) The most favoured area was that along the junction of the Howardian hills and Ryedale, a zone known as Holdlythe.

The contrast between the eastern and western ends of the Vale is what we would expect from the details of conditions at the time.

Conditions between 1400 and 1700.

There is very little information concerning conditions in the Vale during the fifteenth, sixteenth and seventeenth centuries. This is the period for which records of the Commissions and later the Courts of Sewers provide many details of conditions and improvements in Holderness and the Vale of York. In the Vale of Pickering, no such body ever appears to have established itself. A Commission of Sewers is known to have been appointed for the North Riding in 1615, and one for Pickering Lythe in 1637.[21] But there are no records suggesting that the first ever functioned, while the second appears to have dealt with one minor matter only.[22] The Vale lacked the tradition of joint drainage organisation and control, probably because it lacked sea-banks and the early need for communal effort which these gave rise to elsewhere.

(21) P.R.O. Commissions of Sewers. C 191.

(22) Records have been sought without success with the local drainage boards, the Yorkshire Ouse River Board, the North Riding Record Office, and solicitors in Pickering and Scarborough.

There appeared to be no interest in communal drainage efforts,(23) and all improvement depended on the activity of individuals. Thus if records for the individual townships and estates were studied, some references to drainage changes and improvements during this period might be discovered. But they are likely to have been on a small scale, and to have made little contribution to the final pattern of drainage of the Vale.

The greatest changes during this period probably took place in the Marishes. These resulted from the change from monastic to lay control of the area, at first by the leasing of the granges by the abbots of Rievaulx, and after the dissolution by the transfer of the land. The change appears to have been accompanied by the division of at least part of the land into closes and the establishment of some new farms.(24) Mixed farming probably still predominated, for references to "foldes" suggest arable land, while the closes were probably for meadow and pasture. In 1539 there were closes for sheep, while a 1534 lease of the grange of Newstead refers to land known as "Calfcote and Cowhouse yng" which suggests the presence of cattle. When Leland crossed the area, he "passed thorough a plain low medow .....: and I gessid it to be in compace a 4 miles".(25) The arable may therefore have been of relatively

(23) J. Tuke. A General View of the Agriculture of the North Riding of Yorkshire, 1800, p. 348 has this note, following a recommendation that a Commission of Sewers be obtained for the Vale: "A Commission of Sewers is rarely found to do any good; it soon becomes a sinecure. W.S."

(24) Rievaulx, op. cit. p. 350. Conventual leases, June 1534. This refers to "a newe place that William Norram lately was dwelling upon, to which newe place was and is except a greatt felde called Estfelde and a close called Wyethe clos and a new clos in the Estmare".

(25) Leland's Itinerary, Ed. by L. Toulmin Smith, Vol. I, p. 59.

small extent at this time, and was probably confined to the neighbourhood of the granges.

Leland also travelled eastwards from Malton along the southern margin of the Vale, then crossed it at Seamer. He described the land beside the road from Malton to Sherburn as "fruteful of grass and corne,"[26] but from Sherburn to Seamer he had "hills on the right hond and low ground with carres on the lift hond". He described Seamer as "a great uplandisch toune having a great lake on the south west side of it".[27] The Ordnance Survey 6" and 2½" sheets show "The Mere" south-west of Seamer, covering an area of about 6 acres. It may have been considerably larger in the sixteenth century in order to qualify as "a great lake".

The single record of Court of Sewers activity is related to the eastern end of the Vale. Francis Ings in Wykeham was meadowland alongside the Derwent, from the floods of which it was sheltered by Staple Bank. The bank was used as an access road to the distant parts of the Ings, and hay was carted along it, which resulted in its damage and flooding in the Ings. Between May 3rd and Lammas Day (Aug. 1st) the Ings were reserved for hay, but for the rest of the year the inhabitants of Wykeham and Ruston "doe yearly putt att their pleasure All their Beasts and cattle into the said francis Inge to feed and depasture there and on the said Bank".[28] This suggests that the carrs were only used for pasture during the period the Ings were closed, re May, June and July. Fish, fowl and

(26) Ibid. (27) Ibid.

(28) Yorkshire Archaeological Society Library. M.D. 125.

fuel were no doubt still important products of the carrs, but no reference to them is known during this period.

Eighteenth Century Conditions.

The lack of early descriptions of the Vale is compensated for by very adequate descriptions of conditions towards the end of the eighteenth century. Since there had been so few changes in the Vale since the thirteenth century, the late eighteenth century accounts give a very good idea of conditions throughout the pre-drainage period. Before considering these conditions, however, it is necessary to look at one important aspect of the geography of the Vale which had changed during the eighteenth century, the external trade and communications.

The focal position of Malton in Roman times was mentioned in Chapter XI. Medieval clearing and improvement of the lowland enhanced its position as the key to the main landward exit of the Vale. It became an important market-town between the arable land of the Howardian hills and the margin of the Vale, and the cattle land of Ryedale and the Marishes. Leland commented that "the toune of Malton ..... hath a good market".(29) In the seventeenth and eighteenth centuries, there was a steady growth in the population of the West Riding and an increasing demand for agricultural products. The Vale of Pickering was capable of fulfilling much of the demand, and Malton was the obvious town through which the produce should pass. But Malton was at a disadvantage in that it had not the means of cheap water-transport available to such places as Beverley and Howden. The Derwent linked Malton with the West

(29) Leland, op. cit. p. 57.

Yorkshire river-system, but the shoals and mud-banks in its lower section and its relatively steep gradient through the Kirkham gorge made it impossible to navigate except by very small craft. Yet the improvements necessary were relatively few and easily made, and in 1701 a Mr. Palmes of Malton obtained an Act of Parliament to make the river navigable.

This Act is important as it contributed much to Malton's control of the economic life of the Vale, and also to the later problems of obtaining adequate drainage. It vested the undertakers of the improvements with the same powers over the river as a Court of Sewers. Since the control belonged effectively to one man, it gave to that person overwhelming control of the economy of the surrounding countryside. He could adjust the drainage tolls as he wished (at a later date there is evidence that this power was used as a weapon against political opponents[30]) and he could veto schemes of improvement which were not in his interest. He could improve whatever section of the river he wished between the junction with the Ouse and Scarborough mills. Although only the section between the Ouse and Malton was made navigable in the early eighteenth century, the right to improve the rest remained vested in the owner of the navigation.

Soon after he had obtained the Derwent Navigation Act, Mr. Palmes sold Malton and his rights acquired under the Act to Mr. Wentworth of Wentworth Woodhouse in the West Riding. The rights have remained

(30) Wentworth Woodhouse Muniments F 74, Aug. 1807, Letter of Complaint to Earl Fitzwilliam, Sheffield Public Library.

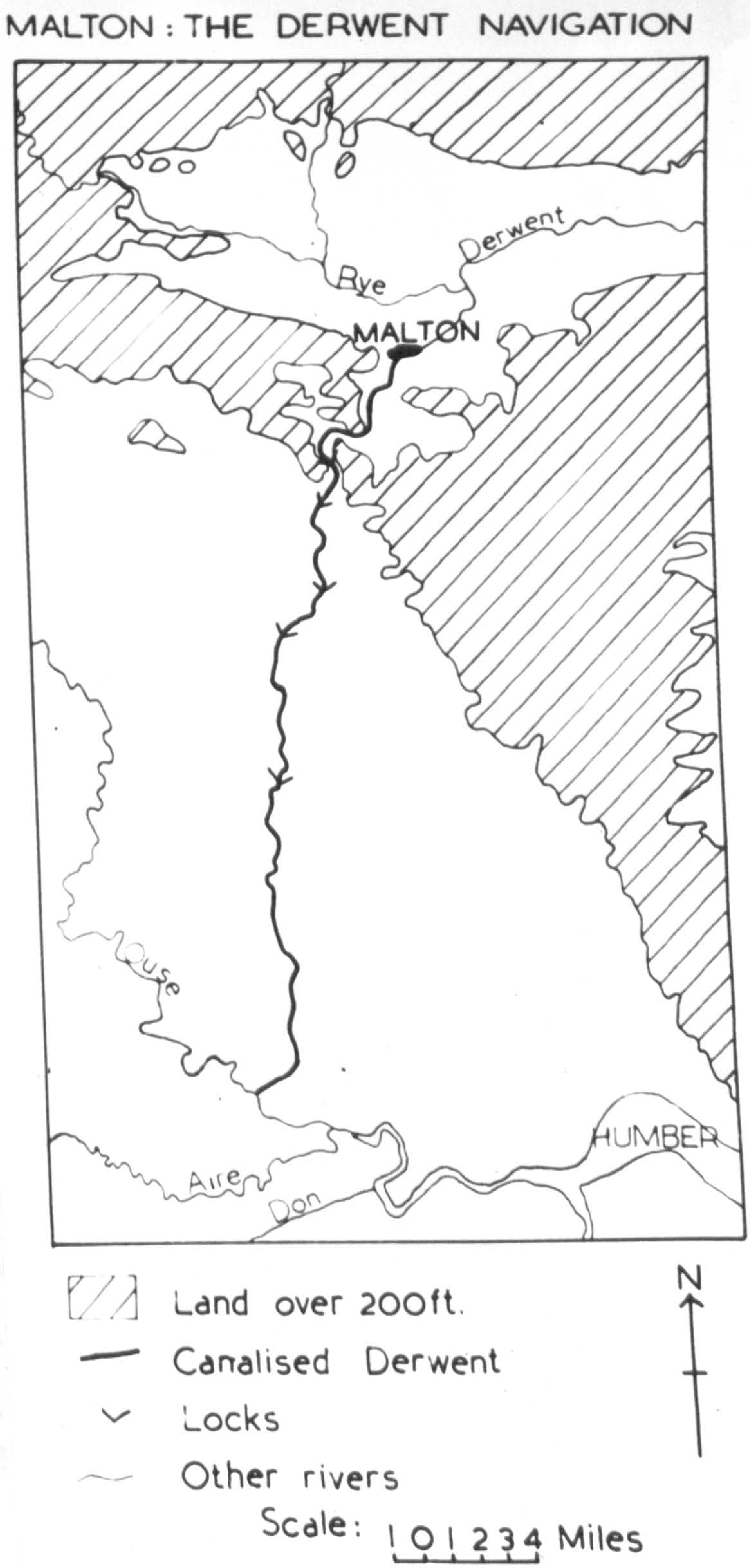

MALTON : THE DERWENT NAVIGATION
Derwent
Rye
MALTON
Ouse
Aire
Don
HUMBER
Land over 200ft.
Canalised Derwent
Locks
Other rivers
N
Scale: 1 0 1 2 3 4 Miles

Fig. 81

vested in this family (later the Earl Fitzwilliams) to this day - the Fitzwilliam estate office is the invisible controlling force behind the present life of the remarkably feudal Malton. Soon after he bought the estate, Wentworth perfected the navigation to Malton at a cost of £4,000.(31) Shoals were removed in the lower part of the river, five locks built in the upper section, and a towpath constructed along the west bank (Fig. 81). The Act provided for 45 Commissioners who were to be responsible for the regulation of the navigation. It is evident, however, that little notice was taken of this provision, for in 1791 it was discovered that no new commissioners had been appointed since 1738, and that only three commissioners then survived!

Although the navigation was far from perfect, it contributed greatly to the prosperity of Malton during the eighteenth century. Wentworth leased the navigation to a firm of carriers who owned most of the vessels using the waterway. The main traffic appears to have been grain travelling downstream and coal upstream,(32) and Malton became the centre for collection of local produce to send to the West Riding. As industry grew in the West Riding, the trade on the river increased. In 1793, it was estimated that "The Increase of Vessells and Trade within the last Twenty Years ..... appears to be something more than Double or about as Five to Two".(33) In that year 50,000 quarters of grainwere carried down the river.

(31) Ibid, F 73a.

(32) Ibid, F 73a. The Supposed Value of the Dues and Profits of Freight to the Undertakers of the River Derwent for one year, 1774.

(33) Ibid. Report on the State of the Locks, Dams, Bridges etc. on the River Derwent by Wm. Hastings, Nov. 1793.

A large proportion of this grain export consisted of oats, which grew especially well in Ryedale. At that time, the industrial workers of the West Riding ate oat bread.(34) There grew up in Malton during the eighteenth century a profitable oats milling or "shelling" industry, for which there were two main mills driven by the water-power of the Derwent, Old Malton Mill and New Malton mill. There had long been at least one mill at Malton e.g. in 1370, there were complaints that Malton abbey had ordered the mill-dam to be raised, leading to flooding of meadows in Knapton, Scampston, Wintringham and Rillington.(35) The mills raised the level of the Derwent upstream by about 10 ft., and contributed much to the problems of drainage.

As a result of the improvements in the navigation during the eighteenth century, therefore, farming was improved in parts of the Vale, and the emphasis altered to some extent. On the other hand, drainage was less efficient than before. Fortunately, Marshall frequently mentions previous uses of the land in his account of conditions in the Vale in 1783. Marshall, and Tuke, whose account was published in 1800, are the two main authors who describe the Vale in the eighteenth century.

Both Marshall and Tuke agreed that Ryedale had some very fertile soils. Marshall stated that formerly, much of the area had been under grass, but by then considerable areas were converted to arable. Tuke estimated that the arable land formed about one third of the total, and typical rotations were fallow, oats, wheat; or turnips, barley, red clover, wheat.(36) "Also turnips or rape, succeeded by oats for 4, 5,

(34) W. Marshall. The Rural Economy of Yorkshire, 1783, Vol. II, p. 22.
(35) Flower, op. cit., CCXVII.
(36) Tuke, op. cit., p. 108.

6 or 7 years successively, may be met with in the almost inexhaustible fields of Ryedale, which are peculiarly adapted to the growth of oats."(37) The soil also produced good grass; "many of the old fields in ..... Ryedale are highly productive, though they have been mowed for ages and rarely pastured or manured, and no means taken of improving them. Land of this description...... may produce from 1 ton to 1½ tons per acre".(38) Cattle were grazed on other grassland.

In spite of the general fertility and prosperity of Ryedale, there were parts which suffered from inadequate drainage. This is how Tuke described the area:-

"The surface of the lower part of Ryedale is flat, and a large proportion of it, probably not less than 7,000 acres, liable to be flooded, the waters being much retarded by the extreme curvature of the river, and kept up by a mill of little value at Newsham, and still more by those at Malton, which raise the water 10 feet and 4 inches. The bridge at Kirby Misperton also contributes much to keep up the floods; it has only one arch, which is quite insufficient for admitting the sudden torrents which rush from the moors after heavy rain; an additional arch might be built at a very moderate expence. In general, the Rye, as well as the smaller streams falling into it, have been embanked, but almost always injudiciously, not upon any regular plan, and without leaving sufficient foreshore; the consequence has therefore been, that by contracting the passage for the water, the force, rapidity and

(37) Ibid, p. 108.

(38) Ibid, p. 170.

height of the stream have been greatly augmented, the probability of the banks breaking increased, and when broken of doing additional injury, particularly in the summer time; and where both side of the river have not been embanked, of throwing with increased power an accumulated weight of water upon the opposite shore."(39)

According to Marshall, many of the banks were constructed at the time of enclosure. He gave as an example of the improvement which embankment could produce, Brawby Moor near the junction of the Seven and the Rye. This contained "about 300 acres of low marshland soil, overrun in an open state with furze and rushes, together with some interspaces of sedgy grass".(40) In its natural state this was worth £50 a year; when embanked, it brought in over £120 a year. Neither author mentioned any land remaining unembanked in the area, so that such areas were probably only small if they existed.

In the Marishes, most of the land was under grass; Tuke suggested that the proportion was about two-thirds.(41) Marshall considered that the soil was more clayey than in Ryedale, and particularly suitable for grass.(42) "In the West Marshes and other central parts of the Vale, which have been inclosed time immemorial, and which, until of late years, have always lain in a state of rough grass, great numbers of Young Cattle were reared for sale."(43) At the time when Marshall was writing, few stores were exported, and the area had turned instead to fattening and

(39) Ibid, p. 13.

(40) Marshall, op. cit., Vol. I, p. 230.

(41) Tuke, op. cit., p. 101.

(42) Marshall, op. cit., Vol. I, p. 17.

(43) Ibid, Vol. II, p. 180.

dairying. The main products of the region by 1783 were butter, in-calf cows for London dairies, dry cows for fattening in the pastures of southern England, and fat cattle.(44) Many thousands of firkins of butter found their way to Malton from this area; the best quality was sent to London, the poorer grades to West Yorkshire,(45) but there is no reference to this travelling by the Navigation.

In the Marishes, flooding was restricted to "a narrow strip, through which the river meanders from side to side".(46) Tuke emphasised the lowness and wetness of the whole area,(47) whereas Marshall seems to have been impressed by the adequacy of the drainage; "by keeping open furrows, deep ditches and clean shores, the land in general is left as free from superfluous moisture as if it were elevated a mile above the Derwent".(48)

Included within the area we have called the Marishes is the bed of the Old Costa lake, and Marshall described how the carr that occupied the area was drained and improved about 1770. Before improvement it was covered by "a mat of rushes, sedges and other palustrian weeds, equally unpalatable and unproductive either of hay or pasturage".(49) Improvement took the form of deepening the Costa Beck and cutting a number of drains in the area.

Marshall considered that the carrs at the eastern end of the Vale "still remain a disgrace to the country; lying chiefly in a state of

(44) Ibid, Vol. II, pp. 193-5. (45) Ibid, Vol. II, p. 196.

(46) W. Chapman. Report on the Draining of the Low Grounds in the Vales of Derwent and Hertford, 1800.

(47) Tuke, op. cit., p. 14. (48) Marshall, op. cit., Vol. I, p. 225.

(49) Ibid, p. 230.

fenn - provincially "Carr" - overrun with sedges and other palustrian plants; which afford, during a few months in summer, a kind of ordinary pasturage to young stock. In the winter months, they are generally buried under water, and in the summer months are subject to be overflowed."(50) Chapman described how "the Floods spread themselves over a surface of about 6,000 acres, where they formed a lake discharging its waters graduallfy, in general without a Materially destructive Effect at Yedingham".(51) He considered that these lands had "little more than an eventual value dependent upon the result of a drainage".(52) Marshall's description of the vegetation supports this contention: "The surface in many places is more than half of it occupied by the leaves of the Cotton-Thistle; and in others, entire patches are covered with bog-rush. The medial produce about half a load of hay (if it merits the name) an acre. The rent five to eight shillings."(53)

These accounts make it clear that there was urgent need for drainage improvements. Tuke considered that there were 17,500 acres of flooded land in the Vale, 7,000 acres in Ryedale, 7,000 acres in the East Riding section of the Marishes and the carrs and 3,500 acres in the North Riding section. The same accounts also reveal the problems which had to be faced before improved drainage could be obtained. In the first place,

(50) Ibid, p. 225.

(51) Letter from W. Chapman, June 1830. M and Y.D.M., Oct. 1830.

(52) W. Chapman. Report on Draining the Low Grounds in the Vales of Derwent and Hertford, 1800.

(53) Marshall, op. cit., Vol. II, p. 111.

the enormous volume of water brought down by the Derwent needed to be carried out of the Vale as rapidly as possible, and this required an improvement of the Derwent channel "being very crooked, much choked and insufficient for floods."(54) Second, various bridges, the mills at Malton, and the locks on the Derwent Navigation contributed to holding back this water in the Vale: "The cataract-like mill-dam across the Derwent at Old Malton is a public nuisance which reflects disgrace on every man of property in the Vale. It appears as if intended to finish what nature has left undone!"(55) Third, banks needed to be raised or improved to an overall plan; Marshall suggested windmills to raise the water from each level when embanked.(56)

The account of Tuke also reveals another feature of the geography of the Vale at the time which was to prove an obstacle to drainage improvements. Communications were poor: "In the lower part of Ryedale and the Marishes, the parochial roads are in as bad a state as possible; good materials are scarce in some parts of these districts, but care and attention much more so in them all. Many of these roads are upon the natural soil, and in winter not passable without great danger and difficulty, if passable at all. No part of England produces worse roads."(57) At the same time, the growing market for agricultural produce encouraged an increased interest in communications, and the idea of a canal network leading to Malton seized the imagination of many in the Vale. Improvements

(54) Tuke, op. cit., p. 13.

(55) Marshall, op. cit., Vol. I, p. 16.

(56) Ibid, p. 225.

(57) Tuke, op. cit., p. 293.

for navigation became confused with improvements for drainage purposes, and contributed to the difficulties of obtaining improved drainage.

The problems facing drainage of which the contemporary writers do not appear to have been conscious were two. First, the area which suffered from flooding was relatively small in relation to the size, and especially the cost, of the physical problems involved. Second, the drainage interests of the various parts of the Vale were not the same. For example, it was only the carrs which were greatly concerned with the waters of the Derwent, a problem which did not affect Ryedale at all. The only common interest was in the outfall through Malton, the mills, and the Derwent Navigation.

These various problems influenced the progress of drainage during the late eighteenth and nineteenth centuries.

Drainage Improvements after 1760.

The same awakening to drainage problems and the possibilities of improvement which affected Holderness and the Vale of York after about 1760 also occurred in the Vale of Pickering. A number of landowners appear to have been sufficiently interested to arrange for a survey and report on the prospects. In 1773, Isaac Melbourn surveyed the low grounds and drew the map reproduced as Fig. 82. In the same year, Thomas Tofield presented his report.(58) Melbourn's survey revealed 10,754 acres of

(58) W.W.M. Plan pound in with 1701 Navigation Act, F74c. A Report of the present State of a large Tract of Low Ground extending from Muston to Malton; To which is added A Scheme for the more effectual Drainage and Preservation therof. Proposed by Thomas Tofield, Sept. 1773. F122.

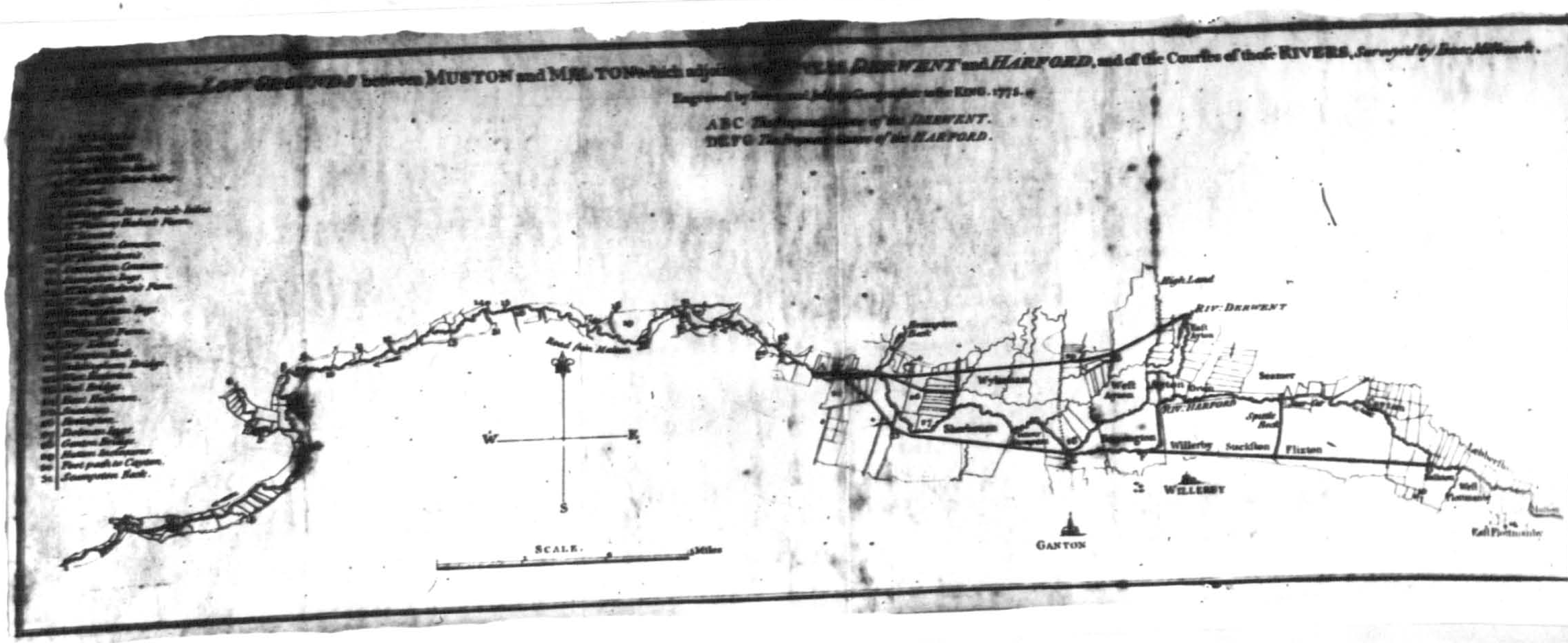


Fig.82. Reproduction of I.Melbourn's plan,1772,with proposed improvements.

"low grounds", of which 9,358 were east of a line from Snainton via Foulbridge to Heslerton, and 1,395 to the west. Since the fall was 27 ft. 7½ ins. in 20¾ miles, Tofield considered that the area was capable of "a very compleat Drainage". His plan was to make a new cut for the Derwent from Ayton to Foulbridge, and a new cut for the Hartford from Folkton to East Heslerton and thence to Foulbridge. Below Foulbridge the Derwent was to be embanked, straightened and widened. The estimated cost of these improvements was £7076-10- 0d.

This scheme was never adopted. There are no records directly concerning this period which explain why, but two indirect references suggest that it was because the promoters wanted to make it a combined drainage and navigation, and this met with the opposition of the Malton interests. In September 1794, in a letter to Mr. J. Denison, Earl Fitzwilliam wrote: "Several years back, it had been in contemplation of some of the landed Proprietors to induce me or those who preceded me to continue the Navigation as a means of improving the Drainage of a large tract of Country lying far Distant from the River, and principally to the South East. They meant then to have aided the making of the Navigation by an Acre-tax upon the Drainage - this went no further however than mere Speculation, except that a person was engaged to take the Levels and made a general Survey ....."(59) Since there is no record of any other scheme of drainage in the Vale between 1773 and 1791, this reference must be to the survey by Melbourn and the report by Tofield. In a letter from Hastings, Earl Fitzwilliam's agent in Malton, in 1791, there occurs

(59) W.W.M. F 74.

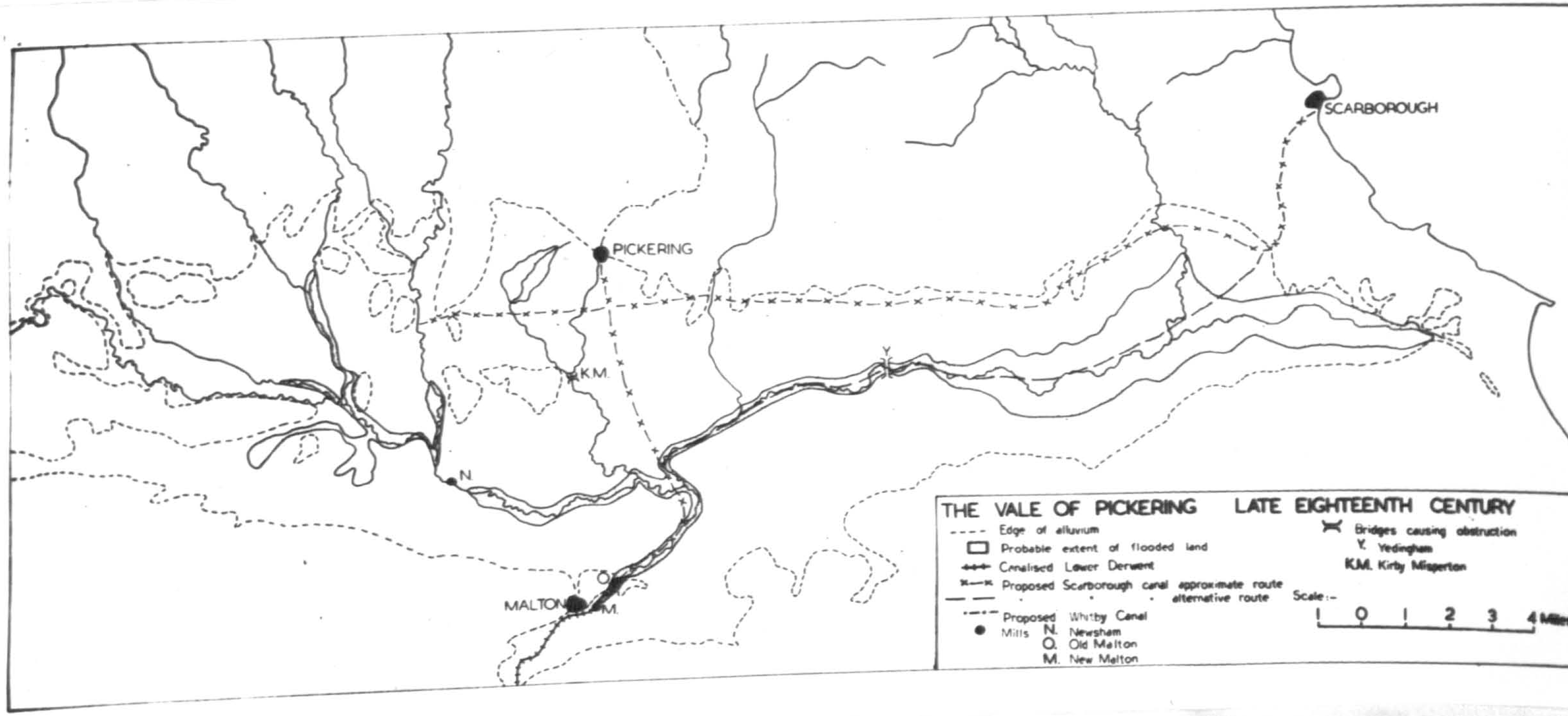
the statement: "Mr. Ayrton says that a similar proposition was set on foot in Lord Rockingham's lifetime and an application was made to parliamt[t] for that purpose and that Lord Rockingham was so far satisfied that the Continuation would be an injury to the town of Malton that he was at great Pains in opposing it and with some difficulty succeeded in such opposition and the business then ended."(60) If the navigable channel had been extended upstream from Malton as was evidently planned, Malton would have lost its favourable position as head of navigation and the principal market of the district. The promoters were probably not prepared to stand the cost of improvement for drainage only, therefore the Vale continued in an unimproved state.

The next move towards improvement was also promoted more by a desire for navigation facilities than by drainage needs. In 1790, a Mr. Denison bought a large estate in the Vale, and intimated to Earl Fitzwilliam his desire to become a Commissioner of the Derwent Navigation, as he wished to see the navigation extended to Scarborough as permitted by the 1701 Act.(61) A number of navigation projects were mooted in the following few years, possibly as a result of Denison's influence. In 1793, a scheme was proposed to construct a canal from Scarborough to Kirkbymoorside along the northern margin of the Vale, with a branch to join the Derwent about a mile above Malton.(62) In the spring of 1794, however, the

(60) W.W.M. F 76.

(61) W.W.M. F 74. Letter to Earl Fitzwilliam, Jan. 1791.

(62) W.W.M. F 74. Letter to Earl Fitzwilliam from Hastings, Dec. 1793.



SCARBOROUGH
PICKERING
K.M.
N
Y
O
MALTON
M.
THE VALE OF PICKERING LATE EIGHTEENTH CENTURY
Edge of alluvium
Probable extent of flooded land
Canalised Lower Derwent
Proposed Scarborough canal approximate route
alternative route
Proposed Whitby Canal
Mills N. Newsham
O. Old Malton
M. New Malton
Bridges causing obstruction
Y. Yedingham
K.M. Kirby Misperton
Scale:-
0 1 2 3 4 Miles

Fig. 83

supporters of this scheme divided into two factions. One group put navigation interests first and continued to favour the route along the northern edge of the Vale (Fig. 83), while a minority group pressed for the canal to run further south through the centre of the Vale in the interests of drainage.(63) Each route had advantages and disadvantages. The first was certainly most suitable from the point of view of navigation, for it would have passed through some of the richest lands of the Vale: but it would not have helped the drainage of the carrs, and might in fact have caused a deterioration of conditions there if water spilled over the banks. The second route might have aided drainage but would not have gained a great deal of trade en route.(64) While the two factions were competing for support, a scheme for linking Whitby to this navigation by a canal through Newton Dale was also prepared.(65)

Once again, no improvements were in fact undertaken. This time, there was no opposition from Fitzwilliam, who even agreed to make the Derwent navigable between the then head of navigation below New Malton mill and the outfall of the navigation canal into the river. This would have involved constructing locks at the mills.(66) He apparently intended to compensate Malton for the loss of its position at the head of navigation by making it the centre of a network of navigable waterways,

(63) W.W.M. F 74. Letter to Earl Fitzwilliam from J. Denison, Sept. 1794.

(64) W.W.M. F 74. Letter to Earl Fitzwilliam from Hastings. Also Observations respecting the Proposed Scarbro' Canal by I. Leatham, Aug. 1794.

(65) W.W.M. F 74. In Dec. 1793, Hastings reportdto Earl Fitzwilliam: "The people of Whitby talk of a Navig^{n} from Malton to that place but I think this less practical than the other (i.e. the Scarborough canal). They have however ordered the levels to be taken."

(66) W.W.M. F 74. Henry Eastburn's report on the Expense of Making the River Derwent Navigable from New Malton to Mr. Baker's Farm, June 1794.

for he employed an engineer, Eastburn, to report on the possibilities of making navigable the Rye and the Derwent as far as Yedingham Bridge.(67) The reason for the abandonment of the Scarborough canal scheme seems to have been rather the disagreement between the two factions as to the course the canal should follow, and the inability of either group to attract sufficient capital to allow the scheme to go forward.

The failure of these early schemes must have impressed upon the landowners of the Vale that it was not prudent to attempt to combine drainage and navigation. The Market Weighton canal may have also shown them the unfortunate results for drainage of such a combined scheme. At the same time, agricultural prices were rising, especially for grain crops, so that improvement for drainage purposes only could be financed more easily. Probably for these reasons the third scheme of improvement proposed in the Vale was principally for drainage.

In 1799, after an "unprecedented rainy season",(68) the owners of land in the eastern part of the Vale again decided to attempt to obtain some improvement. They considered that there were three methods of improvement which ought to be adopted. First, the river Derwent should be straightened; second, the flood waters of the Derwent should be diverted along its old pre-glacial valley to the sea north of Scarborough; and third, the mills at Malton should be bought and demolished. It seems probable that Isaac Leatham was the master mind behind these proposals, the first occasion when the problem arising from the great volume of

(67) W.W.M., F 74.

(68) W.W.M., F 122. Letter to Earl Fitzwilliam from Sir Digby Legard, Oct. 1799.

water in the Derwent appears to have been realised. In a document among the Wentworth Woodhouse Muniments entitled "Mr. Leatham's Plan for Draining the low Lands between Muston and Malton and for Extending the Navigation up the Derwent" the problems are expressed clearly:-

> "The natural Drainage of the Eastern district is by the River Derwent, but there are two ancient Mills, the one at Old,a the other at New Malton, which hold up the Water of that River and considerably render imperfect the Drainage formed by Nature. Also this district receives the Water which falls upon the adjacent Hills, particularly those from the Moors where the Derwent takes its rise, which comes down that River to a considerable magnitude and with great force 'till it reaches this district, when its progress is slow, owing to the flatness of the Country and the winding and narrow state of the River and therefore very much overflows so that there is not only to provide for the water incident to the Land in question, but for this vast extra water also."(69)

The two major aspects of the scheme, the removal of the mills and the diversion of the flood-waters of the Derwent, both required Earl Fitzwilliam's approval, for New Malton mill was part of his property in Malton, and the diversion of water would inevitably affect the Derwent Navigation. The removal of the mills was an essential part of the scheme for the combined effect of these was to raise the level of the river upstream of them about 10 feet. If they were removed this fall could be distributed throughout the course of the river through the Vale to

(69) W.W.M., F 122.

produce a much more adequate gradient. If they were not removed, it would be necessary to replace the natural course of the river by a straight cut, with the attendant extra costs. Negotiations for the purchase of the mills took place,(70),but no agreement was reached. Thus one of the hoped-for methods of improvement had to be abandoned.

The two other means of improvement still remained open, however, provided agreement could be reached concerning the diversion of the Derwent flood-water. William Chapman, the engineer, was called in to advise on the scheme. He reported in January 1800(71) that it would be possible to construct a weir on the Derwent at Everley which would send most flood-water to the sea north of Scarborough, but would allow a regular amount to continue to flow down the Derwent sufficient to drive the mills at Malton and support the Navigation below. In the Vale, he suggested that all the rivers should be embanked, and the Hartford and the Derwent above Yedingham straightened (in this way the course of the Derwent between Ayton and Yedingham Bridge could be reduced by one third). He proposed that catchwater drains should be cut alongside the river below Yedingham Bridge, to empty into the Derwent below New Malton mill dam, and that a new course should be cut for the Rye from above Newsham mill to below Old Malton mill.

Chapman's proposals for the improvement of drainage in Ryedale and the Marishes did not meet with the approval of the landowners there, for the cost of improvements suggested was great, and the likely benefit small. The main interest these areas had in the original scheme was in the

(70) W.W.M., F 122. (71) Chapman, op. cit.

removal of Malton mills. Since that proposal had by then been abandoned, the western areas had no further interest in the scheme, and the Drainage Act which was obtained in 1800 was limited to the section of the Vale east of Yedingham. The Act embodied Chapman's proposals for the Sea Cut, with limitations on the amount of water to be diverted in the interests of Earl Fitzwilliam's mills and navigation. The other cuts and banks east of Yedingham proposed by Chapman were also sanctioned, but there was a saving clause which gave Earl Fitzwilliam the right to use any new cuts for navigation at a later date if he so desired. The powerful influence of Malton was thus felt in the drainage even of this most remote part of the Vale. Fig. 84 shows the drainage pattern developed in the eastern part of the Vale under the Act, completed in June 1806.

Improvements in the western part of the Vale took place principally as a result of Fitzwilliam's own initiative. These were of two types. There were, first, attempts to improve the rivers for navigation purposes, and second, drainage improvements within Fitzwilliam's own estate.

In September 1804, the Muston and Yedingham Drainage appealed to Fitzwilliam to make the Derwent navigable as far as Yedingham, otherwise they would appeal to Parliament for the right to do it themselves.(72) Eastburn was commissioned to report on the prospects of making the Derwent navigable to Yedingham, the Rye to Nunnington, and Thornton Beck to Thornton.(73) He found that the landowners along the Rye opposed the combination of navigation with drainage. In addition "The intended

(72) W.W.M., F 74e. Letter from Hastings to Earl Fitzwilliam, Sept. 1804.
(73) W.W.M., F 76.

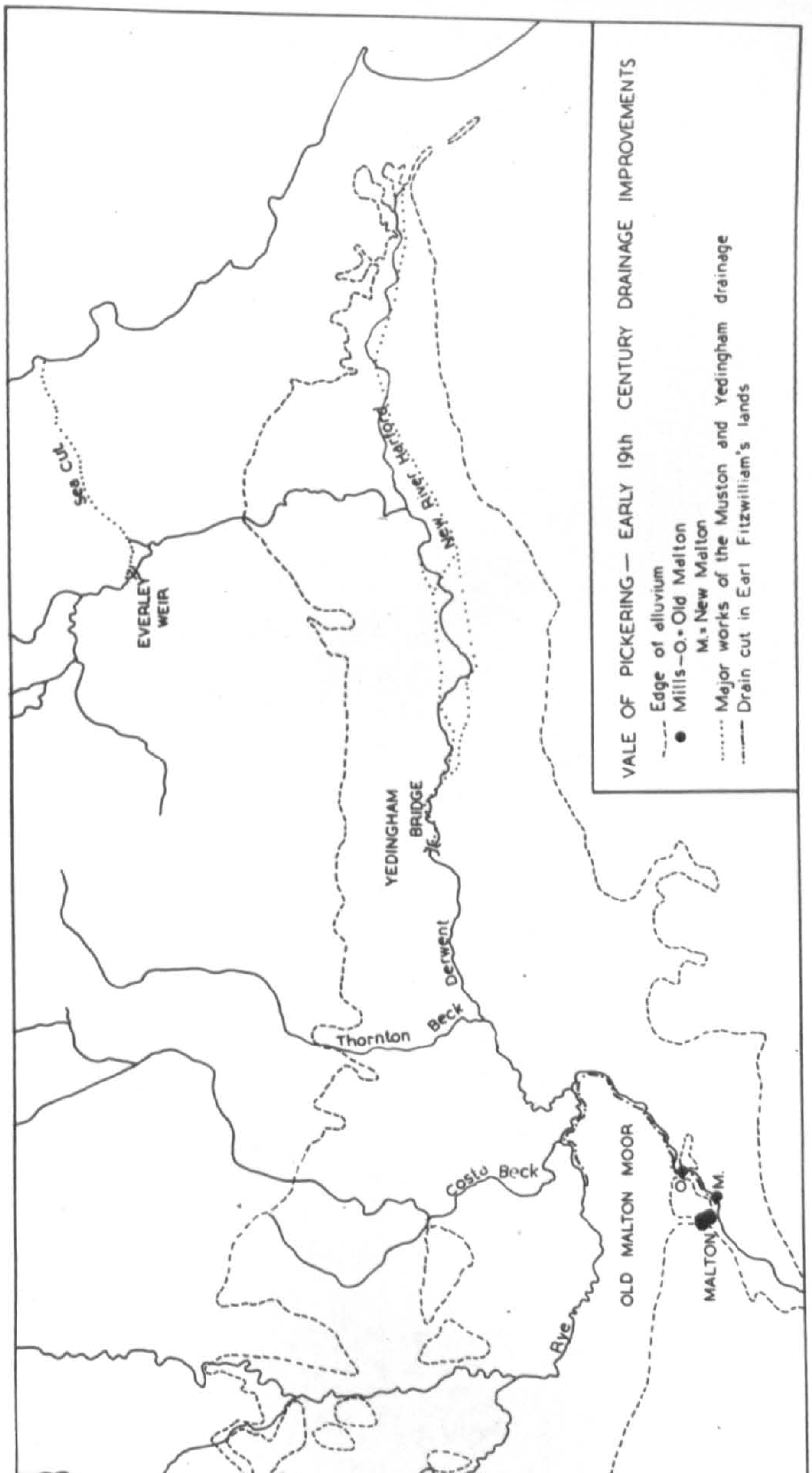

VALE OF PICKERING— EARLY 19th CENTURY DRAINAGE IMPROVEMENTS
Edge of alluvium
Mills–O.= Old Malton
M.= New Malton
Major works of the Muston and Yedingham drainage
Drain cut in Earl Fitzwilliam's lands
Sea Cut
EVERLEY WEIR
New River Hertford
YEDINGHAM BRIDGE
Derwent
Thornton Beck
Costa Beck
OLD MALTON MOOR
Rye
MALTON
O.
M.

Fig. 84

Branches up the Rye and Thornton Beck have made no little stir in Malton as the inhabitants seem to consider these as being calculated to completely ruin the Trade of this place". Other objections were also met: "on acquainting Mr. Cleaver of Nunnington with the intended Application to parliament for an Act for a navigation he enquired whether it was to be at the sole expense of Earl Fitzwilliam and being answered in the affirmative he said he did not approve it as the Country had already suffered enough by a monopoly of the Malton Navigation."(74)

On the Derwent, Eastburn found that the cost of widening and deepening the river for navigation would be excessive, and he therefore recommended that a canal should be cut on the south side of the river from just below Yedingham Bridge to just above the junction of the Rye. The 1701 Act, however, did not cover the making of a new cut, and a new Act was required. It was decided that the whole scheme was too costly, and instead, in 1810 the section of the river between Malton and Yedingham was made navigable for small vessels by the construction of locks round the mills. Only small boats, carrying 18 to 20 chaldrons of coal, were able to navigate this section of the river. This seems to have satisfied the Muston and Yedingham drainage, but also did not unduly trouble Malton which remained the head of navigation for most traffic.

Drainage improvements were undertaken in 1810 in Old Malton moor, where Earl Fitzwilliam was the principal landlord. A drain was cut round the moor, close to the Rye to open into the Derwent just below New Malton mill (Fig. 84). This concluded the period of improvement in the

(74) Ibid.

Vale, and there was little further change until 1845.

The descriptions of the Vale during this period reveal some marked improvement in conditions, especially in the carrs. The 1804 Petition from the Proprietors of the Muston and Yedingham Drainage to Earl Fitzwilliam(75) painted a very rosy picture: "From the Works of Drainage already effected under the Authority of the Muston Drainage Act considerable Tracts of Grass Lands situate within the said Vale have been so effectually drained and improved as to render the same now fit for converting into a complete state of Tillage by Means whereof the Corn and Grain produced within the said Vale will evidently experience a considerable increase." In 1812, Strickland reported that the drainage had "very considerably improved" the carrs.(76) Other accounts, however, make it clear that conditions were still far from satisfactory in the Vale. The first minute book of the Muston and Yedingham Drainage contains several references to flooding e.g. in October 1823, April 1827, August 1828 and September 1846. In connection with flooded lands at Yedingham, Earl Fitzwilliam's agent in Malton reported to him in October 1829: "no one will be able to cultivate them with any prospect of remuneration. ..... a less quantity of water now comes down to Yedingham than came down previous to the new drainage, but much more rapidly than heretofore - from being confined within a drain and embankment, instead of being left to expand over an extensive valley .....”(77)

(75) W.W.M., F 74.

(76) Strickland, op. cit., p. 20.

(77) F 107 K.

In the western part of the Vale, the works of the early part of the nineteenth century had brought only slight improvement, and flooding still occurred from time to time. In 1814, the agent in Malton reported that one tenant of land in Old Malton had "lost three crops upon the great Ings in the six years he has had it", presumably through flooding.(78) ←A memorandum in September 1832 concerning Howe Farm, part of Earl Fitzwilliam's estate stated "the Rent was to have been £350 a year but in consideration of Damage by Floods, £50 a year was deducted from the rent".(79)

Outside the Vale, the Sea Cut provided some difficulty during this period. The water was constantly undermining the banks, and giving rise to the expense of compensation to land and mill owners.(80) The trouble arose from the steep gradient along parts of the course e.g. 33 ft. in less than half a mile near Scalby,(81) and the large volume of water that occasionally passed that way.(82) The costliness of maintaining the Sea-Cut led some landowners to suggest that it should be abandoned and all the water returned to the old course, but Chapman was able to confound the arguments.(83)

The landowners of the Vale were conscious of the inadequacy of their drainage, and tended to blame this on the one drainage proposal of

(78) Ibid. (79) Ibid.

(80) E.g. Minutes of the M. & Y.D., Oct. 1815, April 1831.

(81) Report by R. Hodgson, C.E. on the Sea Cut. May 1864, Minutes of the M. & Y.D.

(82) In the winter flood of 1799, the Derwent had a flow of 2,500 tons a minute. Letter from W. Chapman, June 1830. M. & Y.D. Minutes, Oct. 1830.

(83) Ibid.

1799 which had not been adopted, i.e. the need to remove the mills at Malton. In 1829, Earl Fitzwilliam was told: "Some complaints have now and then been made to me of the dam at Old Malton Mill being too high and as being one of the causes of the overflowing of the river banks, but no one has ventured to take any steps to lower it, since they cannot discern that it is higher than its old and usual accustomed height".(84) Yet it was clear that so long as the mills had plenty of work and the navigation was prosperous, there was little chance of these interests being abandoned in the supposed interest of drainage. The mills continued to prosper, for there was still a large demand for oats from the West Riding.(85) The first signs of a decline in their importance were in 1819 and 1825, when Fitzwilliam was petitioned to grant permission for the erection of steam mills in the town.(86) The petitions were turned down, and mills could not be erected without this permission even on land outside the Fitzwilliam estates, for the navigation dues could be manipulated in such a way as to make such mills uneconomic.(87) The greater economies of the steam-driven mill could not be ignored for ever, however, for oats from Malton had to compete with oats from other areas.

(84) Letter from Allen, agent in Malton, Feb. 1821, F 107k. Complaints were greatest in the wet seasons of 1829 and 1835.

(85) Allen wrote in Feb. 1821: "Oats may be considered to be the staple commodity of this place and neighbourhood". In Feb. 1819, he listed the following totals of oats sold in Malton:- 1816 - 96,000 quarters, 1817 - 97,000 quarters, 1818 - 94,000 quarters. F 107K.

(86) F 107K.

(87) E.g. in Oct. 1832, a bone mill was built in Norton (on the East Riding side of the river) and there was discrimination against this mill in the navigation dues.

The Navigation remained prosperous until about 1820. In February 1818, Allen reported: "The Tolls and Dues arising from the River Derwent have been very productive during the last three months - they have amounted to between £400 and £500 a month." After 1820, there was some distress in the district which reduced the imports of coal and lime up the river, but did not affect the export of grain.(88) The importance of the Navigation was challenged by the railway to Malton from York, proposed in 1836 and opened in 1845. Even before it was opened, however, trade on the river had declined; in July 1844, Allen reported "The receipts from the Navigation have fallen off very seriously indeed the last six months, owing to the almost total stagnation in the Coal Trade and decrease of traffic on the River arising from the great competition of the Land Carriers, and, I fear, a diminished trade in the Town and Country. What the effect of the Railway may be on the River Traffic, and the trade of Malton is impossible to calculate, but at any rate it must have a serious one on the Navigation."(89)

By the 1840's, therefore, the economic advantages to Malton of the Derwent Navigation and the water-driven grain mills, had been considerably reduced. Yet they were still impeding the drainage of the Vale, and preventing the low-lying areas taking advantage of the methods of under-drainage then becoming popular. The tithe maps (Fig. 85) show the land-use pattern of this period. In Ryedale and the Marishes, grass and arable were about equally represented, and in the carrs arable land predominated.

(88) F 107K. June 1821 and April 1822, Letters from Allen to Earl Fitzwilliam. In 1821, the number of vessels trading on the river was reduced from 60 to 35.

(89) F 107K.

LAND USE IN THE MIDDLE NINETEENTH CENTURY

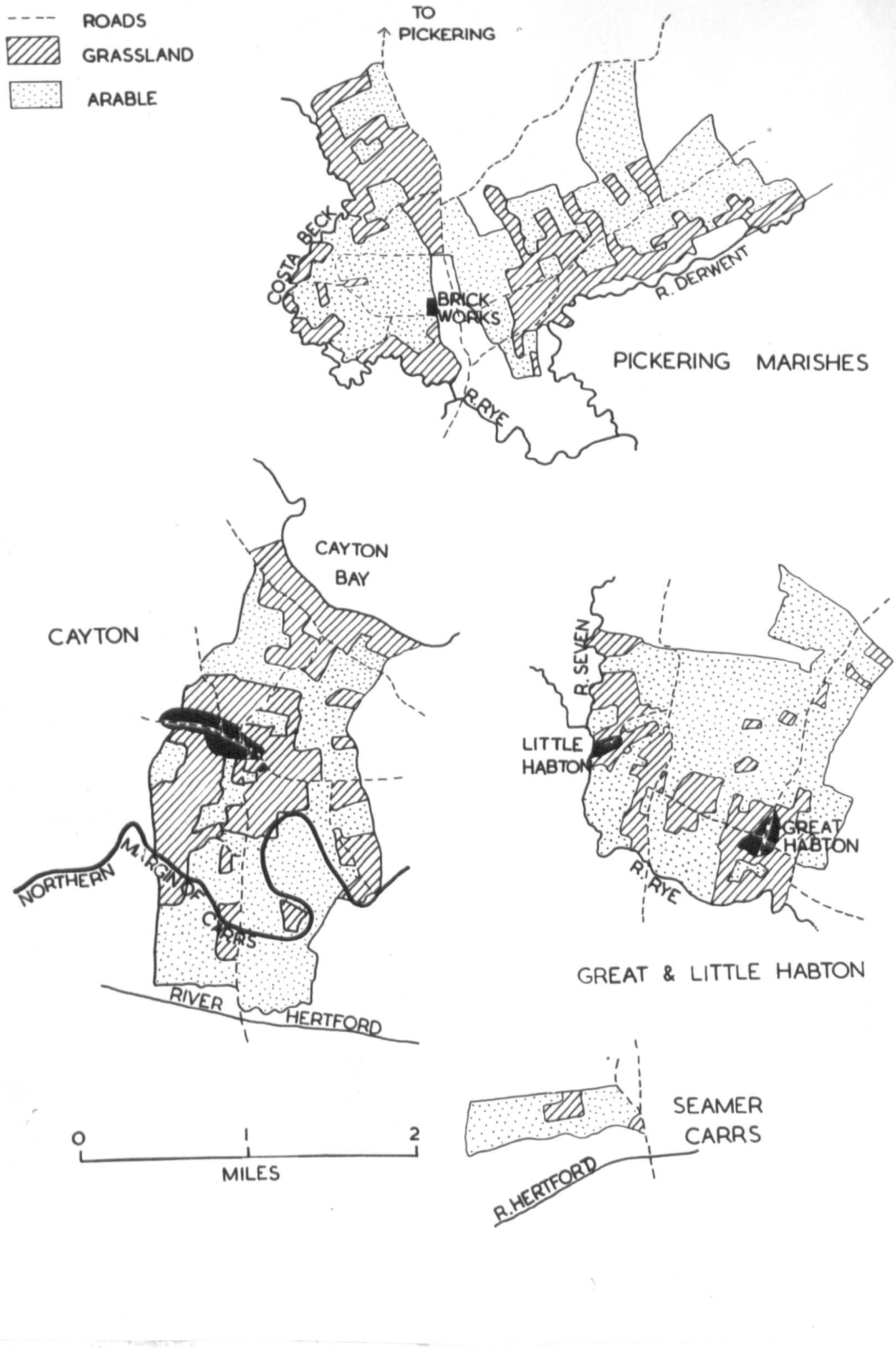


Fig. 85

Waterlogging probably troubled all parts to some degree .

The reduced economic advantages of the mills and the navigation led both to give way to drainage as the supreme interest between 1845 and 1856. In 1845, the Rye and Derwent Drainage Act was passed. A sum of £30,000 was raised from owners of low land in Ryedale and the Marishes to remove the mill dams at Malton, compensate the mill owners and deepen the rivers above. Fitzwilliam converted his mills to use steam power(90) and in 1848 the mill-dams were finally taken down. This step did not give so much improvement as had been hoped, however, but the shortage of money prevented further works being carried out under the 1845 Act.(91) Navigation on the Derwent ceased in 1856, when Fitzwilliam sold his interests to the railway company which had made the river navigation uneconomic.

There is unfortunately very little information concerning the effect of these two changes on drainage conditions in the Vale. It seems likely that there was a marked improvement, for the Muston and Yedingham Drainage was able to deepen its drains and probably similar improvements were made to private drains at the western end of the Vale. Underdraining was adopted in some parts. On the other hand, heavy rainfall was still liable to produce a sudden rise in the level of the rivers, and the narrowness and winding nature of many channels prevented the water getting

(90) F 107k. June 1848.

(91) The Rye and Derwent Drainage offered to deepen the Derwent to Yedingham by 2½ ft. if the Muston and Yedingham Drainage would contribute towards the cost, but no such arrangement appears to have been reached. M. & Y.D. Minutes, Oct. 1852.

away rapidly. Thus flooding was still liable to occur in parts e.g. in 1833 a complaint was made that certain lands in Staxton "were constantly flooded".(92) There was little change during the second half of the nineteenth century, except that the Sea Cut was widened, deepened, given a more regular gradient and had parts of its banks protected by concrete walls.(93)

Like the Market Weighton area, therefore, the Vale of Pickering drainage was still far from complete by 1900. Great improvements have however taken place during the past twenty years, as a result of river widening, deepening and straightening. These were the improvements which it was realised were needed during the nineteenth century, but for which the overall control and money were lacking until the creation of the Rye and Derwent Drainage Board in the 1930's, and the Yorkshire Ouse River Board after the River Boards Act of 1948.

The Vale of Pickering is therefore characterised by a slower and later development of improved drainage than the other areas considered, with the exception of the Wallingfen depression. The reasons for this may be summarised as:-

(1) The great physical problems and the consequent high total cost of improvement.

(2) The relatively small area of the Vale in relation to this high total cost, making cost per acre high.

(3) The lack of a tradition of co-operation in drainage matters.

(4) The entrenchment of other water interests, i.e. mills and navigation, before the need for drainage became apparent.

(5) The isolation of the area, so that few other than the local inhabitants were aware of the drainage needs.

(92) M. & Y.D. Minutes.

(93) M. & Y.D. Minutes, Sept. 1891.

The lateness of its drainage was a disadvantage to the Vale. The removal of the mills and navigation locks allowed some extension of underdrainage, but before much could be done, the slump in farm prices came in the 1880's. This, and the still high level of the rivers after rain limited the productivity of some of the lower parts of the Vale, compared with Holderness for example, and only recently have the River Board improvements made it possible to use some areas to their fullest.

SECTION V

C O N C L U S I O N

Chapter XIII. The Three Marshland Areas.

The detailed consideration of the east Yorkshire marshlands reveals considerable similarities between the three areas in the broad outlines of their historical development. There are, however, contrasts between the three in the details of their history for which geography provides at least a partial explanation. In addition the method of drainage and detailed pattern of drains in all three areas reveals clearly the influence of various geographical factors.

Historical Changes.

In all three areas there was little change in the natural condition of the marshlands prior to 1066. Most of the land was flooded for much of the year and probably little exploited by man. Only small stretches of the higher siltlands round Howden, along the lower Humber, and in Ryedale may have been embanked and settled. All three areas experienced considerable activity in embanking siltland between about 1100 and 1300 A.D. In Holderness this involved the reclamation of further land from the Humber; in the Vale of York the embankment of much of Howdenshire; and in the Vale of Pickering the improvement of the Marishes. The evidence suggests that the newly reclaimed lands were fertile and highly valued and that they were used for both arable and pasture. The settlements which grew up on these reclaimed silts in all three areas were either hamlets or isolated farms, and holdings in severalty were normal. During the same period some watercourses were cut in the peatlands of the Hull valley and Wallingfen, but these were principally for purposes other than drainage, especially for navigation and to drive watermills. They may, however, have had some effect upon conditions in the carrs, leading to their drying out in some parts for a few weeks each summer. There is evidence that at this period some of the carrs of the Hull valley and Wallingfen were used for pasture and as sources of fish and fuel.

The years between about 1300 and 1760 form a period of relative inactivity in all three areas. The period included the loss of siltland along the lower Humber (which started earlier, but continued into the fourteenth century) and the accumulation and reclamation of silt round Skelfleet and along the lower Humber after 1670. The greatest activity of this period was in the Hull valley, where some new drains were cut and windmills erected, but even there the changes in the conditions and uses of the marshlands were small. The carrs may have been more extensively exploited than in medieval times. A fairly efficient Court of Sewers existed in the Hull valley, and a less active Court in the Vale of York, but there was no comparable institution in the Vale of Pickering.

The greatest period of change in the three areas was between about 1760 and 1810. Just as medieval improvement had been directed principally to siltland marshes, so this later period was concerned with the peatlands. All the carrs obtained some type of improvement, in most cases through an Act of Parliament. Main drains were cut in the Hull valley and Wallingfen to carry the water off the carrs more rapidly, while some of the water which had previously flooded the Vale of Pickering carrs was diverted by the Sea Cut. These improvements restricted the period of flooding and waterlogging to a few weeks in winter, and arable crops often replaced the old carr pasture. In the Hull valley the winter flooding and waterlogging were further reduced later in the nineteenth century by the separation of upland and lowland waters and by pumping. In Wallingfen and the Vale of Pickering the problem of completing the drainage lapped over into the twentieth century.

The pattern of development revealed by the three east Yorkshire marshlands has many similarities to that of the other marshland areas of England and Wales, considered in Chapter I. The most significant point of difference is that in none of the Yorkshire marshlands was there any drainage by Adventurers in the early seventeenth century. Now that the details of the Yorkshire marshlands have been examined, it is worth while considering whether any evidence has come to light that could explain the lack of drainage activity at that date both in east Yorkshire and in the other areas not affected. In the first place, it is clear that undivided lordship of the soil cannot explain the areas chosen to ~~the~~ be drained by Adventurers, for all Wallingfen was under the lordship of the Bishop of Durham. On the other hand, the Yorkshire marshlands provide some slight support for four other possible explanations. First, if remoteness were a factor leading some areas to be ignored, the Hull valley and the Vale of Pickering would certainly qualify, and the Vale of York might also do so as a result of the barrier formed by the Ouse and Humber. Second, the east Yorkshire marshlands were smaller than the main areas drained by Adventurers e.g. Hatfield Chase contained 70,000 acres, and the peatlands of the Hull valley (the largest of the three areas) only about 50,000 acres. But when it is remembered that the small Ancholme valley was drained by Adventurers and the extensive Somerset levels were not, this feature appears to be of minor significance. Third, in the Hull valley at least, there is evidence that drainage was contemplated at this period,(1) and it was no doubt political events which prevented the scheme going any further. A fourth possible explanation lies in the relationship between the carrs and the adjacent improved land. In the seventeenth century, the carrs had many uses, but they were valued principally for the summer pasture and coarse hay that they provided. The pasture was of most value to young store cattle and plough oxen. Most of the year these grazed on the meadows and open arable fields. Only for a short period in summer while a hay crop was occupying the meadows and cereals were growing in the arable fields was the pasture of the carrs really essential, and under the conditions of drainage which then prevailed, that was exactly the time of year when it was available. So long as there was sufficient summer pasture, the local farmers were unlikely to press for drainage to extend the amount of pasture. Drainage would have appeared worth-while only where there was insufficient summer pasture, or where it was so abundant that there was scope for the conversion of parts to arable uses. The occurrence of such conditions would depend not only on the extent of carr pasture, but also on the agricultural economy of the surrounding upland areas. Holderness was famous by the eighteenth century for its large horned cattle and its beef production, and these were probably important during

(1) P.R.O. E 317 Yorks/34. The Commonwealth Survey of Leven stated" if the carrs be drained (as we heare wilbee endeavoured) ....."

the seventeenth century also. Much of the clayland of Holderness was arable, and pasture was so restricted in area there that plough oxen and cattle probably depended heavily on the summer pasture of the carrs. The weight of this influence may have been sufficiently great to deter Adventurers from attempting to improve the carrs for arable purposes.

This last suggestion must be very tentative until more is known of the function and value of peatlands in the farming of Holderness and other areas untouched by Adventurers compared with the areas drained by them.

Certain other questions arise out of the similar histories of the three Yorkshire marshlands. First, it was suggested in Chapter I that a possible explanation of the decline of reclamation activity after 1300 was the lack of much unreclaimed siltland by that date. Does the evidence from the east Yorkshire marshlands support this theory? There certainly does seem to be a relationship, for little siltland seems to have remained unreclaimed by 1400, whereas very little peatland had been more than slightly improved. Second, why was silting suddenly so troublesome in the Humber, both in the Vale of York and in Holderness, towards the end of the seventeenth century? The possible relationship of this to Vermuyden's work in Hatfield Chase and the changes in Spurn Head have already been considered. The latter explanation appears to be the more likely so far as the lower Humber is concerned, but it is less easy to correlate the silting of Skelfleet with changes in Spurn Head. Further research on the physical geography of the Humber is required before any adequate explanation can be put forward. Third, why was there so sudden and general a development of drainage by Act of Parliament in the 1760's and 70's? (Holderness Drainage 1764, Thorngumbald Drainage 1766, Bishopsoil Drainage 1767, Keyingham Drainage 1772, Market Weighton Drainage 1772, first plan for the Vale of Pickering 1772.) Lythe(2) points out that this is unlikely to have been a result of the increased demand for cereals for the industrial population, for cereal prices did not rise substantially until the 1790's. He thinks that the heavier rainfall of the early 1760's(3) may explain the development, but it seems unlikely that this was the sole reason. The enclosure movement which was then affecting east Yorkshire also needs to be taken into account. Enclosure made possible more advanced forms of agriculture, and the need for summer pasture in the carrs was reduced. On the other hand, those who received carrland in their portion were not content to leave it in its unimproved state when it could be upgraded to better pasture or arable land. This current of feeling was emphasised when wet years reduced the value of the carrs still further and the two factors together may explain the sudden spurt of drainage activity within a period of eight years. This again is a problem, however, where further research by economic historians would prove helpful.

Contrasts between the Three Areas.

The main contrast in the history of the three marshland areas is between Holderness on the one hand and the Vale of York and the Vale of

(2) S. G. E. Lythe, Geography 1938, op. cit.

(3) C. E. P. Brooks in Climate through the Ages, 1926, p. 305, states that the period 1677 to 1750 was drier than average.

Pickering on the other. In Holderness early activity was greater, there was more interest in improvement between 1600 and 1760, and Parliamentary drainage was more vigorous and more complete. This seems to have resulted at least partly from the stronger tradition of drainage activity in Holderness. Where the area bordered on the Humber, a large tidal range was experienced which meant that much attention to banks and defense works was necessary. Such works often required co-operation for their construction and maintenance, and such co-operative efforts became normal under the Commissions and later the Court of Sewers. The Court had to be powerful and active in order to deal with the problems arising along the Humber and it used these powers to cope with other aspects of drainage as well. The area was therefore accustomed to vigorous co-operation in drainage matters, even if this was restricted to maintenance only. In the Vale of York, the tidal range of the Humber was smaller, and the threat to the banks less. A Court of Sewers existed, but was seldom faced with the same scale of problem that troubled Holderness. The Court for the West Parts was therefore less powerful and less active and the tradition of drainage co-operation less well developed. In the Vale of Pickering, there was no tidal water frontage, no early commissions and no established Court of Sewers. There was no training in co-operation in the area, which was partly for this reason the last to get started on the road towards improvement.

Where private drainage was concerned, Holderness was again in the lead. There were two factors which had an important influence on the extent of private drainage. First, the nature of the ownership of rights in the carrs was significant. Where freeholders formed a significant proportion of those holding rights, agreement was necessary before drainage could be undertaken, and this was difficult to obtain unless the numbers involved were small. Large commons like Bishopsoil and Wallingfen had little prospect of improvement at this stage. Private drainage was easiest where the lord of the manor had to contend only with copyholder rights, a condition which seems to have been most common in Holderness. The second important factor was the scale of the physical problems involved. In the carrs of the Vale of Pickering, private drainage would have involved the construction of large banks against the powerful Derwent floods and the cost would probably have been quite uneconomic. The small areas of the Vale affected by private improvements were in the higher marginal areas where less effort was necessary e.g. Hutton Bushell and Ganton. In Holderness the physical problems were considerable on the west side of the Hull owing to the large volume of chalk spring-water, but on the east side only small streams from the drift had to be controlled and the cost of improvement was therefore less. Hence private drainage was easier and more important in Holderness than in the other two areas.

The stronger tradition of interest and co-operation in drainage matters may also have given rise to the greater efficiency and prosperity of drainage in Holderness compared with the other areas in the nineteenth century. But this efficiency also owes something to the fewer obstacles to drainage there. Both the Market Weighton Drainage and that of the Vale of Pickering were handicapped by navigation interests which maintained high water-levels. This limit on improvement was greatest in the Vale of York, and was able to prevent any advance on the original scheme throughout the nineteenth century. In the Vale of Pickering, the mills at Malton, combined with the navigation on the Derwent below Malton, prevented improvement before the middle of the century.

The contrasts between the three areas in their rates of improvement may therefore be correlated with features of the local geography. The combination of conditions was most favourable in Holderness, and least favourable in Wallingfen. Twentieth century conditions in the three areas reflect these differences. The Hull valley is adequately drained, and presents a picture of extensive arable fields growing especially spring-sown cereals. The Vale of Pickering carrs are also mainly arable, but in the lowest parts of Wallingfen there are still extensive stretches of poor pasture. But in each case there is very little settlement within the carrs themselves, the land normally being farmed from villages on adjacent higher land.

There are greater similarities between the silt-lands of the three areas, possibly because their history of reclamation was very similar. The characteristic landscape of the silt-lands reclaimed in medieval times consists of hamlets surrounded by moderate-sized irregularly-shaped fields, usually hedged, and devoted partly to pasture and partly to arable. On the other hand, the areas reclaimed much later round Skeffling and Sunk Island are treeless and hedgeless, and isolated farms stand in the midst of extensive fields of grain.

The Detailed Pattern of Drainage.

A consideration of the pattern of drainage that evolved in the three areas reveals clearly the influence of certain features of the local geography, both physical and human.

Relief is obviously the dominant factor controlling the pattern of drains. Relief does not normally dictate one pattern only, however, but rather makes possible several different patterns between which the choice is influenced by other factors. It provides, as it were, the framework for the interaction of the other influences, a negative and passive limitation on their scope.

Probably the most important of the other factors that have influenced the details of the drainage pattern in the east Yorkshire marshlands is navigation. At times, navigation has proved of greater interest than drainage, and the watercourses, intended to fulfil both functions, were planned more to benefit the former. This state of affairs occurred in medieval times in the Hull valley, when such watercourses as Eschedike, Forthdike and Scurf Dike were cut in an approximately east-west direction to link the margins of the higher ground and the islands to the Hull, and thus make possible direct communication by water with other parts of the valley. Although these cuts may have improved the conditions of the carrs, they took very different directions from those which would have been followed had drainage been the principal concern. At a later date, navigation interests influenced the form adopted by the Market Weighton main drain or canal. This canal would probably have been cut in very similar form in the first case, but without locks, if navigation had not been taken into account. Later, however, it seems likely that some alterations would have been made in order to separate upland and lowland water, had not navigation interests opposed this. The present form of the drainage pattern there is thus the outcome of navigation influences.

A second important factor is the influence of watercourses for mills and other purposes. Artificial cuts to carry water to drive mills were important in medieval times. Kelk Beck was diverted for this purpose, and Hansardam, Thornton Dam and Temple Dam were cut from the Foulney to the Humber. In medieval times too, Julian dike was cut to carry fresh water to the town of Hull. At a later date, all these cuts played a part in the drainage system. The influence of the Malton mills was also apparent in the drainage developed in the Vale of Pickering after 1800. It is possible that all the water of the Derwent might have been diverted by the Sea.Cut if the maintenance of an adequate water-level for the Malton mills and the Derwent Navigation had not been insisted upon. Also, because the mills raised the level of the river upstream, new channels had to be cut for the Derwent and Hartford to provide the necessary gradients for an adequate run-off.

Third, even when cuts were made for drainage purposes only, the pattern of land ownership and rights often prevented the most obvious course being taken. When the landowners of Wawne, Routh and Swine wanted to drain their carrs in the seventeenth and early eighteenth century, they were prevented from taking the obvious course of cutting a new drain through Sutton to Marfleet, because Sutton had rights over the land to be cut and over the amount of water which could pass through her lands, and she was not prepared to abandon these. Local remedies had to be sought, and such features as Wawne Engine Drain and the banks round Wawne were added to the drainage pattern. The complicated network of drains in Howdenshire may be explained by the fact that each township cut its own drain to the Ouse in medieval times. Even in the larger-scale schemes of the nineteenth century, anomalies arose owing to the division of the Hull valley between several different drainage authorities. The three separate main drains on the west side of the valley, and the fact that the drain for the north part of the east side of the valley passes under the river to join the Beverley and Barmston main drain are explained in this way.

In the case of the Hull valley, the city of Hull had an important influence. This influence led to the new drains of the late eighteenth and early nineteenth century being constructed to open into the river Hull instead of the Humber. Later, the development of its communication links with the interior effectively prevented the Beverley and Barmston drainage obtaining a direct outlet to the Humber.

That such factors as these are still reflected in the present patterns of drainage is the result of the method of development of drainage systems. Like roads and railways, once a drain has been cut, it is normally retained as part of the system, although its importance and function may change. Most improvements of drainage take place by the addition to the old system of a few new cuts, while old drains may be enlarged or straightened. In the most elaborate cases, therefore, successive stages of improvement have become part of the modern system, and in this way modern systems often contain drains that reveal the influence of factors long since passed. That this should happen rather than that a whole new series of drains should be cut is the result of the lower cost of enlarging old drains than cutting new ones, and of the legal and administrative problems involved in cutting new drains. Existing drains often form field, farm and parish boundaries, and little disruption is caused by enlargement. New drains cut across such boundaries, and cut off farms from their fields, etc. They therefore give rise to much greater opposition, and are avoided wherever possible. This is indeed fortunate for the geographer who wishes to locate early drains and understand the evolution of a drainage pattern.

It is clear therefore that although in broad outline the histories of all the marshlands of England and Wales are similar, detailed study of individual areas reveals clearly the influence of local geographical factors on the rate of progress, on the pattern of drains that comes into being, and through these, on their present geography. That Holderness is now well-drained, Wallingfen poorly drained and the Vale of Pickering in process of being improved is a reflection of significant features of the historical geography of each region.

APPENDIX

The Humber Tides and their Influence on Drainage

The Humber is an estuary with a large tidal range, reaching about 19ft. at Hull. Much of the lowland of Holderness is less than 10ft. above Ordnance Datum or mean tide level, and therefore is below the level of high water at spring tides. These lowlands would be flooded during spring tides were it not for the existence of banks which hold back the waters. Landwater drains must be cut below the level of the lowlands in order to drain them, but this means that their outlets into the Humber are well below the level of high water at spring-tides. In order to prevent the salt water flowing up the drains and flooding the land on such occasions, sluice gates (known locally as a clow or clough) are erected near the outfall into the tidal waters. When the level of the water on the salt side is higher than that on the fresh side, the pressure closes the gates and prevents the tide entering the drain. When the level of the tidal water falls below that of the fresh water, the gates open again, and the land water is able to drain away.

The length of time during which the sluice-gates are closed has an obvious influence on the efficiency of the drains. Two main factors determine the period of closure:- a) The height at which the clow is set. b) The tidal range at that point.

The tidal range varies little from one part of the lower Humber to another. The river Hull also receives tidal waters, however, and there the tidal range decreases upstream (Fig. 86). Near Hempholme, for example, the range is only 4ins., whereas near the junction with the Humber the water-level may rise 2ft.

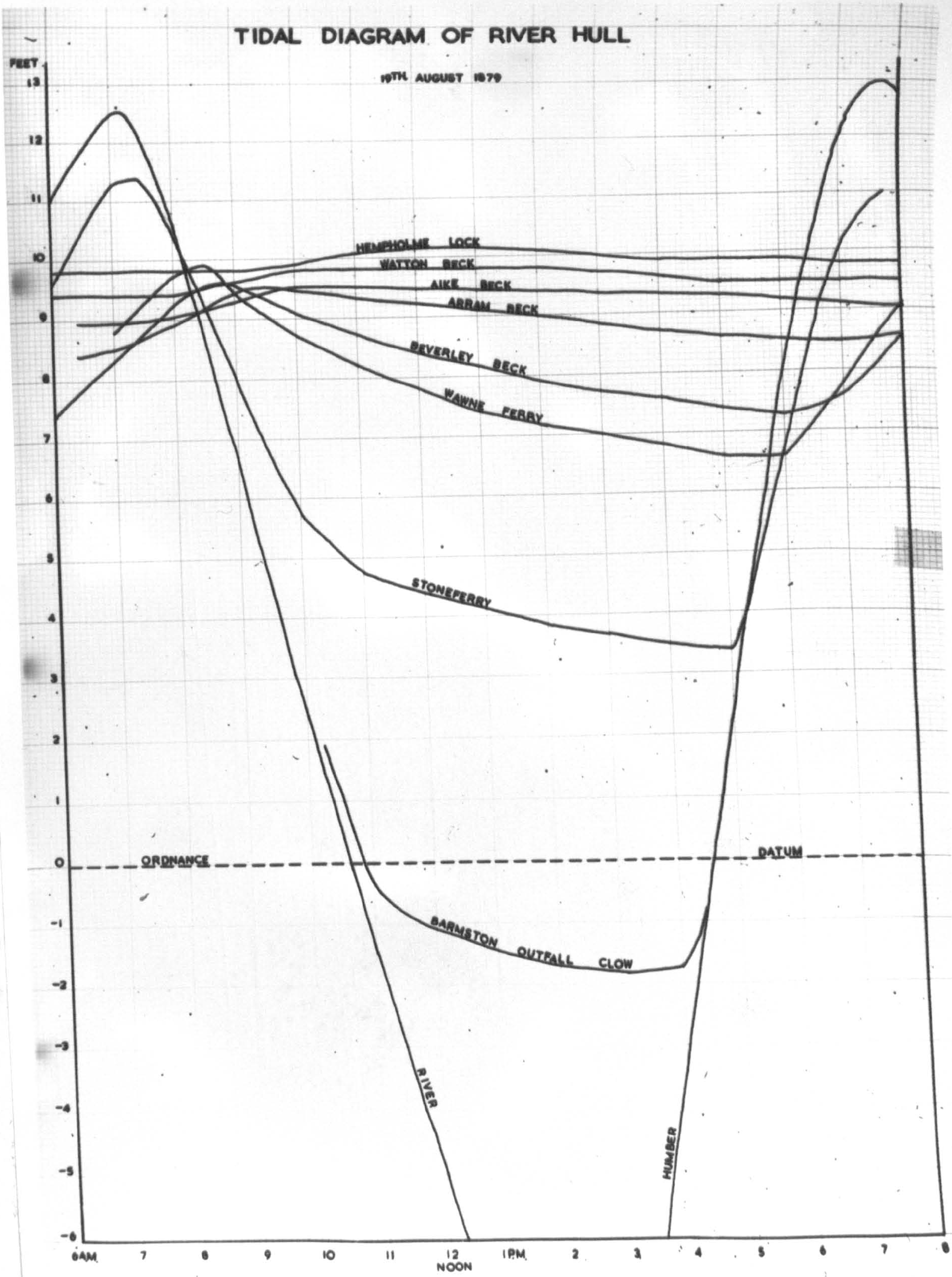


Fig.86. Based on a diagram by Bower.

higher than at Hempholme, but may also fall to 15ft. lower. At Hempholme there is scarcely any need for a clow, because the range is so small. But further south, the much lower level of the river at low tide makes it possible for the drains to be cut lower than those upstream, provided there is a clow to prevent the entry of salt water at high tide. This is of most value to the lowland drains which must run at a low level, therefore there is a tendency to carry such drains southwards to flow into the lower part of the Hull or the Humber. Such drains suffer through being able to flow for only a few hours a day, but if they were carried into the Hull farther upstream and their clows set at the same level, they would never open at all.

Upland drains do not need to have their clows set so low, and have a much wider choice of point of entry into the Hull or Humber. Upland drains therefore flow almost all the time and give little trouble; lowland drains give rise to much greater engineering problems owing to the need to pass off the water as rapidly as possible during the short period when the clow is open. A nice balance has to be achieved between an adequate gradient and a sufficiently long period of free outflow.

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