Holderness: land drainage and the evolution of a landscape

Siddle, David J.

"H O L D E R N E S S: L A N D D R A I N A G E A N D T H E E V O L U T I O N O F A L A N D S C A P E."

A Dissertation

Presented for the

Degree of Master of Letters

by

David J. Siddle B.A.

University of Durham October 1962.

C O N T E N T S

		Page
MAPS, PHOTOGRAPHS, AND DIAGRAMS.		I
ABBREVIATIONS		V
ACKNOWLEDGEMENTS		VII
INTRODUCTION		i

SECTION 1 - Control of the Landscape by the Water Surplus

		Page
Chapter 1	The Physical Setting	2
(i)	Introduction; Regional Subdivisions	
(ii)	Topographical Evolution and the Lakes of Holderness	
(iii)	The Holderness Landscape before Colonisation	
Chapter 2.	Early Drainage Work 1000 - 1760	14
(i)	Earliest Activity 1000 - 1367	
(ii)	Mediaeval Lassitude 1400 - 1660	
(iii)	Growing Interest and Minor Improvements 1660 - 1763.	
Chapter 3.	The Mediaeval Rural Economy and Water Surplus	33
(i)	Introduction	
(ii)	The Mediaeval Economy of Holderness	
(iii)	Conclusion	
Chapter 4.	Settlement and the Water Surplus	59
(i)	Introduction	
(ii)	Primary Colonisation	
(iii)	Settlement and Relief Variation	
(iv)	Secondary Colonisation	
(v)	The Pattern of Settlement	
(vi)	Water Town	
(vii)	Conclusion	

			Page
Chapter	5.	Communications and the Water Surplus	79
(i)		Inadequacy of land routes	
(ii)		Water as a means of communication	
Chapter	6.	The Mediaeval Landscape 1000 - 1760	88
SECTION 2.		<u>Land Drainage and the Transformation of the Landscape</u>	
A.		<u>The Drainage of Holderness 1764 - 1865</u>	
Chapter	7.	Arterial Drainage Work 1764 - 1860	97
(i)		Leglisation	
(ii)		The Hull Valley	
(iii)		South Holderness Drainage	
Chapter	8.	The Inclosure Movement and Land Drainage 1700 - 1830	105
Chapter	9.	Field Under Drainage 1847 - 65	108
(i)		The Evolution of Under-Drainage	
(ii)		The Invention of Tile Drainage	
(iii)		Under - Drainage in Holderness	
B.		<u>Land Drainage:- Agricultural Improvement and the Growth of Settlement.</u>	
Chapter	10.	Land Drainage in areas of Clay Lowland	117
Chapter	11.	Historical Evidence of the Influence of Land Drainage on Agricultural Improvement	121
Chapter	12.	Land Drainage and the Agricultural Census Returns of the Nineteenth Century	125
(i)		The Problems of Treatment	
(ii)		Crops Chosen for Comparison	
(iii)		Detailed Crop Analysis	

			Page
Chapter	13.	Land Drainage and Agricultural Practice	164
(i)		The Problems of Analysis	
(ii)		Analysis of Areal Differences	
Chapter	14.	The Growth of Settlement and Communications	179
SECTION 3.		<u>Special Factors Influencing Land Drainage and the Evolution of the Region</u>	
Chapter	15.	Special Features of Climate and Topography	185
(i)		Climatic Variation	
(ii)		The Influence of Poor Drainage on Health	
(iii)		Diversity of the Terrain and Difficulties of Drainage Organisation	
Chapter	16.	Socio-Economic Factors and the Evolving Drainage Pattern	207
(i)		Land Drainage and the Development of the South Holderness Siltlands	
(ii)		Early Economic Evaluations	
(iii)		The Growth of Hull and The Siltland Ports	
Chapter	17.	Land Drainage and the Regional Setting	238
(i)		Holderness Open Drainage Pattern 1962	
(ii)		Settlement and Land Drainage "	
(iii)		The Communications Pattern in "	
(iv)		Conclusion	
BIBLIOGRAPHY			-
APPENDIX			-

MAPS, PHOTOGRAPHS, AND DIAGRAMS.

M = MAP.
P = Photograph.
D = Diagram.

Fig. No.

1. Holderness Relief and Sub Regions. (m)

2. Glacial " Still " Lines (m)

3. Glacial and Post Glacial Gravels. (m)

4. Post Glacial Inundation. (m)

5. The Leven - Hornsea Overflow. (p)

6. Lamination revealed by coastal erosion. (p)

7. Natural Drainage. (m)

8. Catchment Areas. (m)

9. Drainage Flow Lines (m)

10. Drainage in 1367. (m)

11. Monastic cuts. (m)

12. Hull Valley Drainage in the Seventeenth Century. (m)

13. The Growth of Sunk Island. (m)

14. The Lands of Meaux Abbey. (m)

15. Carrland in Summer and Winter. (p)

Fig. No.

16. Domesday Plough Lands (m)

17. The Two Field Systems of East Yorkshire. (m)

18. Siltlands in the Thirteenth Century. (m)

19. Domesday Population Density. (m)

20. Domesday Settlement Distribution. (m)

21. Mediaeval Land Values. (m)

22. Archaelogical Finds. (m)

23a. The Barmston Lake Dwelling (p)

23b. Reconstruction of the Barmston Lake Dwelling
The Pile Dwelling excavation near Pickering. (d)

24. The Barmston Outlet. (p)

25a. Saxon Place Names. (m)
b. Danish Place Names. (m)

26a. Settlement and the 25' Contour. (m)
b. Settlement and the 50' " (m)

27a. Settlement and Land types. (m)
b. Skipsea mere. (p)

28. Hornsea and Brigham - Lake and Marsh Settlements. (p)

29. Early Causeways and " Water " Towns. (m)

30. The Beverley Leven Causeway (p)

31. Monkdike and Barmston Dike. (p)

32. Drogo's Mound. (p)

Fig. No.

33. Fragmentation of Drainage Authority. (m)

34. Holderness Drainage Authority 1785. (m)

35. Drainage Pattern in 1835 (m)

36. Land Drainage System 1885.

37. Exaggerated Ridges and furrows (Sproatley) (p)

38. Holderness Parishes - (m)

39. Graph of Crop Structure Deviations. (d)

40. Areal differences in Holderness Wheat Cultivation (m)

41. " " " " Oats " "

42. " " " " Beans & Peas " "

43. " " " " Turnips " "

44. " " " " Fallow " "

45. " " " " Barley " "

46. Land Drainage in 1962 " (m)

47. Questionaire Sample. (d)

48. "Bottomland" and Buildings Constructed 1770 - 1827. (m)

49. "Bottomland" and Road Improvements 1770 - 1827 (m)

50. Graph of Raininess. (d)

51. Meetings of the Commission of Sewers 1682 - 1786. (d)

52. Rainfall and Underdrainage. (d)

cont

Fig. No.

53. Hempholme Lock and Catchment Areas (m)

54. Holderness Drainage. Improved Low Grounds. (m)

55. Parishes Paying No Drainage Tax. (m)

56. Burleigh Chart of the Humber 1580. (m)

57. Keyingham Clough 1728. (d)

58. "Water Towns" a) Tickton b) Sutton. (m)

59. Withernwick Drainage Award and Stream Diversions (m)

60. Holderness Open Drainage Pattern 1962. (m)

61. Aike Beck, Barmston Drain and the River Hull. (p)

62. Buildings and the 25' and 50' Contour lines 1962. (m)

63. Communications 1962. (m)

ABBREVIATIONS.

A.A.A.G.	Annals of the Association of American Geographers
Ag. Hist. Rev.	Agricultural History Review
Bev. Ref.Lib.	Beverley Reference Library
C.S.R.	Commission of Sewers' Records
C.M.M.	Chronica Monasterii de Melsa ("Rerum Brittanicum Medii Aevi Scriptores" Vols.I.II.III)
E.P.N.S.	English Place Names Society
E.R.P.R.O.	East Riding Public Records Office
Eng.Hist.Rev.	English History Review
E.Y.L.H.S.	East Yorkshire Local History Society
Geog.	Geography
Hans.	Hansard
H.C.R.L.	Hull Central Reference Library
I.B.G.	Journal of the Institute of British Geographers
Jn'l of B.A.	Journal of the British Association for the Advancement of Science
J.R.A.S.	Journal of the Royal Agricultural Society
Lib. B.M.	Library of the British Museum
M.H.A.S.	Minutes of the Holderness Agricultural Society
Met. Mag.	Meteorological Magazine
Proc.Inst. C.Eng.	Proceedings of the Institute of Civil Engineers
P.R.O.	Public Record Office (London)
P.T.R.S.	Philosophical Transactions of the Royal Society
Proc. Y.G.S.	Proceedings of the Yorkshire Geological Society
Q.J.Met.Soc.	Quarterly Journal of the Metreorological Society

R.D.B.	Registry of Deeds, Beverley
S.G.M.	Scottish Geographical Magazine
Trans H.G.Soc.	Transactions of the Hull Geological Society
V.C.H.	Victoria County History of Yorkshire
Y.A.J.	Yorkshire Archaeological Society Journal
Y.A.S.R.S.	Yorkshire Archaeological Society Record Series

A C K N O W L E D G E M E N T S

The writer is much indebted to the following :

Messrs A.Harris,G. de Boer and H. MacMahon of the University of Hull, and Mr. H. Long of the University of Leeds for advice on specific points ; to Mr. Maxwell oof the University of Sheffield for access to unpublished material ; to Miss June Sheppard for permission to use material from her thesis ; to Mr. Higson, the East Riding County Archivist, for valuable assistance in the sorting of early documents, and Canon A.E. Earle for his guidance in using them ; and to Mr. Gilbert of the Hull and East Yorkshire River Board, for the most recent material.
My thanks are also due to the many East Riding farmers and agricultural administrators, too numerous to mention for their practical assistance.
Finally, my thanks to Professor W.B.Fisher, for his continuous help and guidance during the preparation of this work.

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

(i) ENCYCLOPEDIC AND ' LANDSCHAFT' REGIONALISM

When designing the form of a monograph or dissertation, the regional geographer should follow two basic precepts; the presentation of work which has a clear expositional shape, and the faithful analysis of an often complex set of spatial relationships.

It has been found in the past a relatively easy matter to conform to one, but extremely difficult to fulfil both these requirements within a single academic excercise. Because there is, to a large extent a dichotomy between both precepts there has often been an almost inevitable division within the field of regional geography. Those who follow the former tenet may be called ' landschaft ' regionalists; those who follow the latter, ' encyclopedic ' or ' empirical ' regionalists.

The attempt has rarely been made to discover a form of approach which steers a course between the Scylla of a catalogue of empirical facts and the Charybdis of an imposed " unity " which is often not inherent in the regional unit.

The empirical approach is often more intellectually honest, and therefore, more academically respectable. But, by presenting all aspects of the regional mosaic, faithfully and accurately recorded, works of this type can often lack unity and cohesion. The inspection of individual sand particles often precludes a view of the whole shore. Often no attempt is made to suggest more than a rudimentary framework of relationships. Even inter-regional limits are ill defined or crudely conceived. Valuable as a source book, and as an almanack of facts, this approach is no more than a sophistication of Nineteenth century ' capes and bays' regionalism. It makes dull reading and poor regional geography.

'Landschaft' regionalism may contain all the clarity of thought and exposition which is characteristic of this type of construction. Clarity is , however, often achieved by the invention of a regional homogeneity which is more putative than real. Such constructions are vitiated, not only because they lack factual detail, but because the whole work is often based on a quicksand of false premises. The approach to regional work which involves searching for homogeneous units has, therefore, fallen into academic disrepute. This disrepute has led to its almost total rejection as a method of approach. Its qualities have been forgotten. In the attempt of geographers to achieve a fashionable scientific status, the idea of a region as a "unit - whole", the main concept of 'landscape' geography has been dismissed as an artistic aberration.

Because the thesis of this dissertation is based upon an amended version of this concept it is important to trace, briefly, its development and to attempt a resoution of the problems it engenders.

The concept of an area of land as containing a distinctive unity which distinguishes it from other surrounding areas, was first elaborated in Germany. Much of the confusion, and disrepute attached to the idea derives from the variety of interpretations made by German geographers of the word " Landschaft ".

The pre-geographical use of the word might easily be translated into English as " landscape" - in the pictorial sense; a "scene" or view. The word was later used, however, to describe a politically defined territory. This gradually developed into the concept of a regionally defined unit. As the idea of "Region" grew in stature, "landschaft" was variously used to describe a region by one physical factor; a region with some physical homogeneity; and finally, a region in which all elements of the physical and human 'Landscape' contributed to form a somewhat mystical conception of Platonic "wholeness".(1)

(1) Best summary of the problem-Crow "Landscape and Society" S.G.M.1939
K.H.Huggins "Landscape and Landschaft" Geog. 1936. p.224

It is this third concept which has proved least easy to assimilate by many practical geographers. Many German geographers spent much time in the third decade of this century attempting to justify a mystic "wholeness" in these terms. Burger even went so far as to suggest that it was on the authentic use of this idea that geography stands or falls.(2)

The first major consideration of the problem as a whole is due to Hartshorne.(3) After a careful examination of all the evidence he was forced to come to the conclusion that not only should the use of the word "landscape" be avoided as part of the premise of any regional hypothesis, but that because of its mystical implications the idea of a region as a concrete "unit whole" be rejected.(4)

He does concede, however, that some effort should be made to find regional "mosaics" (a word chosen from the most conventionalised of art forms) in order to understand more clearly the character of the region, "since reality is too complex for us

---

(2) Kurt Burger "Der Landschaft Begriff" Dresdener Geographische Studien Heft 7. (1935)

(3) R. Hartshorne - "The Nature of Geography" (A.A.A.G.) 1937

(4) op. cit. p. 263.

to present in all its details." [5] This idea is, however, not developed in his argument and is conveniently forgotten in the final assessment that " only over the world-as-a-whole can some form of areal delimitation of regions be applied." [6]

Despite the fact that Hartshorne succeeded in clearing out of the way a considerable quantity of verbal under-growth, the problem of the detailed analysis of a small unit area was left without solution. So much confusion had surrounded the concept and etymology of regionalism that this was inevitable.

Issue has again been taken over this problem since the last war, notably in the work of Kimble, Robinson, Woolridge and East, in England; and James, Platt, and Hartshorne in America.[7]

In discovering a solution which is more than a compromise perhaps the most valuable contributions have come from Robinson, and again from Hartshorne.

---

(5) op.cit. p. 276
(6) op.cit p. 284
(7) G.H.Kimble " Inadequacy of the Regional Concept " Lond Essays in Geog, (Cantab) (1951) p.151-174.
G.W.Robinson " The Geographical Regions Its form & Function" S.G.M. LXIX (1953)
S.W.Woolridge and G.W.East" op.cit.
P.E.James " Towards a Further Understanding of the Regional Concept" A.A.A.G. XLII(1952)
R.S.Platt - " A Review of Regional Geography " A.A.A.G. XLVII(1957)
Hartshorne " Perspective on the Nature of Geography" A.A.A.G.(1960)

Robinson elaborates an idea of economic regionalism originally propounded by Carol. Regions defined and charater-ised by a uniformity of individual features, Carol terms "formal regions". By contrast, areas inter-connected by one element of economic distinctiveness, (e.g. connected valley interfluves relying on the same staple crop) are distinguished as "functional regions"

Robinson maintains that by making this basic categorical distinction, Carol has taken a step toward the solution of the problem of regionalism, and Robinson takes the idea further by stressing the particular value of the "formal" approach as containing winthin it both formal and functional elements. In other words, Robinson discerned that "functionalism was merely an off-shoot of the main "formal" stem. With this discovery of regional uniformity and formalism as the main purpose of regional geography, Robinson achieved considerable reconciliation of the dichotomy of views which has hitherto divided the study.

This matrix of systematic ("functional") and regional ("formal") approaches to regional work was also conceded as permissable by Hartshorne in his post-war re-examination of the problem.(8)

---

(8) Hartshorne "Perspective on the Nature of Geography" (1958) A.A.A.G.

In his later work Hartshorne distinguishes between "topical" and "regional" studies, and notes no real distinction between the two approaches, but rather " a graduation along a continuum, from those who analyse elementary complexes in areal variation throughout the world, to those who analyse the most complex integrations in areal variation within "small areas" (9)

Hartshorne now maintains that every truly geographical study should combine both "topical" and "regional" approaches; elementary integrations are "topical", maximum intregrations are extremely "regional".

By this devious means, regional studies of small unit areas or 'landscapes' moved with necessary qualifications towards academic acceptibility. The qualification is that there is to be no mystical "unit-whole'ness which implies autonomous identity. Hartshorne has rightly emphasised the inter connections between regions which are often responsible for complex inter-penetration of regional elements.

Nonetheless, a set of geographical relationships confined within an areal limit may be unique to that area. If this is so, then that area may be called a region, irrespective of size. The much modified definition which emerges

---

(9) op.cit. p. 121. Basically, with slight alterations and improvements these are Robinson's ideas.

from Hartshorn's re-appraisal is that -:

> " A region is an area of specific location which is in some way distinctive from other areas and which extends as far as that distinction extends." (10)

Within this definition lies the resolution of the problem of regional analysis. The distinctive element by which the region gains its regionality provides, ipso facto, a basis for the development of a description and analysis:- a definition which satisfies both tenets of regional geography, and contains within it a framework upon which a regional analysis can be based.

The aim of this dissertation is to demonstrate the practical efficiency of this interpretation of regionalism. It is contended that a small region stands or falls upon the ubiquitous nature of the unifying element which distinguishes that area as a region. This feature should act as a matrix binding together strands of intra-regional relationship. If no such welding factor is apparent then the unit cannot claim regionality.

It is the writers' firm belief that in Holderness, the excess of surface and sub-surface water and patterns created by its removal provide the unifying element which distinguishes

---

(10) op.cit. p. 130.

the area as being of truly regional character. The attempt will be made to trace the patterns and the importance of surface and sub-surface water in conditioning the physical disposition and the pattern of human responses in the region. It is hoped to prove that no other single element was of similar importance in creating these patterns. If this attempt is successful then there is some justification for believing that work of recent regional theorists is vindicated; that some progress in the evolution of the concept of "Region" has been made.

(11) <u>ORGANISATION OF THE DISSERTATION</u>

The dissertation is arranged in three sections. The first deals with the evidence for suggesting that the " water surplus" (11) controlled most aspects of the early Holderness landscape. This control seems to have conditioned, not only the pattern and type of early water channels which framed the first -often inadvertent- system of drainage, but also the pattern and type of settlement and communications. Perhaps the most important response to the excess of surface and sub-surface water in the region,however, was evident in the structure of the mediaeval economy of Holderness. Some time will be spent in stating the evidence for concluding that this response was unique.

(11) This phrase was found to be the only one which adequately embraced in meaning, both visible and invisible excesses i.e. not only lakes, marshes, carrs, but also soil saturation and ephemeral water-courses.

The first part of the second section deals with the great period of land drainage in Holderness during the Eighteenth and Nineteenth centuries and with its expression in terms of great public drainage schemes, and the growth of a system of under-field drainage. Some effort is made to indicate the effect of the Inclosure movement upon the progress and pattern of land drainage. The second part of this section attempts to isolate the impact of these drainage improvements upon agriculture, and the development of settlement and communications. In this part more reliance is placed ~~more~~ upon statistical rather than historical evidence.

In the first two sections several issues are neglected in order to follow the main theme of this work. In the third section the attempt is made to redress this balance. Special features which influenced the progress of land drainage are discussed. These include both physical and socio-economic factors, several of which are of some importance in determining the ~~con~~structure of the contemporary drainage pattern.

The final chapter assesses, briefly, the extent to which the contemporary landscape still reveals the imprint of the feature which has played such an important part in its evolution.

~~cont; overleaf~~

S E C T I O N 1

CONTROL OF THE LANDSCAPE BY THE WATER SURPLUS.

CHAPTER 1. THE PHYSICAL SETTING.

(1) Regional Subdivisions.

The plain of Holderness is that triangular peninsula which forms the south eastern extremity of the East Riding of Yorkshire. The region is bounded to the west and north by the dip slopes of the Yorkshire Wolds, and to the south and east by the Humber estuary and the North Sea.
The word 'plain' suggests a certain morphological homogeneity, but as with many other areas similarly distinguished, it is mis-named. The 'plain' of Holderness in fact, contains within the limits of its subdued relief, a considerable degree of topographical variety. For the purposes of this brief preliminary survey, five subdivisions of the region can be distinguished.

(1) The Holderness clay-lands.
(2) The flood plain of the River Hull.
(3) The siltlands of the Humber Bank.
(4) The Dip-slopes of the Yorkshire Wolds.(The Wold Flanks)
(5) The 'Barmston Overflow' Channel. (fig 1)

(1) The Holderness Claylands:-

Are the largest and most physically complex of the four divisions, They consist of a series of arcuate moraines extending from north-east to south-east. These moraines,

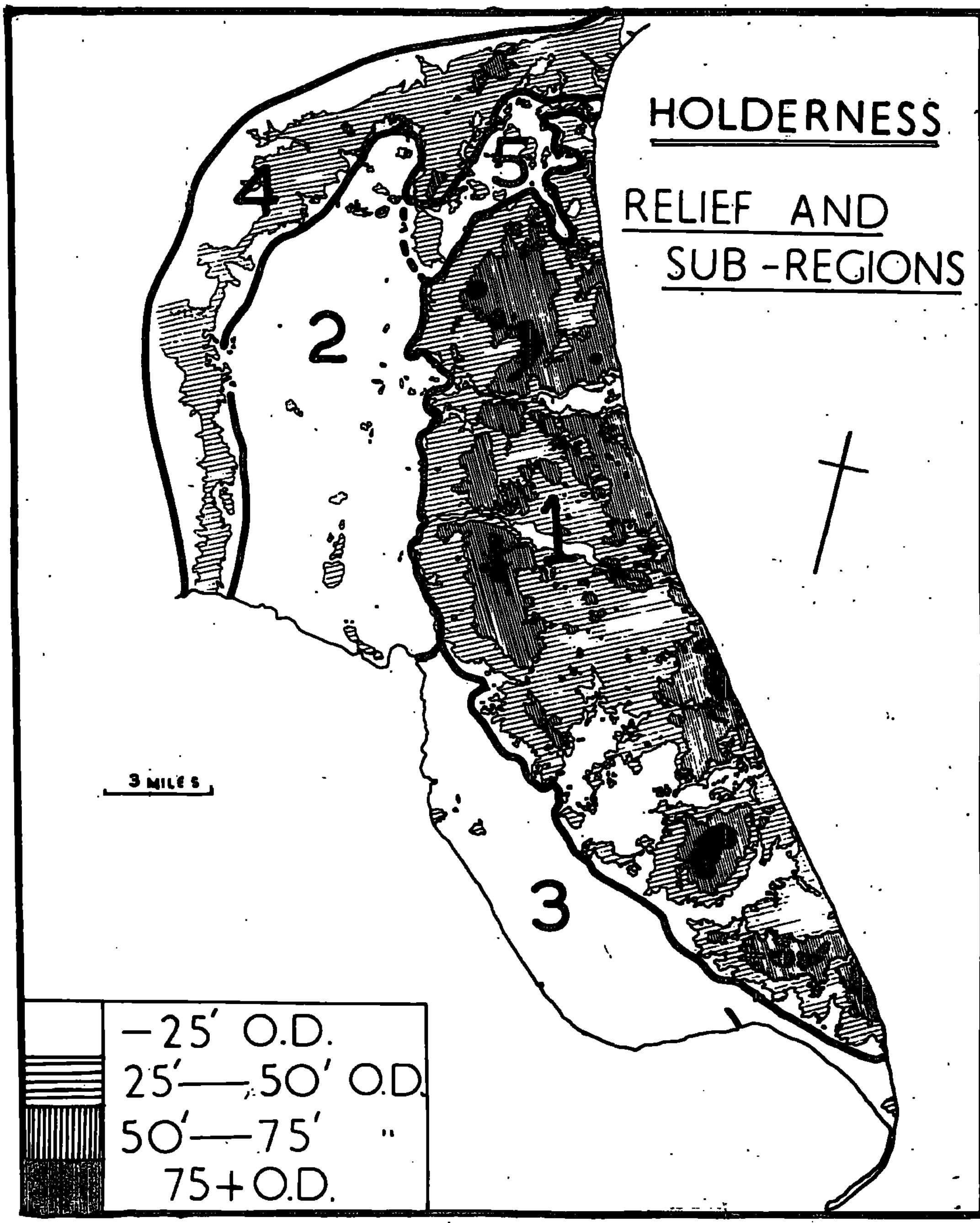

HOLDERNESS
RELIEF AND
SUB-REGIONS
1
2
3
4
5
3 MILES
-25' O.D.
25'—50' O.D.
50'—75' "
75+ O.D.

FIG 1

representing various stages in the glacial retreat, rise in most places above 25ft O.D, and in the highest, to 50ft and 75ft O.D. Much dissected by post glacial stream erosion, these moraines display little continuity. This is particularly true of south Holderness. The chief morainic ridges are separated by irregular 'kettleholes' and depressions, out-wash eskers and smaller lacustrine sand and gravel deposits. The topography is further diversified by several east-west sub-glacial valleys notably between Hornsea and Brandesburton on the one hand and Aldborough and Lambwath Bridge on the other. (fig 4.)

(11) The Flood Plain of the River Hull:-

The flood plain of the river Hull separates the Wold-flank Boulder clays from those of east Holderness. It is of a fairly uniform width of four miles throughout its length. The river has a fall of only four feet in twenty five miles, and is tidal as far as Hempholme (fig 53)

The level floor of the valley is broken in the east by a line of low glacial mounds, seldom rising above 25ft O.D, a moraine which may have been caused by a more mature "still" in the glacial retreat than those of the main morainic area further east. (fig 4.No.2.)

(3) The Siltlands of the Humber Bank:-

This area of gradually accumulating estuarine silt forms a southward extension to the claylands of South Holderness.

(4) *The Dip Slopes of the Yorkshire Wolds:-*

The dip slopes of the Yorkshire Wolds are the concern of this dissertation in two respects. Firstly they constitute an effective northern and western limit for the regional unit and secondly they form a vast calcareous reservoir which ensures a continuous flow of spring water to the streams which feed the already over-burdened main stream of the River Hull.

The limits of the region as a whole are taken as being the line along which the decreasing declivity of the Wolds dip slope, and increasing over-burden of boulder clay, co-incides with the emergent spring-line to cause problems of land drainage. These conditions are fulfilled approximately along the 50 feet contour line.

(5) The 'Barmston Overflow Channel':-

The 'Barmston overflow channel' is a north eastern extension of the Hull valley, joining that feature with the North Sea at Barmston. This complex group of boulder clay and gravel mounds, separated by a series of inter-connected depressions may have been a desultory and sporadic overflow for the lake which probably occupied the Hull valley during the immediately post glacial period.

(ii) Topographical Evolution & the Lakes of Holderness.

Valentin maintains that the topography of Holderness is a result of ice movements during the final (Würm) period of Quaternary glaciation.[1]

The complex relief mosaic would appear to be the result of eight recessional stages in the ice-front[2] of which three are significant enough to deserve special attention. (fig 2)

The most mature in origin is the well distinguished end-moraine referred to in the previous part of this chapter which marks the eastern limit of the Hull valley proper. (No.2 in fig.2). Valentin fails to make clear whether he considers this feature to be a product of an earlier glacial phase in the Quaternary period, or merely an early "still" in the "Würm" retreat. The line of clay mounds which marks this moraine is distinctly separated from the main drift area to the east.

---

(1) Valentin - " Young Morainic Topography of Holderness" Nature Nov. 1953 p.920.

(2) op.cit. p.920.

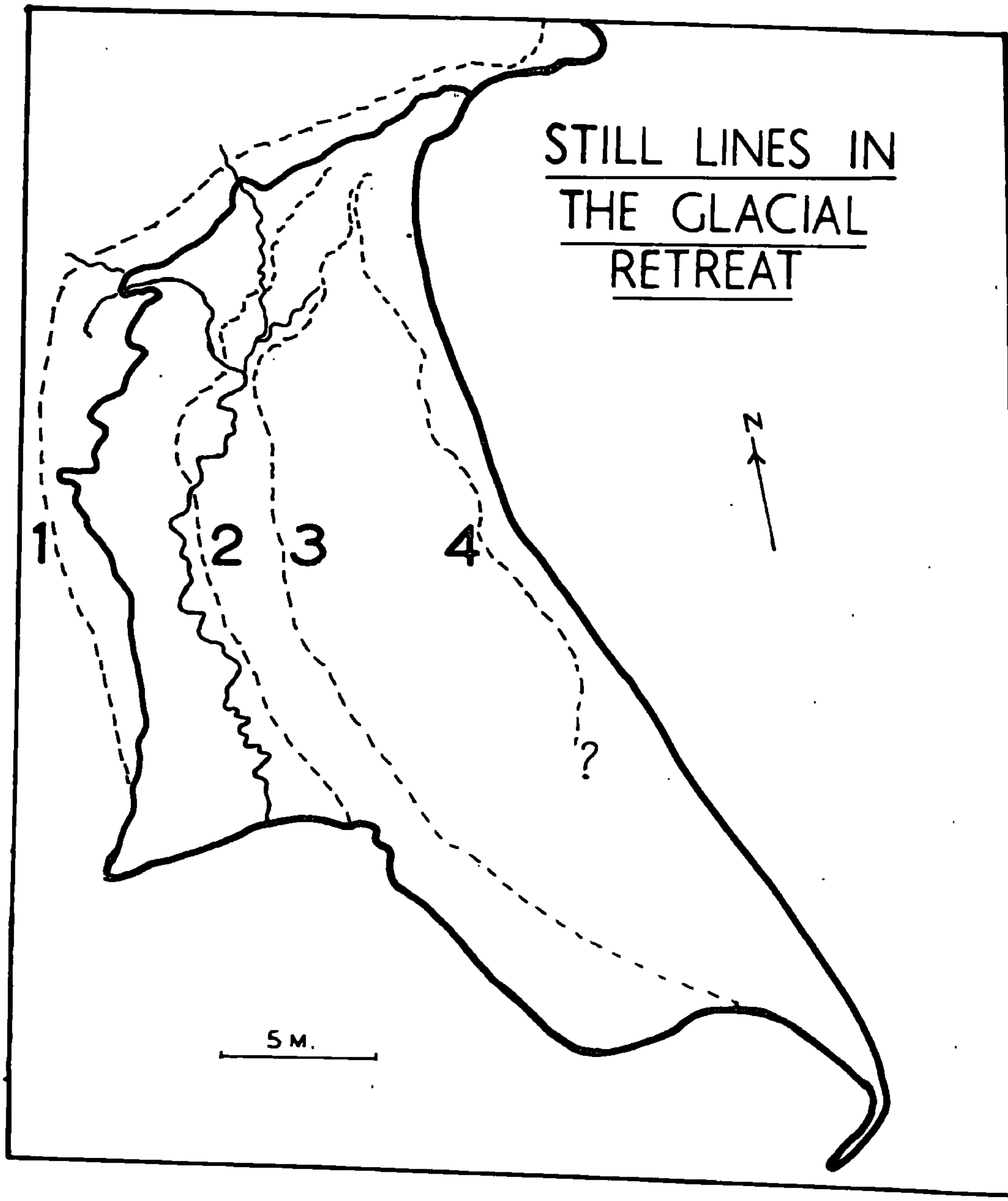


FIG 2

It would, therefore, be reasonable to suppose that the "Wurm" ice sheet found its limits east of this line, along the esker out-wash gravels which fringe the main boulder clay hummocks (fig 3). Whatever its origin, this moraine was to be of some significance in the colonisation of Holderness and will be termed the "Hull Valley Moraine". Of the two major "ice-stills" in the main moranic area to the east (Nos.3.and 4 in fig 2) the coastal deposition from the last (No.4) is most important. It is along this, the longest of the "stills", that the thickest deposits were laid down. This moraine consequently forms the eastern water - shed of Holderness which is a complement to the Wolds water - shed and gives the region its characteristic saucer shape in cross -section.

There is considerable evidence to support the view that at least one of these north - east to south - west running moraines extended across the Humber estuary into Lincolnshire.(3) This would make an effective dam for Wold and Holderness drainage waters, forming a large glacier lake in what was to become the Hull valley (fig 4)

---

(3) Kendall - "Glacial History of Holderness " Q.J.G.S.1902.
T.Sheppard - "The making of East Yorkshire ".
~~(4) Palmer - "Holderness in the Making " (Hull Mus.Publication)~~

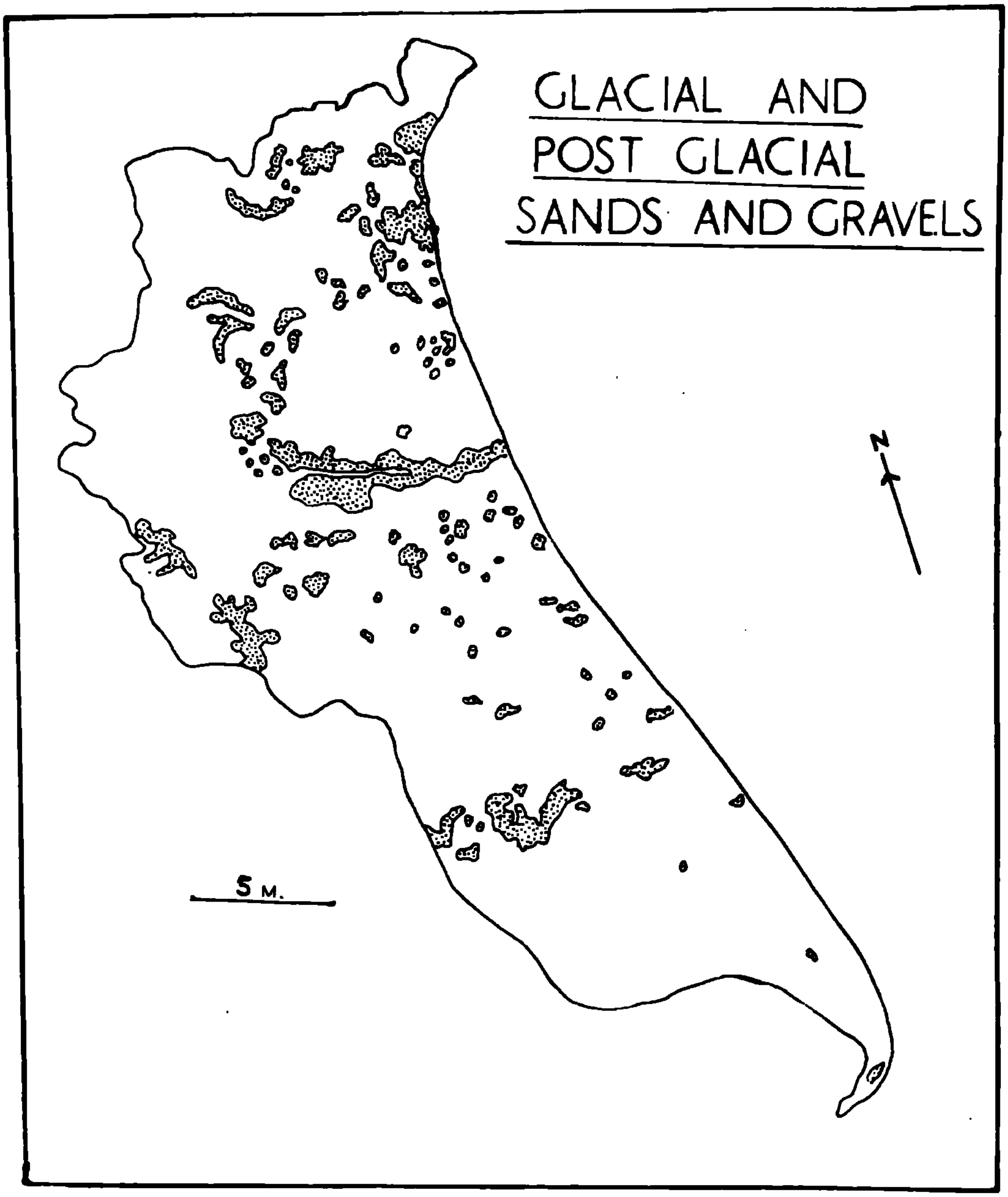


FIG 3

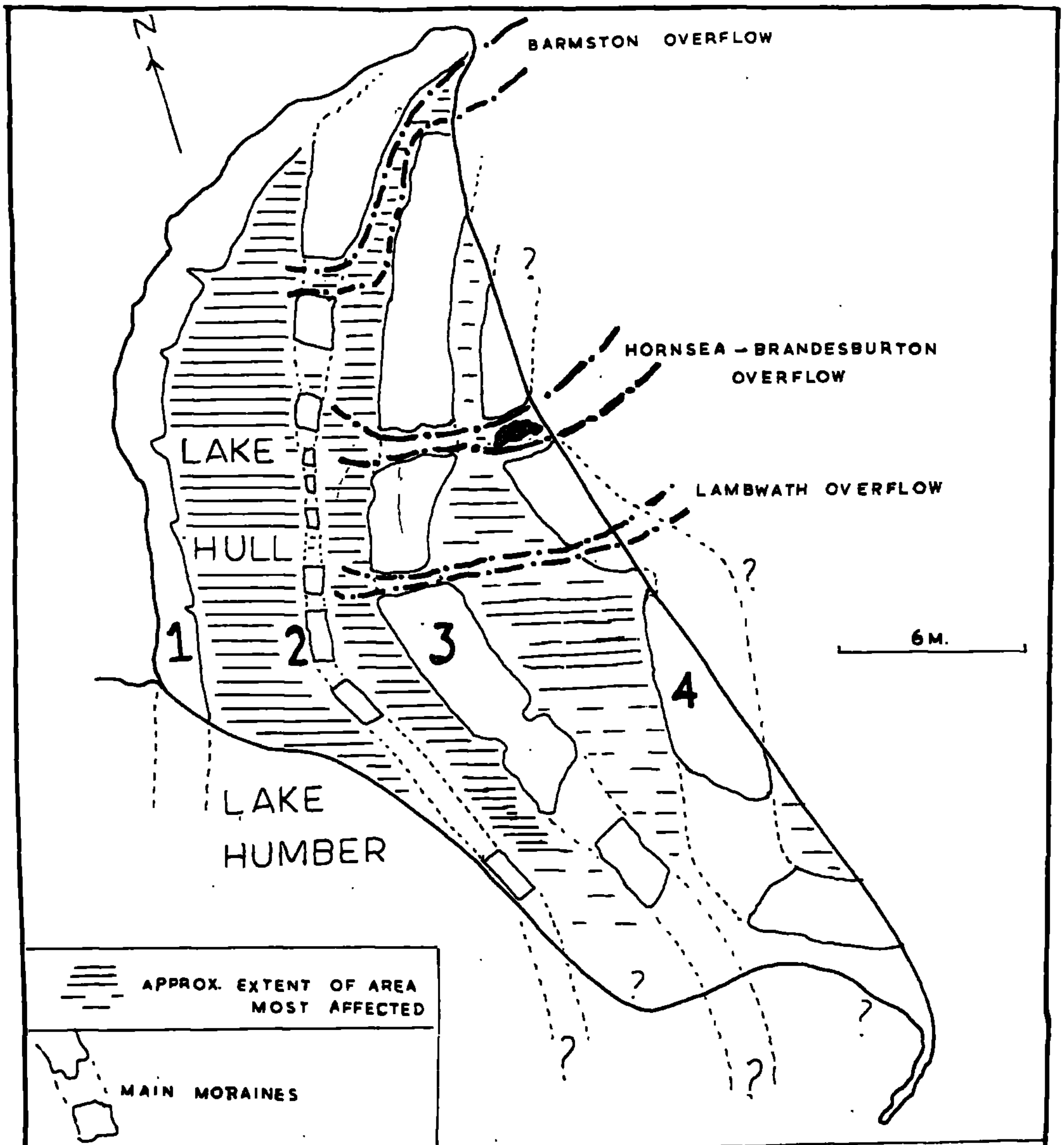
The lake thus formed probably found two over-flow channels. Primarily, water escaped southwards down the Ancholme Valley to the Wash. (4) Far more important to this work, however, is the probable minor outlet to the north at Barmston. This overflow will be referred to in this work as the 'Barmston Overflow'. It would seem to have had considerable importance in the settlement and drainage of Holderness.

A further possible outlet bisected the drift area between Leven and Hornsea. (figs. 4 & 5) This significant depression, a possible sub-glacial channel, is sufficiently continuous to justify the contention that it was a high level outlet for the lake which occupied the Hull valley. Place name evidence would suggest that this channel was sufficiently deep to be a probable line of entry during the period of Danish colonisation. (fig. 25b)

The reduction of surface drainage in the Holderness claylands produced by the Humber dam led to the formation of many smaller lakes in the kettleholes and depressions of this drift area.

There is a considerable body of evidence to suggest that not only did this more general inundation take place, but that it was a <u>dominant aspect of</u> the Holderness

(4) Palmer "Holderness in The Making" (Hull Mus. Publication).



POST GLACIAL INUNDATION

FIG. 4

FIG. 5

landscape until the drainage operations of the Eighteenth and Nineteenth centuries. As much of the argument of this dissertation depends upon the firm evidence that this general inundation took place, an examination of the causes for this phenomenon, is justified.

Evidence can be grouped under two heads; geological and structural, and historical. In the Hull valley borings have revealed a deposit of warp varying in thickness from twenty to forty feet.[5] Such deposits could only have been laid down during a long period of inundation. On the drift, one lake (Hornsea mere) (fig 28) still remains to indicate the existence of others. Evidence of these are found in the laminated re-deposited clays, revealed in the eroding cliff line (fig. 6) and in the post-glacial lacustrine deposits of varying size distributed throughout the area, many of which are shown on Ordnance Survey Drift maps.

A large body of historical evidence supplements these physical indications of inundation. Some further substantiation from place name studies is included in this work,[6] but the main historical evidence for the existence of these lakes and marshes is supplied by Sheppard.[7]

(6) Chap. 4 (iii) (5) J.Sheppard - "Drainage of the Yorks Marshland" Lond Univ. Thesis.
(7) J.Sheppard - "Mediaeval Meres of Holderness" I.B.G.1958. (~~op.cit. p.220~~)

Miss Sheppard has shown that not only did these aqueous tracks cover a large area in Holderness, but that they remained the dominant feature of the landscape until the end of the mediaeval period. (Appendix 1a) It is part of the purpose of this work to utilise the pioneer scholarship which has proved the existence and importance of these stretches of marsh and lake as the basis for further elaboration. It is hoped to demonstrate the extent of such importance in the development of a distinctive regional economy and a unique pattern of settlement.

(iii) <u>The Holderness Landscape Before Colonisation.</u>

It is now possible to attempt a reconstruction of the Holderness landscape immediately before the major period of colonisation, undertaken by the Saxon and Danish peoples between 400 and 1000 A.D. Before this period, colonisation of Holderness was superficial. No alteration of the delicate balance of natural forces was effected by early primary settlers who made no significant contribution to the formation of the regional mosaic.(8) This region of difficulty was usually avoided by prehistoric peoples in favour of the more adaptable Wolds landscape.

---

(8) Chap. 4. (ii)

FIG. 6

The last great physical change, affecting the physical evolution, of Holderness was the breach of the ' Humber Dam ' which probably took place about 400 A.D.(9) From this time Holderness gradually assumed the shape more closely resembling that which it has to-day. The complex of morainic undulations (the Holderness claylands) in the east still formed the core of the region, it is probable, however, the coastal watershed was higher than it is now.(10) The relief pattern seems to suggest that coastal erosion(11) has considerably reduced the height of this feature (fig. 1). Such a reduction in height would have influenced the speed both of the ' run off ' and of the accumulation of silts in the bottom - lands. The factor has undoubted significance in the development of particularly the southern parts of Holderness, where this watershed was highest.(12)

Generally the undulations in the drift rise to little more than 50ft and often to no more than 25' O.D. (fig. 1.) Between these clay hillocks, stretches of swamp, and lake

---

(9) J.Sheppard op. cit. p. 220.
(10) Chap. 16. (i)
(11) T.Sheppard in " Lost Towns of the Yorkshire Coast "(1910) shows that the contemporary average rate of erosion is 7' per anum a figure recently checked by the writer.
(12) Chap. 16. (i).

were probably covered by a thick tangle of aquatic plants developed during the ameliorating conditions after the Ice Age.[13] The hillocks themselves were doubtless covered by a close development of deciduous woodland and undergrowth.

This complex area in the east of Holderness was separated from the rest of the East Riding by the large swampy glacial hollow of the Hull valley into which seeped most of the waters of both the Wolds and Holderness. It remained a feature of the landscape until the end of the Eighteenth century and has played a significant part in the evolution of the region.[14] (fig. 4.)

Retained by the vegetation cover, the movement of moisture would be slow; by evaporation rather than by ' run off '. Natural drainage must have been sporadic and indeterminate. By a use of aerial photographs; drainage flow lines

---

(13) Wright - " The Quaternary Ice Age " p.82 and Palmer, opcit. 7.
(14) It is probable that the origin of the word 'Holderness' reflects this importance. Camden in his 'Britannia ' (1753) notes the etymology of this word as Hol(low) - deira - ness. "The nose divided from Deira by the hollow "
T.Blashill (History of Sutton-on-Hull) supports this view, adding that 'Hol' may be an abbrevation of the Saxon 'Holme' or 'island'
Sheahan and Whelan "History and Topography of the City & County of York " (1853) point out, however, that 'Hol = Gaelic for water "Der" = stream and "Ness " = nose.

marked on Ordnance survey six inch sheets; and the more reliable of the early maps showing natural drainage, it has been possible to determine the direction of flow of the main natural 'streams'. At this stage they can scarcely have claimed the distinction of this term. In fact, during the period under consideration ' seepage' may be a more appropriate descriptive mount (fig. 7)

From this reconstruction of natural streams, and by studying the map of the catchment areas of the various modern drainage authorities (fig, 8) it has been possible to determine the three main directions of natural drainage (fig, 9). A relatively small proportion of the water from the Holderness claylands would seem to have supplemented waters in the 'Barmston Overflow', to find outfall in the North Sea; most of the waters of the region drained into lakes of the drift and eventually into the Hull Valley and the Humber estuary. The considerable concentration of flow lines towards the Hull Valley and the Humber is clearly demonstrated.(15)

---

(15) In view of the soft clay cliff line it is perhaps fortunate that most of the waters drained from the coast, towards the west, rather than into the sea. The progress of coastal erosion could only have been encouraged, had the main watershed been situated further inland.

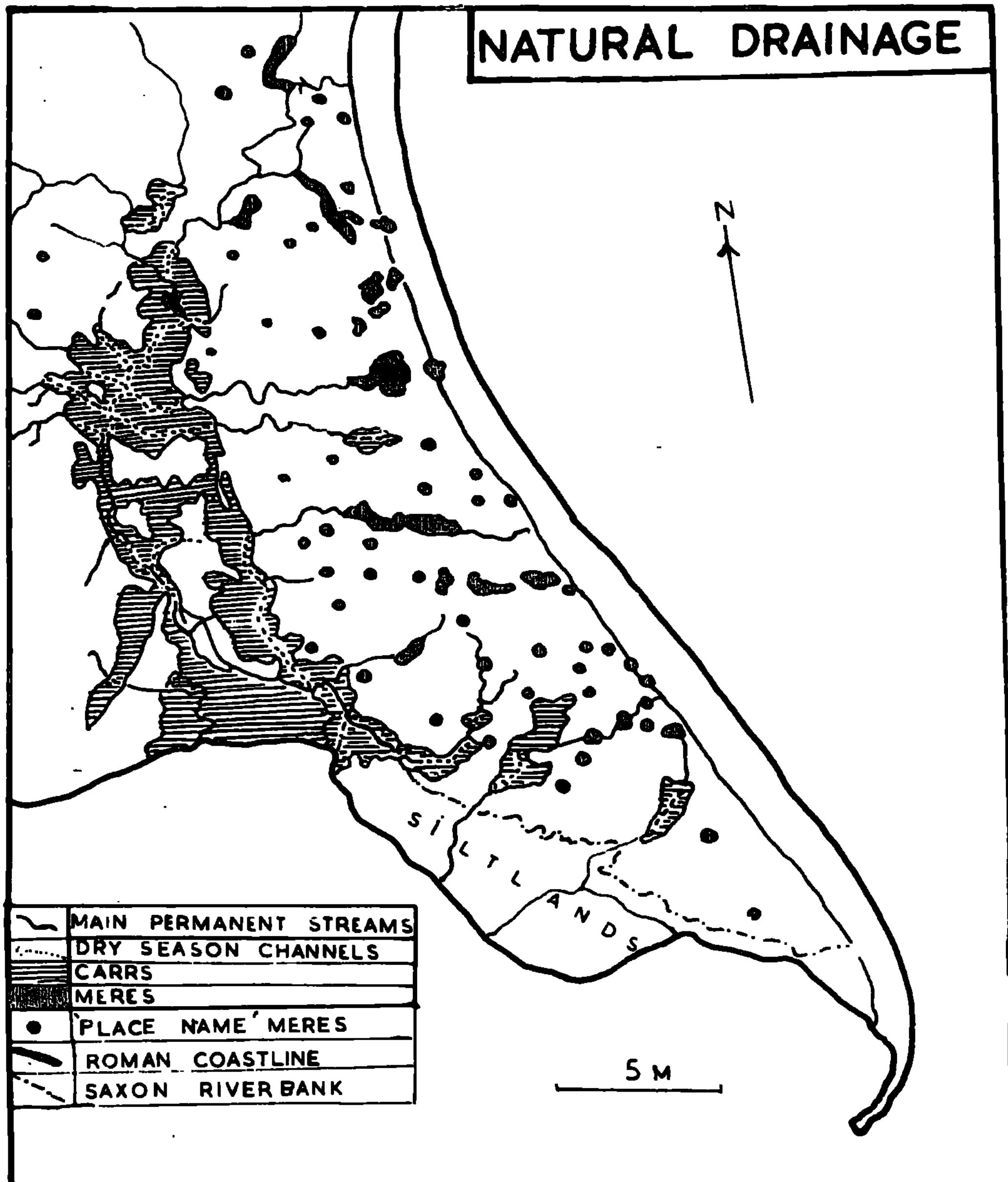

NATURAL DRAINAGE
N
SILTLANDS
MAIN PERMANENT STREAMS
DRY SEASON CHANNELS
CARRS
MERES
'PLACE NAME' MERES
ROMAN COASTLINE
SAXON RIVER BANK
5 M

FIG. 7

In conclusion it is possible to suggest that in the period of Saxon colonisation in the Sixth century A.D. Holderness was, it would appear, an area of swamp, marsh and lake, interspersed by a discontinuous series of clay and gravel hummocks. Any movement of surface water would probably be greatly impeded by a thick cover of deciduous and aquatic vegetation. Isolated and insulated by the more general inundation of the Hull valley and Barmston overflow, the region was, with notable exceptions, generally avoided by pre - Saxon settlers; a source of fish and fuel for foraging expeditions from the more habitable Wold lands; and a refuge in times of assault.(16)

(16) Chap - 4. (ii)

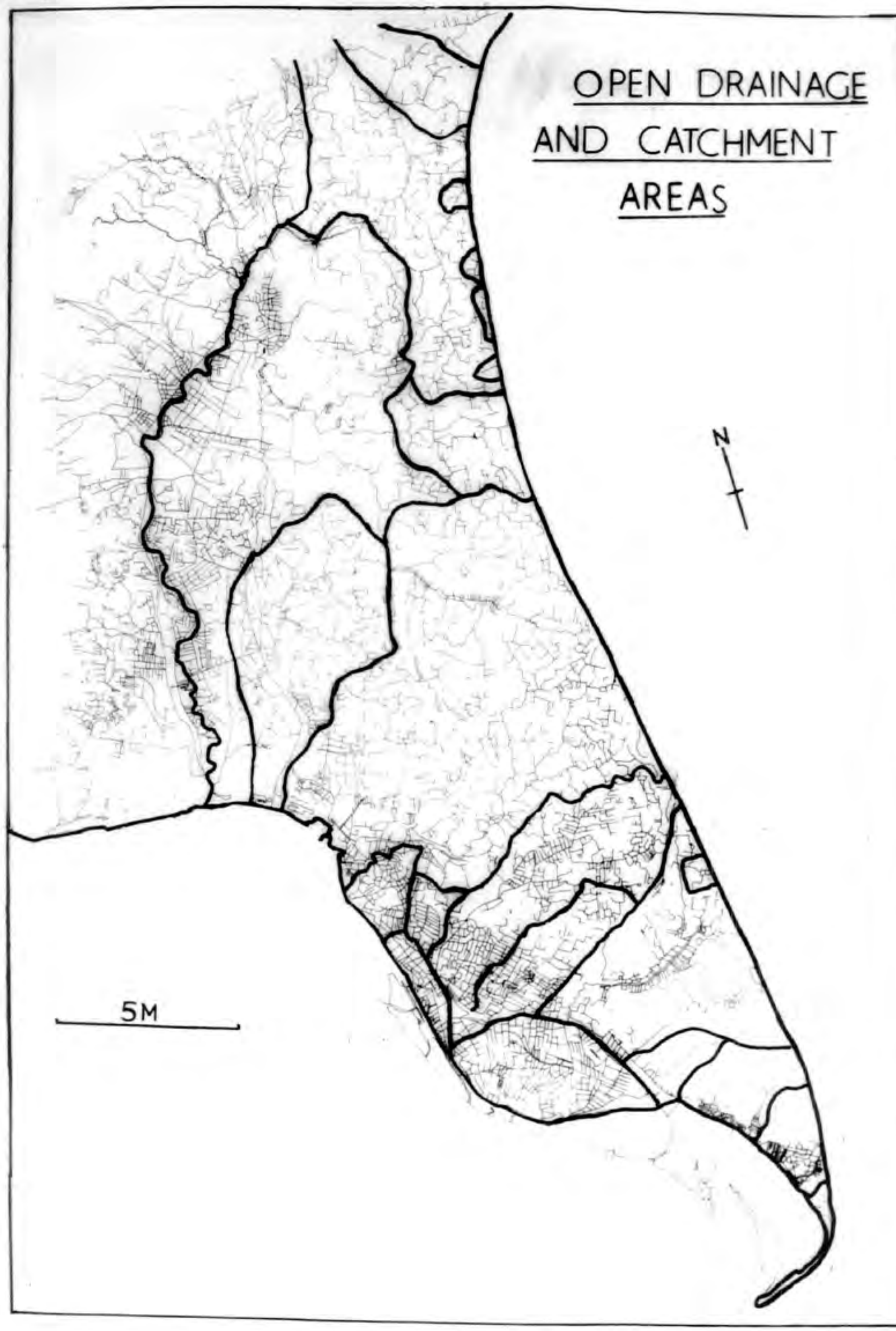


FIG. 8

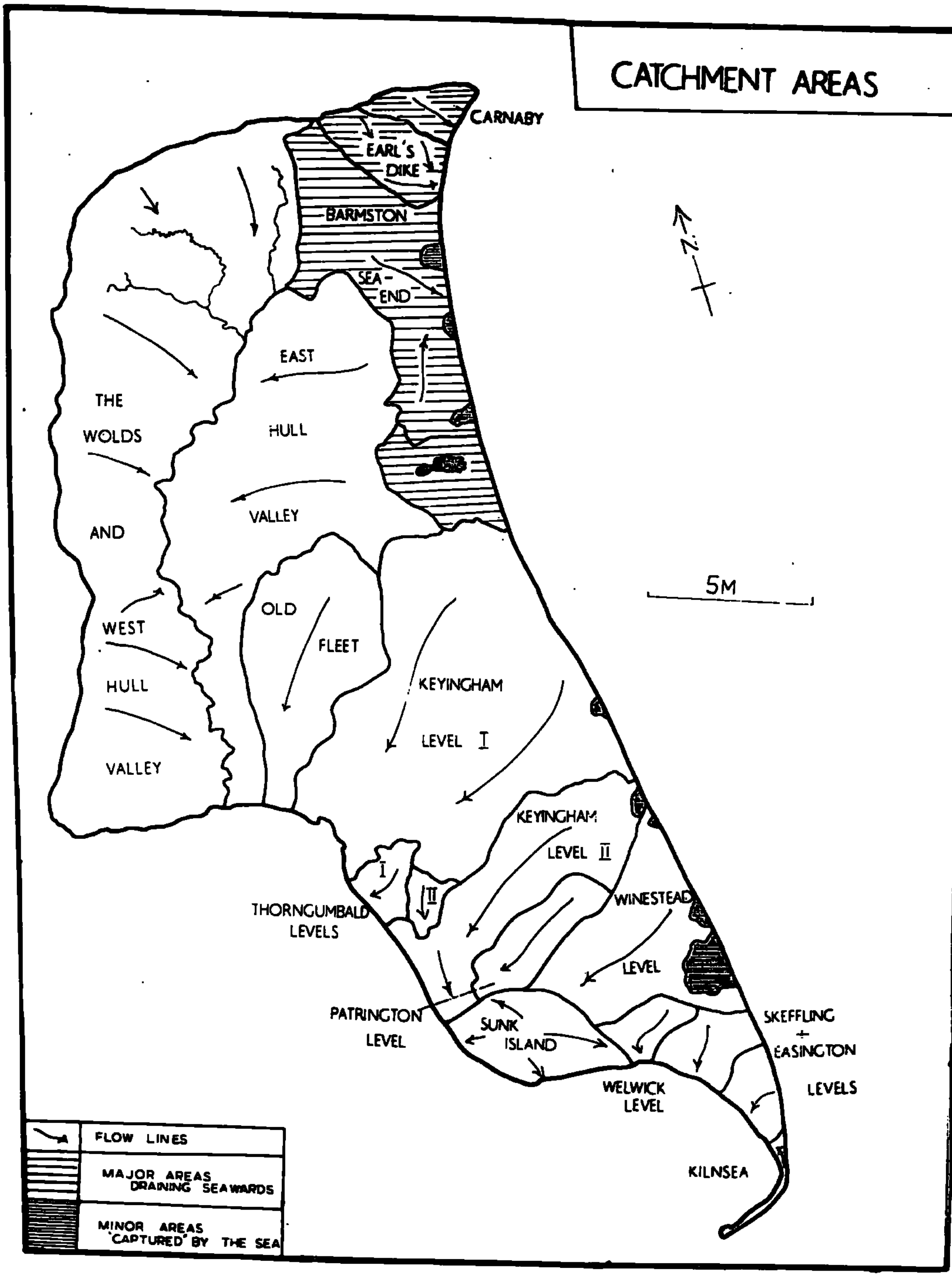

CATCHMENT AREAS
CARNABY
EARL'S DIKE
BARMSTON
SEA-END
EAST
HULL
VALLEY
THE
WOLDS
AND
WEST
HULL
VALLEY
OLD
FLEET
KEYINGHAM
LEVEL I
KEYINGHAM
LEVEL II
THORNGUMBALD
LEVELS
WINESTEAD
LEVEL
PATRINGTON
LEVEL
SUNK
ISLAND
WELWICK
LEVEL
SKEFFLING
+
EASINGTON
LEVELS
KILNSEA
5M
FLOW LINES
MAJOR AREAS DRAINING SEAWARDS
MINOR AREAS 'CAPTURED' BY THE SEA

FIG. 9

CHAPTER 2. EARLY DRAINAGE WORK 1000 - 1760.

This chapter is intended partly as a summary of previous research into the history of land drainage in Holderness, and partly as a supplement to that work.(1) Its main purpose, however, is to serve as a reference chapter. As such, it is a framework for the main thesis of this dissertation, an excercise involving some juxtaposition of evidence from different historical periods.

Early land drainage activity in Holderness may be divided into three historical phases;(2)

(i) Earliest activity 1000 - 1367.
(ii) Mediaeval Lassitude 1367 - 1660.
(iii) A period of growing interest and minor improvements 1660 - 1760.

---

(1) J. Sheppard - "The Drainage of the Yorkshire Marshlands " Ph.D.Thesis - London Univ.1956.
"Mediaeval Meres of Holderness " I.B.G. 1958.
Lythe " Drainage and Reclaimation in Holderness. 1760 - 1830" Geog. Dec, 1938.
(Supplemented by material from the E.R.P.R.O.)

(2) Lythe distinguishes five stages, but his divisions can justifiably be telescoped.

(i) Earliest Activity 1000 - 1367.

The first authentic record of drainage work in Holderness is concerned with embankment along the Humber, and dates from the end of the Thirteenth centuary. In 1285 Thomas de Normanville was instructed by Edward I. ' to view and mende the Humber bankes '.(3) Blashill in his history of the township of Sutton (which stands close to the banks of the Hull) mentions a record of embanking here as early as 1086, but he fails to quote the source of this information.(4) The date is, however, significant and it may be that Blashill, noting that Sutton is mentioned in the Domesday Survey, assumed quite reasonably that the township could not have existed without some control of the tidal flow in the River Hull.

---

(3) This, and following references are taken from Court Rolls of the period transcribed first by Dugdale and quoted in full in his "History of Embakkyng and Drayning" (1662) p.129. later taken by Poulson and used in his "History of the Seignory of Holderness " (1840) Vol.1. p.116. - 124.

(4) T.Blashill "History of Sutton-on-Hull " (1867) p.13.

Waters from this source were certainly saline and useless even in an area where quite poor marshlands were highly valued.(5) There is little doubt that some drainage work was done to improve the saline marshes of both the south Hull valley and the Humber banks of south Holderness, before the date of the first specific record. Although no records exist which specify drainage work as well as embankment in these areas, the Melsa Chronicle (6) refers to early inclosures in such new drained lands.

e.g. " The improved marsh of Wawne was divided amongst three tenants, each tenant marking out in the said marsh according to the quantity of his tenements " (trans) (7)

or again, "Peter de Wagna.......dedit uidam Reginalis de Ulram unam dailam......... " (8)

Certain records of instructions to embank the rivers Hull and Humber occur with sufficient frequency after 1285 to justify the contention that this activity had taken place long before this time.(9)

---

(5) Chap. 3 (ii)
(6) The 'Chronica Monasterii de Melsa ' is a continuous record of the main events affecting the Cistercian abbey at Meaux in the Hull valley, from 1150 to the time of its dissolution. It has been transcribed, but not translated by A.E.Bond in the series "Retum Brittanicum Medii Aevi Scriptores" Vols. 1. 11. 111.
(7) C.M.M. Vol.1. p.45.
(8) ibid. Vol.1. p.50. daila ="lot" or "deal"
(9) In 1285 and on fourteen other occasions between 1380 and 1342 Poulson op.cit. p. 117. Dugdale op.cit. p.131.

It is also likely that the primitive sluices, (or "clows" and "Cloughs " as they are locally known) were in existence in the Twelfth century to prevent the inflow of tidal water from flooding the marsh, whilst allowing marsh to drain into the Hull and Humber on the ebb-tide.(10) The sluices can hardly have been intended as a means of drainage. Fresh water marsh remained a feature of these lower siltlands until the public drainage schemes of the Eighteenth century. Nonetheless, it is possible to trace some extension of drainage activity during the Fourteenth century, particularly in the Humber siltlands of south Holderness, where the accumulation of very fertile esturine silts made reclamation possible. Not only were embankments made but there are records of ditchmaking and scouring throughout the area of South Holderness. This activity did not last for long, but it was something of a phenomenom in a region where economy was not orientated towards land drainage. The first records of ditch improvement date from the early Fourteenth century. In 1312 a sewer between Burstwick and Paull was scoured and in 1329 a new sewer between Hedon and Burstwick was made.

---

(10) C.M.M. Vol. 1. p.7.

For the years 1342 and 1367 more general injunctions for drainage survive. The 1342 injunction was not wide in scope, mentioning only a few of the ditches which must have existed in the region. (Appendix 1b.) It was, nonetheless, the first attempt at a more general improvement for which records remain, despite the concentration of interest in south Holderness.

The beneficial effects of drainage in south Holderness deriving from 1342 improvements were probably sufficient to act as a spur to further improvement. In 1366 five men were appointed to examine the state of the land drainage throughout the East Riding. It is probably due to their report that the first Court of Sewers for the East Riding was established in 1367.

Twelve jurymen were appointed to report in detail on each division of the Riding. Their account of ditches which needed attention, with notes concerning not only apportionment of responsibility for cleaning, but also including specific ditch sizes, is the first existant full record of open drainage in Holderness. (Appendix 1b). The distribution of drains mentioned in the 1367 Inquisition (14) is much more

(14) Dugdale from Court Rolls p.133, op.cit, and Poulson p.116.Vol.1. op.cit. p. 117 - 126.

revealing than that for 1342. The marked concentration of activity in south Holderness is brought into clearer relief in the over-all pattern (fig.10). The stipulation of ditch sizes (See Appendix 1b) also gives some indication of the importance of each drain, indicating those which were arterial drains, and those which were wide enough to be used for navigation.

After 1367 there seems to have been a rapid decline in sewer scouring construction. The reason for the decline in the interest in drainage during the next three years is probably initially due to the losses of land through the Humber storms (1349 - 1401) which "re-claimed" all land previously taken from the river in the preceding centuries and devastated several townships which had developed on the silt-lands.[15]

Sheppard has suggested that the various marsh diseases caused a decline in vitality which would contribute to this decrease in interest throughout the region.[16] It is possible to claim, however, that apart from this extremely local concentration on improvement in south Holderness there was little interest in removing surplus water, and that the manifestation

---

(15) F.R.Boyle. op.cit. also Chap. 16 (i)

(16) J.Sheppard op.cit. p. 312.

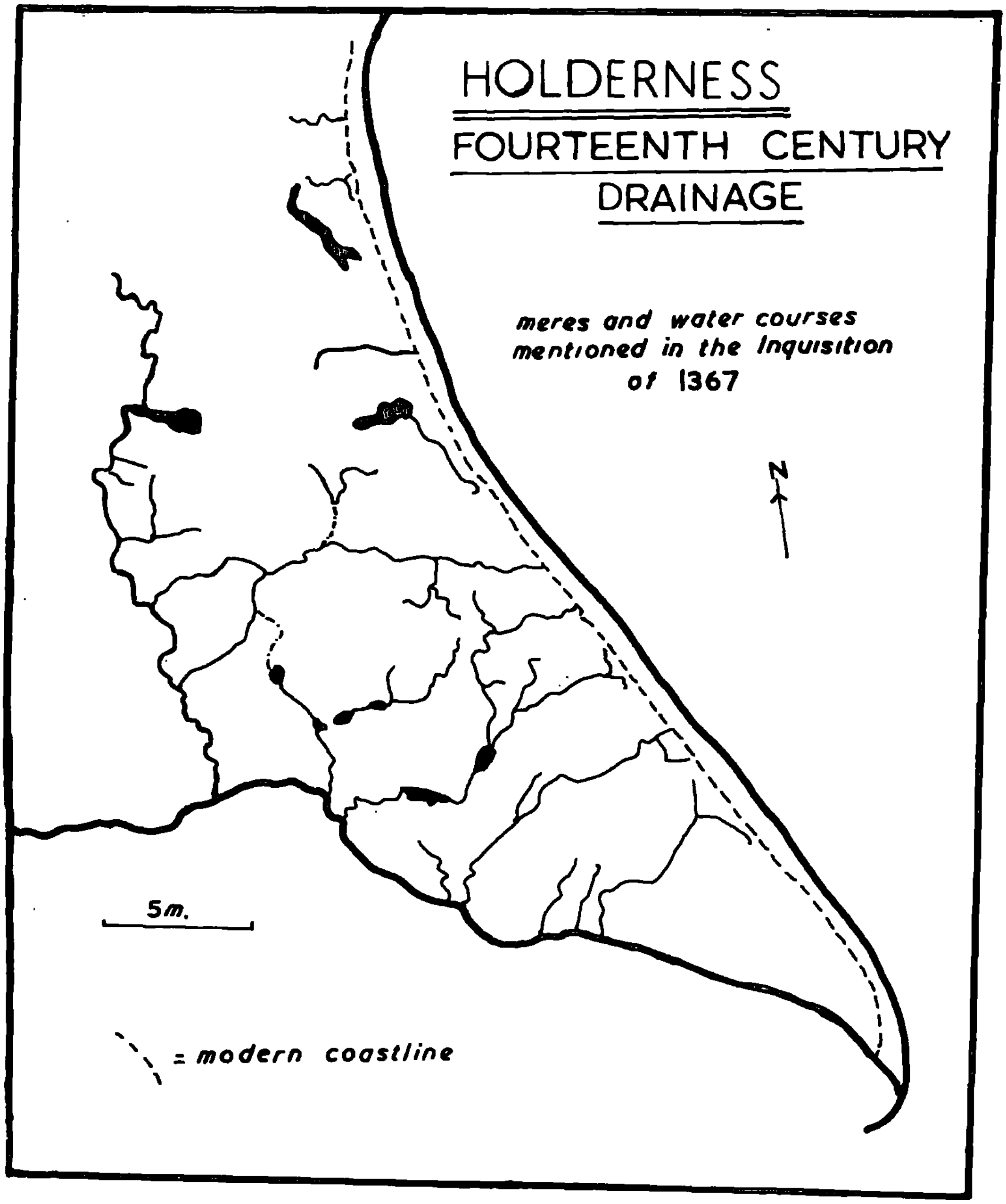

HOLDERNESS
FOURTEENTH CENTURY
DRAINAGE
meres and water courses
mentioned in the Inquisition
of 1367
N
5m.
= modern coastline

FIG. 10

of an increased interest in drainage matters suggested by the 1367 Inquisition is anomolous. The whole orientation of the mediaeval economy of this region was probably towards preserving water rather than removing it.[17] Only where useless saline water inundated areas where potentially fertile silts were being deposited, was land drainage deemed advantageous. The concentration of activities in south Holderness at the probable expense of the rest of the region is due to four factors; firstly, the value of the rich silt deposits accumulating along the south Holderness shore was probably recognised early.[18] Every advantage was to be gained by their reclamation and use for both pasture and crops; secondly, the drainage of these silts was made easier by the steeper gradients of slopes immediately north and east of the area, which lies, at the most, only ten miles from the main watershed of Holderness, (fig.4.) then higher than it is to-day, after six centuries of coastal erosion; thirdly, the lord of Holderness had taken Burstwick (in the south) as his manse, and it is likely that his interest would be concentrated in this part of the region; finally, the crown claimed all land taken from the sea, and the kings would naturally be anxious

---

(17) Chapter 3. (ii)

(18) Chapter 16. (i)

for this work of reclamation to continue.

It is also significant that the body founded to further drainage work only forty years before the final inundations of 1397 - 9 should so quickly become completely moribund. The effective life of the first 'Commission of Sewers for the East Riding' would appear to have ended almost as soon as this institution was born.

(ii) The Period of Mediaeval Lassitude 1400 - 1660.

"The Commission of Sewers for the East part of the East Riding" was after its enthusiastic inception in 1367 a moribund and ineffectual body.

Few records were made during this period in the minute books of the Commission.[19] Few ditches were cleaned and fewer still constructed. The only work attempted was probably associated with three factors; the need to improve and maintain existing navigation canals, and to delimit property; and the deepening of transient natural watercourses to power water mills.[20] The modern drainage system still reveals in its complexity the changing needs which the water of the region has met during the history of its manipulation. (fig 8).

(19) C.S.R. / 1 / - E.R.P.R.O.
(20) Chap. 16. (ii)

The direction of flow of many of the watercourses which the region has inherited, shows that they were obviously not constructed with any idea of removing the water.[(21)]. Nonetheless, the lack of drainage activity was in some measure due to apathy. Even those watercourses which it was essential to maintain were neglected.

In 1597, Julian Dike, the channel bringing fresh water from the Wolds springs to the developing township of Hull, was allowed to become so stagnant that ;

> " Ye inhabitants of Kingston on Hull had no swete water coming into ye towne but only by botes and lighters ". (22)

This was probably the most valuable and essential water channel in the region (fig 11) and it is possible to imagine the state of repair of other, less vital, channels.

Reports of lack of maintainance during this period are numerous. Watercourses were often completely stopped. In Lowethorpe in 1372 the main street was flooded to "the daungre of alle passying by " and in 1392 Burstwick dike was so stopped up from lack of cleaning that navigation was impeded[(23)]. It is noticeable that in the claylands " willows growing beyond measure hindered the course of streams."[(24)]

---

(21) Chaps 3.(ii) 16.(ii)
(22) E.R.P.R.O. C.S.R/'/45.
(23) C.T.Flower. "Public Works Mediaeval Law" Vol. 11.p.312 & 356.
(24) Poulson op.cit. vol. 11. p.123.

With all these, the complaint is the reult of considerable disadvantage rather than minor inconvenience. There must have been many small grievances which never reached the courts.

The Fourteenth century inundations along the Humber foreshore were so disastrous that they caused complete resignation in an area where drainage activity had been so keenly activated a hundred years earlier. Tides were allowed to penetrate through the cloughs, down the long creeks. Land-water, prevented from flowing down as far as the cloughs and the shoreline, overflowed the surrounding land.(25) In Keyingham fleete (1550 - 60) water flowed back down the channel away from the outfall to 1' 4" above the level of the water in Burton Pidsea Carr, four miles inland.(26) Throughout the Seventeenth century, heavy rainfall allowed the lands between Burstwick and Winestead to be " all overflowed with water for many years "(27) For the whole of the period between 1367 and 1660 there are no records of work undertaken by the Commission of Sewers, and only complaints of the worst catastrophies would seem to have reached the record books.

---

(25) E.R.P.R.O. - Paines C.S.R./1/12.
(26) E.R.P.R.O. Feet of fines - C.S.R./1/24.
(27) C.S.R./1/33

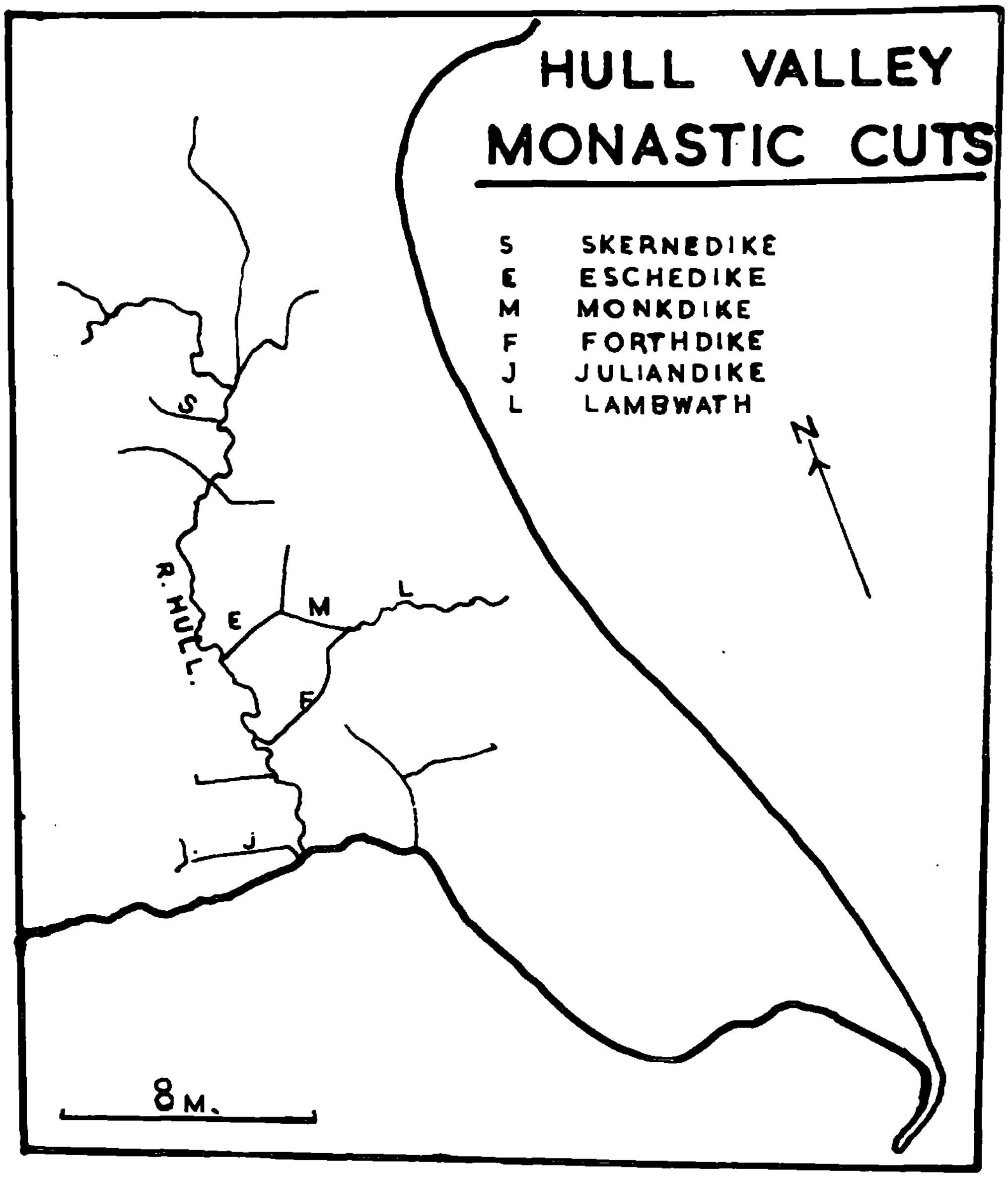

HULL VALLEY
MONASTIC CUTS
S SKERNEDIKE
E ESCHEDIKE
M MONKDIKE
F FORTHDIKE
J JULIANDIKE
L LAMBWATH
N
R. HULL.
S
E
M
L
F
J
8 M.

FIG. 11

(iii) 1660 - 1763. Minor Improvements.

The drainage 'revolution' in Holderness did not begin until the middle of the Eighteenth century, but it had its roots in the increase in drainage activity a hundred years before this time.

The growth of interest in land improvement by drainage, was slow, and any such improvement which did take place was similarly hesitant.

In 1660 the Commission of Sewers was reformed. Juries were appointed, meetings held more frequently, and the general principle of improvement for its own sake seems to have been recognised. The results of the first two years of renewed activity comprise two large volumes in the Commission of Sewers records.[28] The first deals with the official daily work of the Commission; a record of pains and injunctions on the scouring maintainance of all dikes in Holderness. Juries were instructed to enquire into a much wider variety of drainage matters, including the origins of springs and the grounds through which the water passed. They were to apportion responsibility for maintainance of ditches not only "by custom and tenure" but, where this was insufficient, by working out a tax per acre themselves, as they saw fit.

(28) C.S.R. 1660 - 2 E.R.P.R.O.

The second volume is a record of the number of meetings of the Commission and of matters discussed. Much of this early work was associated with the increased maintainance of an existing system of drainage. The gradual changes in the economic structure of rural England, away from mediaeval manorial subsistence farming, and towards the commercial growing and rearing which characterised the Eighteenth and Nineteenth century, naturally influenced the region. It led to a growing recognition that the framework of waterways was inadequate to meet the demands of land drainage. Many of the lowland drains had probably been constructed as boundary ditches, canals, and mill races.(29) Land drainage was inadvertent rather than intentional.

The inadequacies were many. Most of the waters of Holderness eventually found their way into the River Hull, or into the transient streams flowing into the River Humber, Old Fleet, Hedon fleet, Keyingham and Patrington fleets. Early improvers quickly realised that work must begin on the lower courses of these natural streams, before any improvements in the clay hummock areas were possible.

(29) Chap. 3. (iii) Chap. 16. (ii)

In the lower Hull valley, the boundary ditches and canals laid down by the Cistercians of Meaux and other landlords, lay pre-dominantly in an East-West direction across the slope of the valley.[30] (fig, 11)

The chief difficulty lay in persuading the inhabitants of the lower valley to allow water from further north to pass through their lands. This was particularly true of the township of Sutton. Sutton had been one of the townships to recognise the value of improved pasture and had drained its lands early in the Thirteenth century.[31] This they had done by blocking Old Fleet (Goldikestock) and preventing Carr water from further north from reaching this course except in dry summer months. Carr water was thus forced to follow the old East-West Monastic canal cut (further north) known as Forthdike, finding outlet into the already overburdened River Hull. (fig, 12)

Opposition to improvement was strong.[32] Golddike Stock had been in existence long enough for it to become 'law and custom', through which so much local administration was

(30) J.Sheppard. "Drainage of the Hull Valley " E.Yorks. Loc; Hist. Soc. Series. 8. p.6.

(31) T.Blashill - op.cit. p. 13.

(32) C.S.R. / 12 / 7. - E.R.P.R.O.

perpetuated. The Commission of Sewers could do nothing to alter the situation.

Several attempts were made by private landlords to overcome the difficulty. Sir Joseph Ashe, who inherited the Manor of Wawne in 1657, diverted Eschedike (Engine Drain in fig 12.) Using methods learnt from Fenland drainers, he erected banks around Wawne Parish to exclude other carr waters, and built two windmills pumps to lift the water over the banks into the River Hull.[33] Later, with the shrinking of peats, two more such devices were added. In 1693 Sir Joseph Bradshaw erected similar windmills at Routh and Lord Micklethwaite did the same at Swine in 1762[34]

On the west side of the River Hull,however, there was little improvement, it was still " Miserable drowned by neglect of divers persons "[35] Even the drains which did exist were virtually useless. White Dike, one of the main ditches was completely " Stopped with mudde "[36]

(33) J.Sheppard op.cit. p. 10.
(34) J.Sheppard op.cit. p. 11.
(35) C.S.R. /18/4.
(36) C.S.R./21/17.

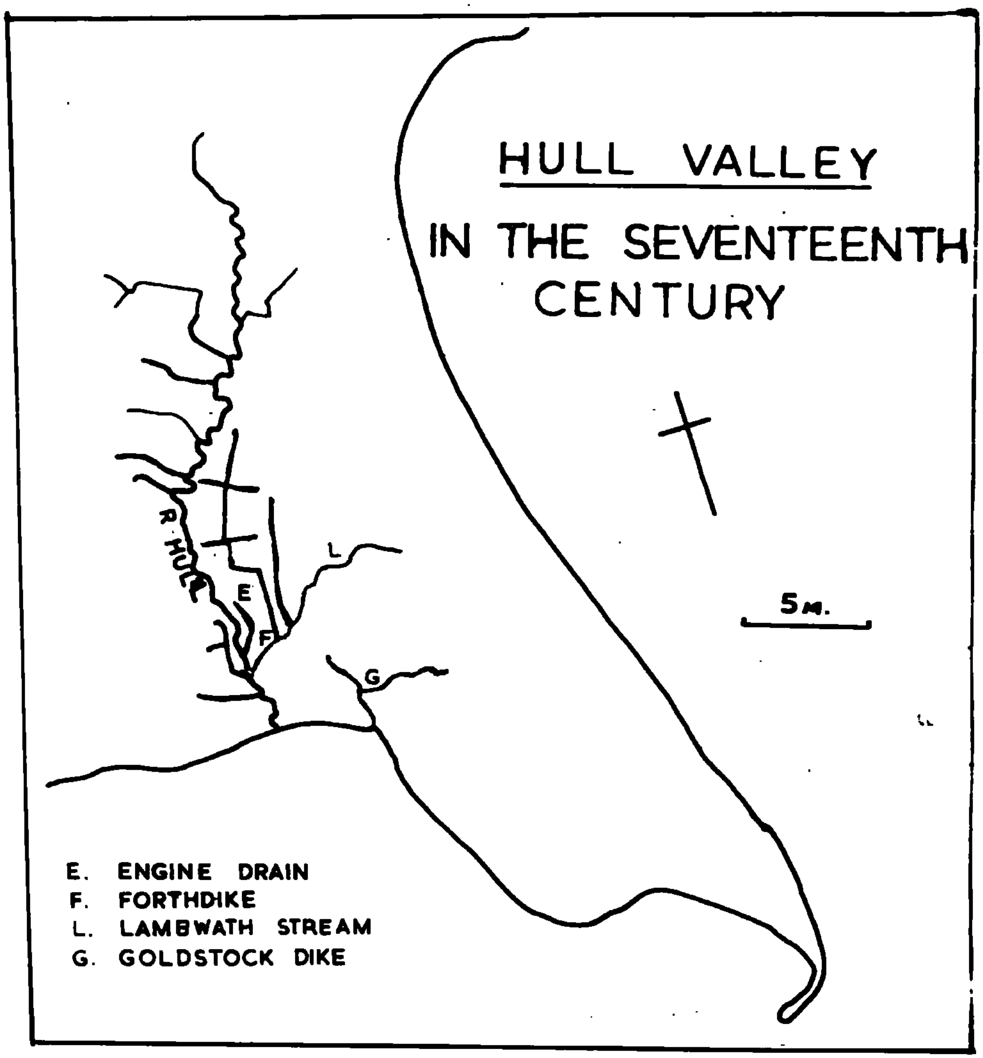

HULL VALLEY
IN THE SEVENTEENTH CENTURY
R. HULL
E
F
L
G
5 M.
E. ENGINE DRAIN
F. FORTHDIKE
L. LAMBWATH STREAM
G. GOLDSTOCK DIKE

FIG. 12

Further north in the valley, the landscape of marsh and island remained unaltered. Sometimes the bed of the river Hull was shallow enough to allow fording, where, to-day, there is twenty feet of water. A Seventeeth century Book of Paines notes that;

> " No person shall drive cattel across the River Hull between Ox Pastures (N.Frodingham) and Weel Clow, at paine £1 per beast " (37)

In 1763 Grundy found two to four feet of water over all the Northern carrs which he surveyed (38) and Iveson, speaking a year later described the area in this manner:-

> " the said low grounds and carrs consisting of 13,000 acres, are overflowed with water and of small advantage....... some of which, let at 2d/ acre whereas dry lands in the neighbourhood let at 10-20s/ acre " (39)

Despite individual efforts of improvement by landlords on the east side of the valley, the general condition of the Hull valley as a whole remained little altered during this period.

---

(37) Book of Paines (1709 - 27) E.R.P.R.O. C.S.R.
(38) J.Grundy " Report to C.of S.R. " 1763 E.R.P.R.O.
(39) Journal of House of Commons. Jan. 1764.

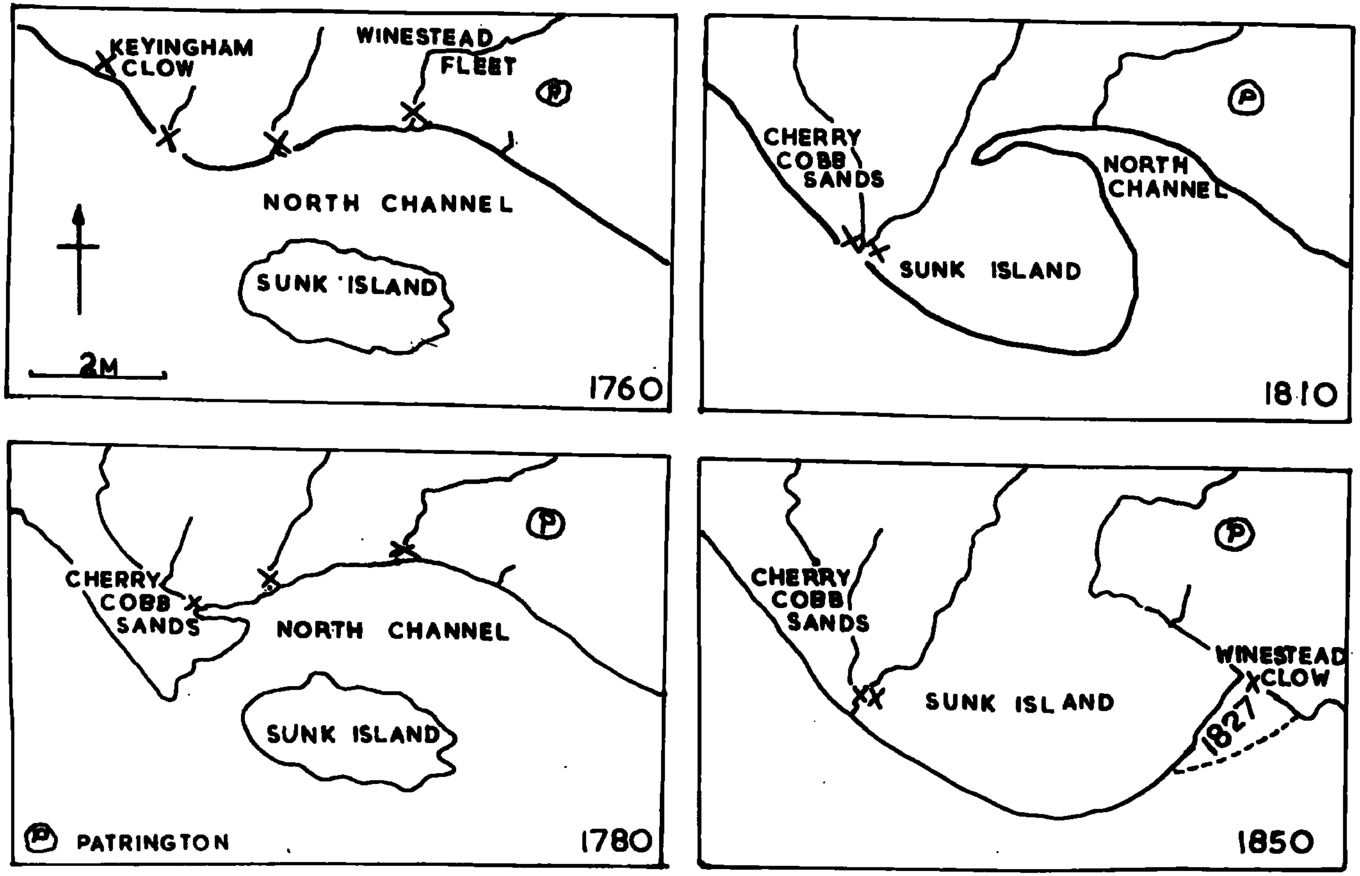
Along the Humber shore-line of south Holderness, however, natural events precipitated an early re-organisation of drainage. Silt deposition, which had caused such flourishing conditions in the earlier mediaeval period,[40] once more became a feature of this river coast.

The island of mud which appeared in the river a quarter of a mile from the shore was first noted on a Yorkshire map of 1684,[41] under the name of Sunk Island. Its gradual growth, encouraged by reclamation, can be traced on all maps of the area since this date.(fig 13).[42]

Silting soon affected the short tidal creeks (or fleets) which connected Hedon and the smaller ports of Keyingham, Patrington,Ottringham,Winestead, and Skeffling to the Humber. This process was probably accelerated by reclamation, and the construction of jetties[43] which possibly acted as groins and collected river mud.

---

(40) Chap. 16. (i)
(41) Grenville Collins Chart 1684 - H.R.L.
(42) Now Sunk Island is an area of 7,500 acres of the best farm-land in Britain.
(43) Noted in C.S.R.Reports of 1602 and 1670.



THE GROWTH OF SUNK ISLAND

FIG. 13

In 1723 Roos and Burton Pidsea water was diverted to Hedon Haven, to prevent the silting of this valuable creek[(44)] After 1702 similar references are numerous in the records of the Commission of Sewers:

> Nov.1702 - "Patrington Haven is growing up and is in dire need of scouring "
>
> 4th Nov.1728 - "Keyingham Haven is so warped that waters leading thereto, cannot issue ".

William Brown drew a sketch for the Commission in 1730 of the extent of silting at Keyingham Clough.[(45)] (fig 57)

A new clough, erected nearer the Humber was soon made useless by the growth of Cherry Cobb Sands. In 1743 the depth of silt in the Clough was 1' 8" allowing only 1' 2" of water to flow out.[(46)] Again the surveyor was asked to find a new outfall.

Further east there was, apparently, less silting Ottringham and Winestead were free to 'scour ' and 'clean'. In the west, however, the problem became gradually impossible. Water unable to escape into the river flowed back down the channels and flooded the carrs.

---

(44) C.S.R. 4/144.
(45) C.S.R. William Brown - "Report to Commissioners on the Silting of Keyingham Haven " E.R.P.R.O.
(46) C.S.R. Minutes - 1737 - 43.

Even as early as 1719 Keyingham Level was:

> " So much appressed with water that several hundred acres, if not thousands, became of little value and in the winter the road from Roos to Halsham was flooded." (47)

and a similar petition is recorded from Burstwick in the Hedon valley for 1717.(48)

After thirty years of makeshift compromises and re-dredging a slightly less temporary solution was achieved in 1760, by diverting the waters of Keyingham Fleet into North Channel.

On the hummock clays of central Holderness, the extent of improvements during this period are more difficult to gauge. Changes were naturally less spectacular in this region than on the bottom-lands of the Hull valley and the Humber shore.

It is probable that the mediaeval meres of this region had, for the most, drained away by the mid Eighteenth century, although the carr lands left behind would be in a similar state to those of the lower lands.

---

(47) C.S.R. Petition - 1719.
(48) " " - 1717.

The slight improvements in these latter areas, noted above, would undoubtedly have affected the levels of inland lakes. Sheppard points out that this process of drainage would be accelerated by silting due to improved ditch maintainance.(49) Many small field ditches drained into the meres, and probably formed miniature deltas in the lakes upon which vegetation would develop. After the mediaeval practice of clearing for fishing had decreased with the Reformation, the increase in weed cover would contribute to the silting process.

For the developing system of ditches and minor sewers in the claylands, information is less conjectural. The Book of Paines for the Commission of Sewers (1719 - 35) gives a valuable indication of the extent of the network of minor drains at this time. (Appendix 1b.)

Land drainage in mediaeval Holderness was, therefore, neither efficient nor extensive. Except possibly in south Holderness, where considerable natural difficulties impeded progress, the main purpose of most of the early cuts was not land drainage at all, and the first attempts to improve the soil by drainage were largely made ineffective by the system of channels already established.

---

(49) June Sheppard. " The Mediaeval Meres of Holderness " I.B.G.1958

CHAPTER 3. MEDIAEVAL RURAL ECONOMY AND THE WATER SURPLUS

Introduction.

The structure of Holderness rural economy during the Middle Ages has received little scholarly attention. For the earlier part of this period (1000 - 1300) the two major documentary sources of information, the Domesday and Melsa Chronicles, have been difficult to interpret.(1) Such material which has emerged from preliminary studies of these sources lacks the authority of inter-dependence. Those who use the one neglect the other.

The Farrar transcription of the Domesday Book, for Yorkshire, has only recently been studied by geographers. The difficulties of correlation and interpretation are numerous. Maxwell's meticulous and scholarly attempts to overcome these problems are yet to be published.(2) Despite its value, this pioneer attempt could not alone be sufficient to justify serious deductions.

---

(1) (I) Domesday Survey - Farrar Transcription. Victoria County History of Yorkshire Vol. 11. p. 137.
(II) Melsa Chronicle - A.E.Bond transcription " Chronica Monasterii de Melsa " Rerum Brittannicum Medii Aevi. Scriptores Vol. 1. 11. 111.

(2) Maxwell - Yorks. Section " Domesday Geog. of N.England " (Cantab) unpublished.

The work is concerned with an accurate cartographic representation of Domesday material rather than the significance of such distributions which emerge. Maxwell's main concern has been to overcome textual difficulties; to translate rather than to interpret.

For further evidence it is necessary to turn to the second major source; the Chronicle compiled by the monks of the Cistercian abbey of Meaux in the Hull valley.

The Cistercian invariably chose areas of primary difficulty for their foundations. The order was concerned with material improvement and inovation as a means of grace. In the regions of swamp and woodland which they chose, their activities were often, therefore, atypical of the region economy as a whole. The Chronicle is, nevertheless, an invaluable source for several reasons. Primarily, it is the only continuous contemporary comment on conditions during the period. With little to gain by exaggeration or deceit (except perdition), the account is, moreover, the most reliable and accurate of records.

It is not only the continuity and accuracy of the document which recommends it. The Monastery was one of the richest and most influential houses in Yorkshire. From its Foundation in 1150 until the Dissolution, its activities embraced all aspects of Holderness life. Progressive and intelligent, the monks were in the fore-front of change, with granges and lands all over Holderness (and many elsewhere in Yorkshire) (fig 14). Any alteration in the aspect of the landscape usually stemmed from either their efforts or their example and inspiration.

Often they were obstructed, either by natural calamity or by human interference, and from the record of such obstructions a valuable insight into mediaeval conditions is gained. This insight is increased by the many side references to aspects of the rural economy which were no prerogative of the monastery; the ordinary activities of manorial administration.

Little work has been done on the Meaux Chronicle. Bond (3) has briefly annotated his transcription of the Latin manuscripts, and Canon A.E.Earle confesses (4) to compiling his short pilot analysis (5) from Bond's paragraph notes rather than the transcription.

(3) op.cit.
(4) In private correspondance
(5) A.E.Earle " Essays on the History of Meaux Abbey " (1906)

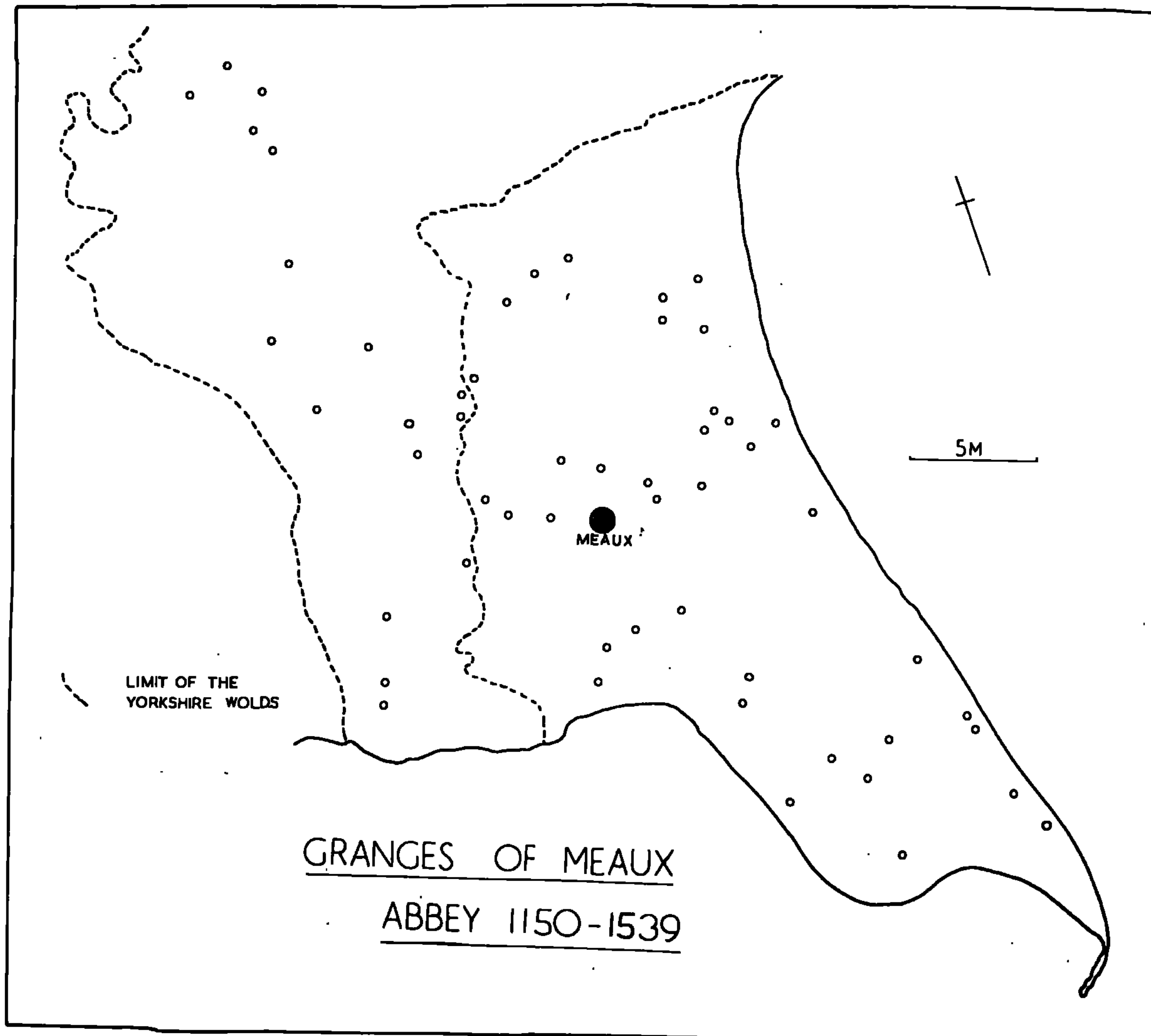

5M
MEAUX
LIMIT OF THE
YORKSHIRE WOLDS
GRANGES OF MEAUX
ABBEY 1150-1539

FIG. 14

A detailed examination of the text of the Chronicle has, however, proved most rewarding and contributed invaluable evidence for this thesis. It has already been suggested [6] that land drainage brought no changes in the balance of rural economy in the region until the mid-Eighteenth century. Conditions in Holderness in the Seventeenth and early Eighteenth centuries were, in no radical way, different from those in 1089. It is, therefore, possible to supplement the evidence of the Meaux Chronicle and the Domesday Survey by reference to the increasing number of later mediaeval documents which refer to the economy of the region.

(ii) <u>The Mediaeval Economy of Holderness</u>.

The Meaux Chronicler, recording the partition of lands which followed the Norman Conquest, notes that the new Earl of Holderness inherited a land;

> " Quae valde sterilis et infructuosa erat
> eo tempore nec gignebat nisi avenam." (7)

After a careful study of Domesday material, Maxwell seems justified in coming to the opposite conclusion;

> " In spite of its marshy nature Holderness
> was one of the most prosperous parts of
> Yorkshire in the Eleventh century." (8)

It seems unlikely that the Meaux Chronicler had any

---

(6) Chap. 2.
(7) C.M.M. -p.90
(8) Maxwell and Darby op.cit. p.230. (proofs)

motive for deception. On the other hand the distributions of various Domesday returns amply demonstrates the truth of Maxwell's assessment.

In attempting to find a solution for this apparent paradox, the writer has followed through independently, the body of evidence in favour of each viewpoint. The results of this treatment are most significant.

Evidence of early Infertility:

It would, indeed, be reasonable to suppose that the first Lord of Holderness was given a land " exceedingly barren and infertile......producing nothing but oats ".

Marsh and lake occupied a very large proportion of the total area of the region though it is difficult to determine the exact amount of this inundation. Sheppard has shown that the deeper hollows of the drift were occupied by large lakes[9] of which Hornsea mere is the only remaining example. (fig.28) In the smaller hollows marsh and carr [10] would take the place of lakes; seasonal rather than perennial waters.(fig.15 + 27) Geological drift maps

---

(9) J.Sheppard " Mediaeval Meres of Holderness " op.cit.) amongst others were Skipsea,Fittouker,Pidsea,Withornsea, Redmere,Prestonmere. See Appendix (Ia).

(10) 'Carr' - from Danish 'Kjor' = drained land.

DRINGHO CARRS:
SUMMER PASTURE

AFTER HEAVY WINTER RAIN

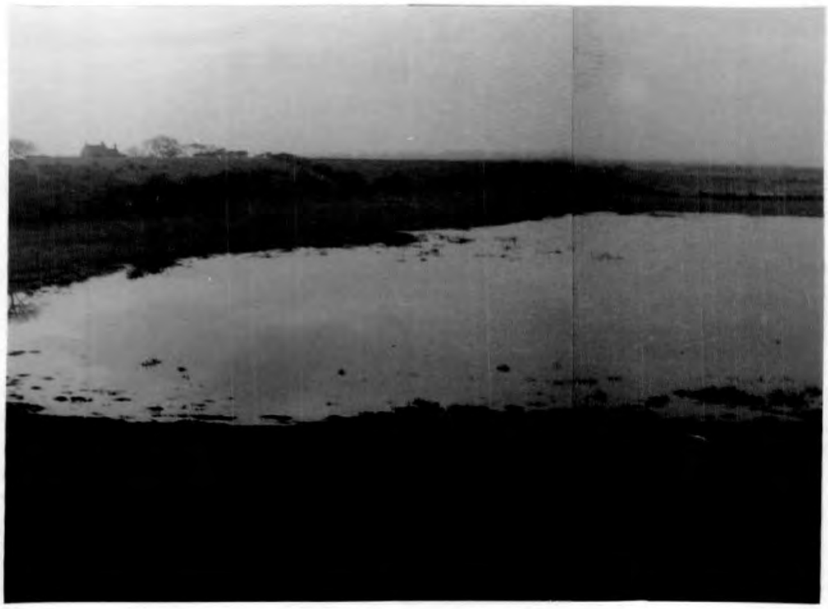


FIG. 15

give some indication of the extent of these areas. By substantiating such evidence with that of place names. and information deduced from relief and drainage on the Ordnance Survey $2\frac{1}{2}$" series it has been possible to represent the proportion of the total area affected by either seasonal or perennial inundation. (figs 7, 48, 49.) hereinafter referred to as 'bottom lands.'

For the Hull valley there is ample evidence of almost total seasonal and tidal inundation, throughout the whole of the period under consideration large areas of permanent lake and marsh are well documented.(11) (Appendix Ia) There is strong reason for believing that more than fifty per cent of the area of Holderness was in fact affected in some way by standing water. (fig 49)

It has already been suggested that during this period (1000 - 1300) drainage was, at its best, intermittent.(12) The gradient of emergent clay hummocks is rarely steep enough to allow effective run - off without artificial drainage. The stiff, cold retentive clays could not, therefore, have been fertile at this time. (13)

(11) Sheppard op.cit.
(12) Chap. 22.
(13) Chap. 10.

It is not proposed in this dissertation to take up the controversy which surrounds the attempts of many authorities to assess Domesday agricultural potential by counting the number of plough - teams per carucate or per acre.(14) A study of the Domesday survey returns reveals the effect of this wet heavy clay agriculture. Darby has shown that the only reliable method of avoiding variables(15) is by plotting the total number of teams in a large area against a known limit of square miles (In Holderness the 'Wapentake')

For Holderness, the excersise is revealing. Drift maps show that Holderness soils varies from a high proportion of sandier, lighter, soils in the North to the heaviest clays in the South, with a more or less continuously gradual gradation between the two areas. (fig. 3) On the heaviest clays in the Southern division there are between 2 and 4 plough teams per square mile. In the North there are 7 per square mile, with 1.0 per square mile in the middle division. These figures compare with

---

(14) Darby "Domesday Geog. of England " (full bibliography).
Farrar - op.cit. p. 137.

(15) Numbers of oxen vary according to the texture of the soil area of 'carucates' (or 'hides') vary with regions.

·2 per square mile on the much lighter soils of the Wolds[16] (fig.16).

It seems clear then, that no natural drainage was sufficient to lighten the texture of these heavy clays; that they were heavy enough to make ploughing difficult, even with the Saxon Mould board plough. If ploughing was so difficult then plant growth could not have been easy. It is probable that among cereals, only oats could withstand such poor conditions.[17] If this is true then one would suppose that lighter soils, freer draining and warmer than heavy clays, would be more highly valued than the heavy lands. Several Fourteenth century Inquisitions which survive would suggest that this conjecture is true.

The more easily drained silt-lands are valued at 4/6 per acre, and neighbouring clays as low as 2/- per acre.[18] The potential fertility of the heavy clays after adequate drainage is demonstrated by the increase in cropping and yields which followed Eighteenth and Nineteenth century drainage operations.[19]

(16) Maxwell op.cit. p.227
(17) Nicholson "Land Drainage" (1940) points out the effect of moisture on soil reducing germination speed. See also Chap. 10.
(18) Yorkshire Inquisitions Vol.XII. p.98. Y.A.S.R.S.
(19) Chap. 12 and figs.

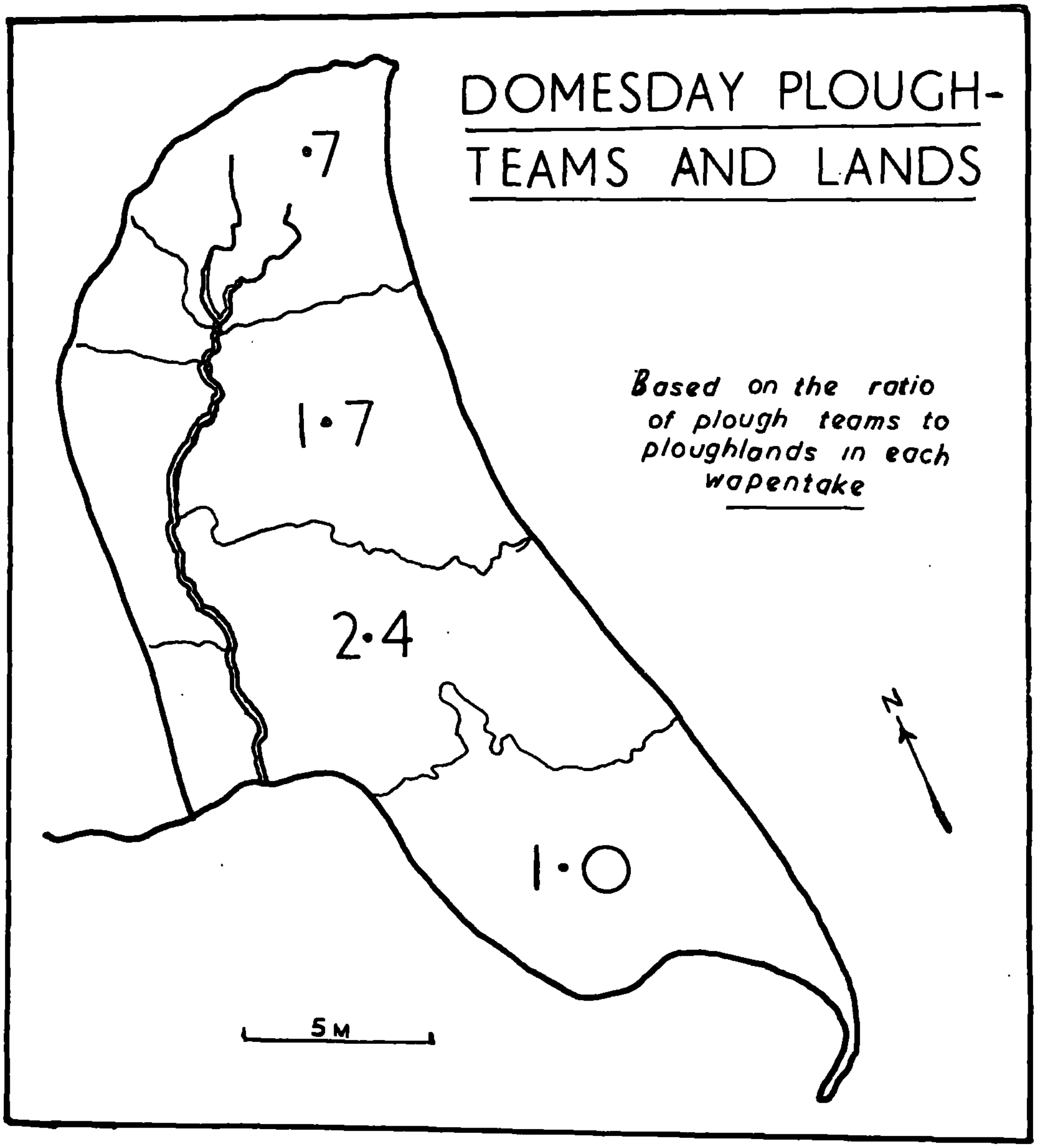

DOMESDAY PLOUGH-
TEAMS AND LANDS
Based on the ratio
of plough teams to
ploughlands in each
wapentake
·7
1·7
2·4
1·0
N
5 M

FIG. 16

Of the influence of poor drainage on the agriculture in the mediaeval period of Holderness there is further evidence. A two - field manorial system would imply a larger area of fallow than in the three - field system.[20]

Harris has shown, from a detailed study of the open field structure of East Yorkshire that of the fourty four parishes in Holderness for which there are records in 1700 thirty six had a two -field system.[21] He shows too, that on the Wolds three and four field villages were much more numerous, with over half as three - field villages.(fig. 17). It is reasonable to suppose that no radical change in the structure of the field system had been made since the inception of the manorial system. In the reign of Henry III, Keyingham was noted as having;

" 41 Acres arable and 21 acres sown yearly ".(22)

A drainage award from Brandesburton in the time of Edward III gives a clear indication of the predominance of the two - field system in Holderness.[23]

---

(20) Grey. " English Field Systems " also makes this point p.245.
(21) A.Harris "Open Fields in the E.R. of Yorkshire " E.Y.Loc. Hist. Soc. Series 9. p.4.
(22) Yorkshire Inquisitions XII. p.80. Y.A.S.R.S.
(23) Harris op.cit. p.5.

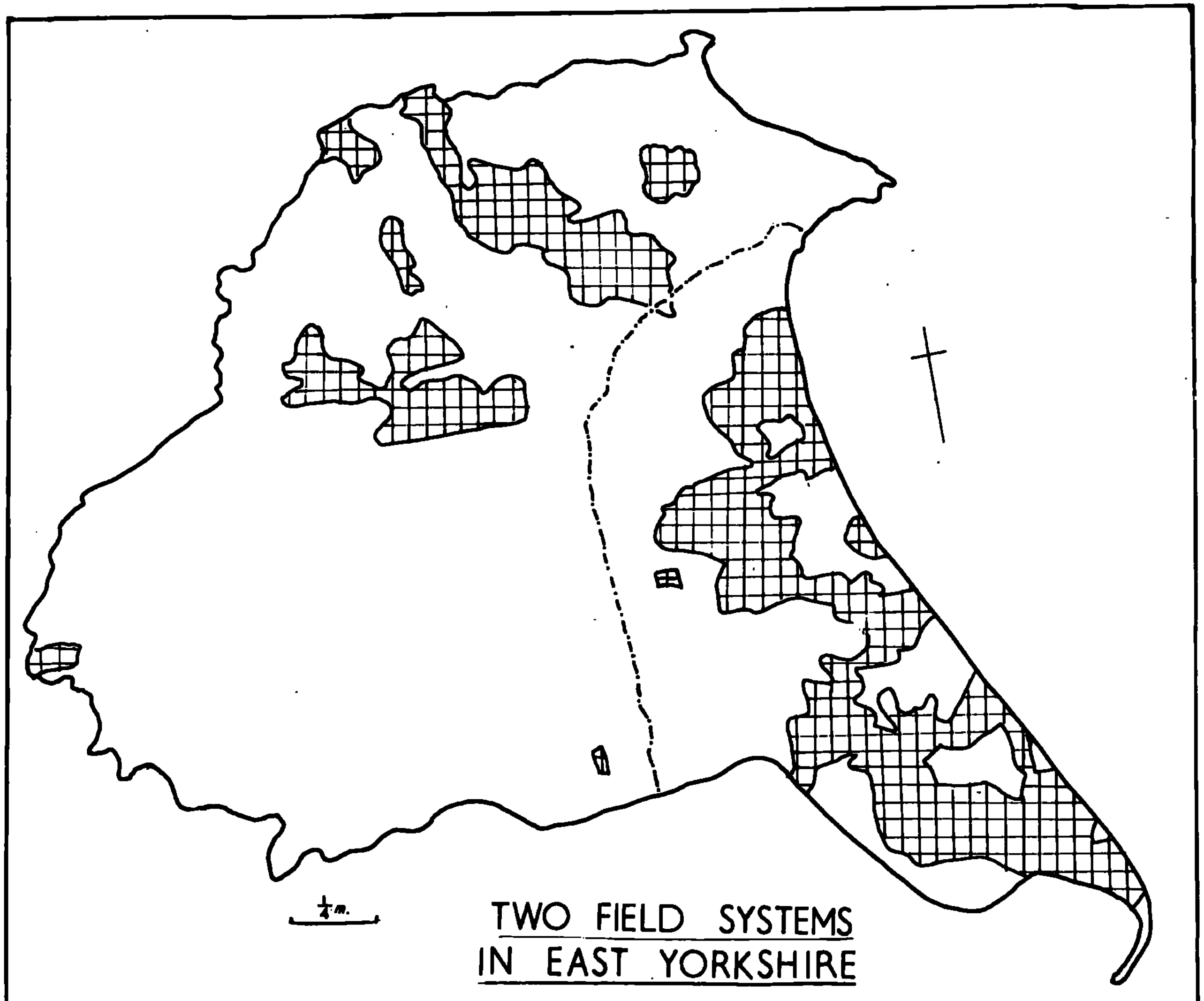


FIG. 17

It seems that excessive soil moisture so reduced soil fertility, as to make fallowing necessary every other year. The award for drainage in Brandesburton is encouraged because;=

" One of the two said fields is lying idle in each year and no profit ensuing therefrom ". (24)

The assumption is obvious. It would seem then that Holderness was eminently ill suited to produce a bulk of agricultural produce. With over half the total land area of the region water-logged, and the remainder so naturally ill drained as to make fallowing necessary once every other year the effective crop acreage at any one time can only have covered roughly a quarter of the total area of Holderness.

From over three hundred farm inventories lodged in the Probate Office in York, Long has been able to make a comparative survey of Yorkshire farming in the Seventeenth century.(25) Because the value of each item of farm stock was recorded, Long was able to deduce the proportional importance of each aspect of farming.

Items listed under 'Corn' formed 32.7% of the total value of farm stock in the Vale of York, 45.5% on the Wolds

---

(24) Brandesburton Papers. P.R.O. London.
(25) D.H. Long - "Regional Farming in Seventeenth Century Yorkshire" - Ag.Hist; Rev. VIII part II.1960

and only 22.7% in Holderness. Even after the minor improvements of the latter Middle Ages - these figures substantiate the evidence given above, that Holderness was generally unsuited to cereal production. It seems clear that the basis of Holderness prosperity in the Middle Ages lay not in the cultivation of its arable land.

Sheep - rearing; A glance at a list of exports of the port of Hedon(26) in south Holderness during the Fourteenth century would suggest that the region was one rich in sheep rearing. Certainly, the Cistercians developed sheep rearing, and used Hedon to ship wool to Flanders and Italy. In 1270 the abbey shipped 120 sacks (each containing 200lbs of wool) in a single load to Lucca:

> " Vendidit etiam hic abbas
> Robertus mercatoribus Luccanensibus
> Una vice centum et vigininti
> Saccos lanae, pro Mille et ducentis
> marcis........ " (27)

Sixty years later they were selling 40 sacks to " one Thomas Home of Beverley." (28)

---

(26) Long since fossilised as a port through silting. For list of exports see E.R.P.R.O. - Hedon Papers.
(27) C.M.M. Vol. (iii) p. 85.
(28) C.M.M. Vol (ii) p.171.

In 1280 the monks owned almost 11,000 sheep;

> " Summa ergo pasturae ovium
> ad bovatas nostras pertinentis
> DCCCLXV praeter pasturam concessam
> nobis de bovatis aliensis." (29)

It would seem extradordinary that a region so unsuited by soil saturation and poor drainage to the production of crops could raise so many sheep. As late as 1853, after the great drainage improvements of the Eighteenth and Nineteenth century Isaac Leatham could write;

> "This division is not suited to sheep, of which
> fatal proof has recently been given in the
> death of a considerable number by rot." (30)

There is no evidence that monastic sheep enjoyed some special immunity from disease:

> " Nam primo omes bidentes
> nostis inde abductas CCCC
> vide licet et plures
> perdidimus quia inconsuetas
> pascuas contemnentes moriebantur
> singillatim." (31)

---

(29) C.M.M. Vol. (ii) p.[illegible]
(30) I.Leatham "Report on Agic, of E.Riding " J.R.A.S. Vol.9. p240.
(31) C.M.M. Vol.(ii) p.182.

How was it possible for the Cistercians to build up such large flocks under these conditions ? Two possible explanations commend themselves.

Between the Tenth and Fourteenth centuries, silt depositions along the northern shore- line of the Humber, encouraged by re-clamation extended over a large area [32] The newly won silts had been well utilised and although later erosion makes it impossible to determine exact area of this land [33] it was large enough to support several villages (Pennisthorpe, Owthfleete, Sunthorpe, Tharlesthorpe, Frismerske (fig. 18) It is reasonable to suppose that these re-claimed silt - lands were, ipso facto, better drained than other areas of Holderness. That their relative land value compared favourably with the clays a little further north testifies to this.[34]

On these silt - lands, the monks had several granges (fig. 18.) It is likely that their main use for these lands was as sheep pastures.

---

(32) Chap. 16. (i)
(33) Boyle op. cit. p.80.
(34) C.M.M. Vol. (ii) p.172.

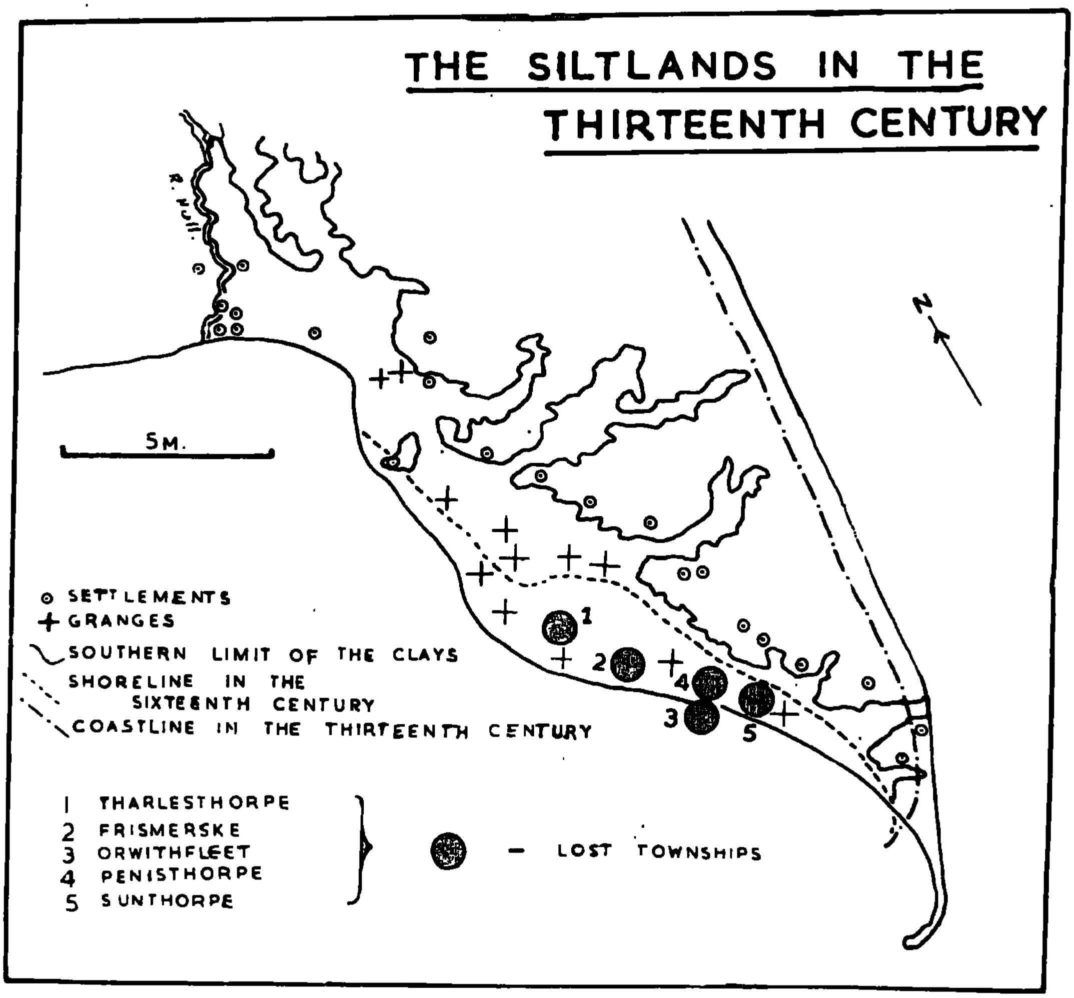

THE SILTLANDS IN THE
THIRTEENTH CENTURY
R. Hull
N
5M.
SETTLEMENTS
GRANGES
SOUTHERN LIMIT OF THE CLAYS
SHORELINE IN THE SIXTEENTH CENTURY
COASTLINE IN THE THIRTEENTH CENTURY
1 THARLESTHORPE
2 FRISMERSKE
3 ORWITHFLEET
4 PENISTHORPE
5 SUNTHORPE
- LOST TOWNSHIPS

FIG. 18

In 1277 there were 1,274 sheep pastured in the parish of Tharlesthorpe, on ground so rich that "ewes usually brought forth two lambs." (35) With four or five granges on the silt lands, each carying over 1,000 sheep (36) this would account for a flock of 5,000 sheep. It is still necessary to account for at least 6,000 others. Another supplementary explanation can be suggested. The writer has noted a remark in Howard's discussion of Nineteenth century farming practice in Holderness. (37) Howard states that prevelant practice at that time was the transfer of sheep to winter on turnips on the Wolds.

This feature of "Winter turnip Transhumance" is interesting in itself as further indication of the influence of poor drainage on the agriculture of Holderness. It is a feature relevant to the present context because it is possible that it was the relic of a much earlier practice.

---

(35) C.M.M. Vol. (ii) p.172.
(36) A generous estimate. Tharlesthorpe was probably the largest of these granges.
(37) Charles Howard; " A general view of Agriculture in the East Riding of Yorkshire (1835). p.148.

The Cistercians also owned acres of land on the Wolds (fig. 14). A main staple of the abbey's economy was sheep ; therefore, it is reasonable to suppose that these chalk uplands were used for winter pasture. Flocks could be grazed in Holderness during the summer and taken across the Hull Valley, probably by the Beverley - Routh causeway (fig 38) to the drier, free draining fields of the Wolds.

Apart from the Cistercians it is unlikely that sheep were a feature of the peasant economy in Holderness. The risks of loss were considerable. The limited dryer ' pasture - lands ' would be needed for crops. Without considerable capital, stock of this kind was a liability.

Cattle Rearing ; Direct references to cattle are rare in mediaeval records. It must be presumed from several factors that they played a more basic part in rural economy than either sheep or crops.

The region was well suited to cattle rearing. The carrs left large areas of pasture in summer, which were accounted common ground by the village,(39) and many field names (Ox Pastures; Cowfield; Oxcarr;) testify to their use as cattle pasture. (fig 15)

(38) Chap. 5. (i)
(39) Maxwell op.cit. p. 228.

The Domesday record shows a heavy concentration of meadowland in Holderness.[40] It is much more likely that this was cattle pasture rather than sheep- land. The heaviest concentrations co-incide with the areas where carrs and bottom lands of the hummocks are most frequent in the claylands and in the Hull valley.

Despite the growing importance of cattle in Holderness in the latter part of the Middle Ages, it is unlikely, however, that large herds were usual earlier in the period.

It is possible that, as in other marshland areas during the period [41] cattle were the chief wealth symbol, and a basis for exchange. Lack of winter fodder, and the reduction of pasture by inundation, would necessitate the general practice of autumn slaughter, common before the agrarian revolution. Only the best bull and sufficient heifers were retained to carry the herd through the winter [42]

---

(40) Maxwell op.cit p. 223.

(41) J.Thirsk " English Peasant Farming - Agrarian, Hist of Lincs" p.39. See also Chap. 6.

(42) Ernle - " English Farming Past & Present."

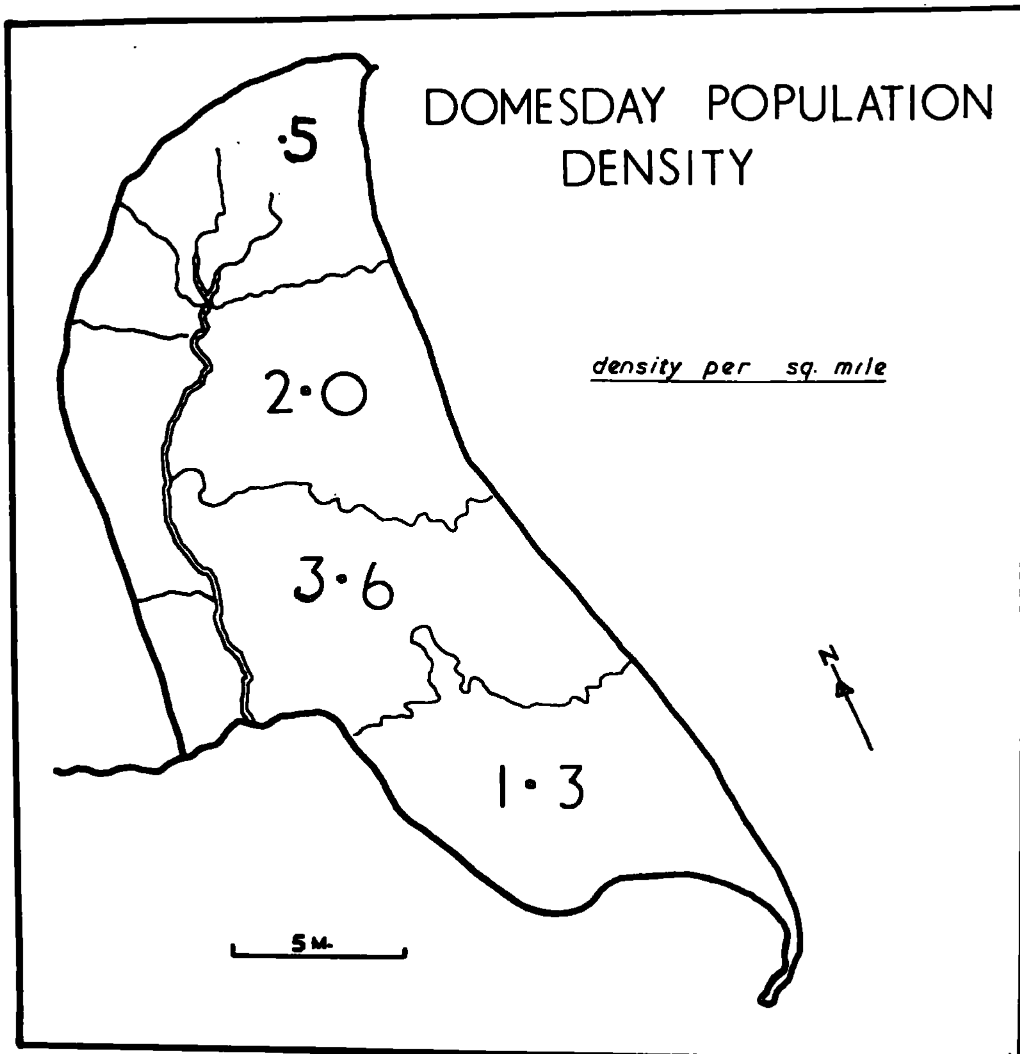

DOMESDAY POPULATION DENSITY
·5
2·0
3·6
1·3
density per sq. mile
N
5 M.

FIG. 19

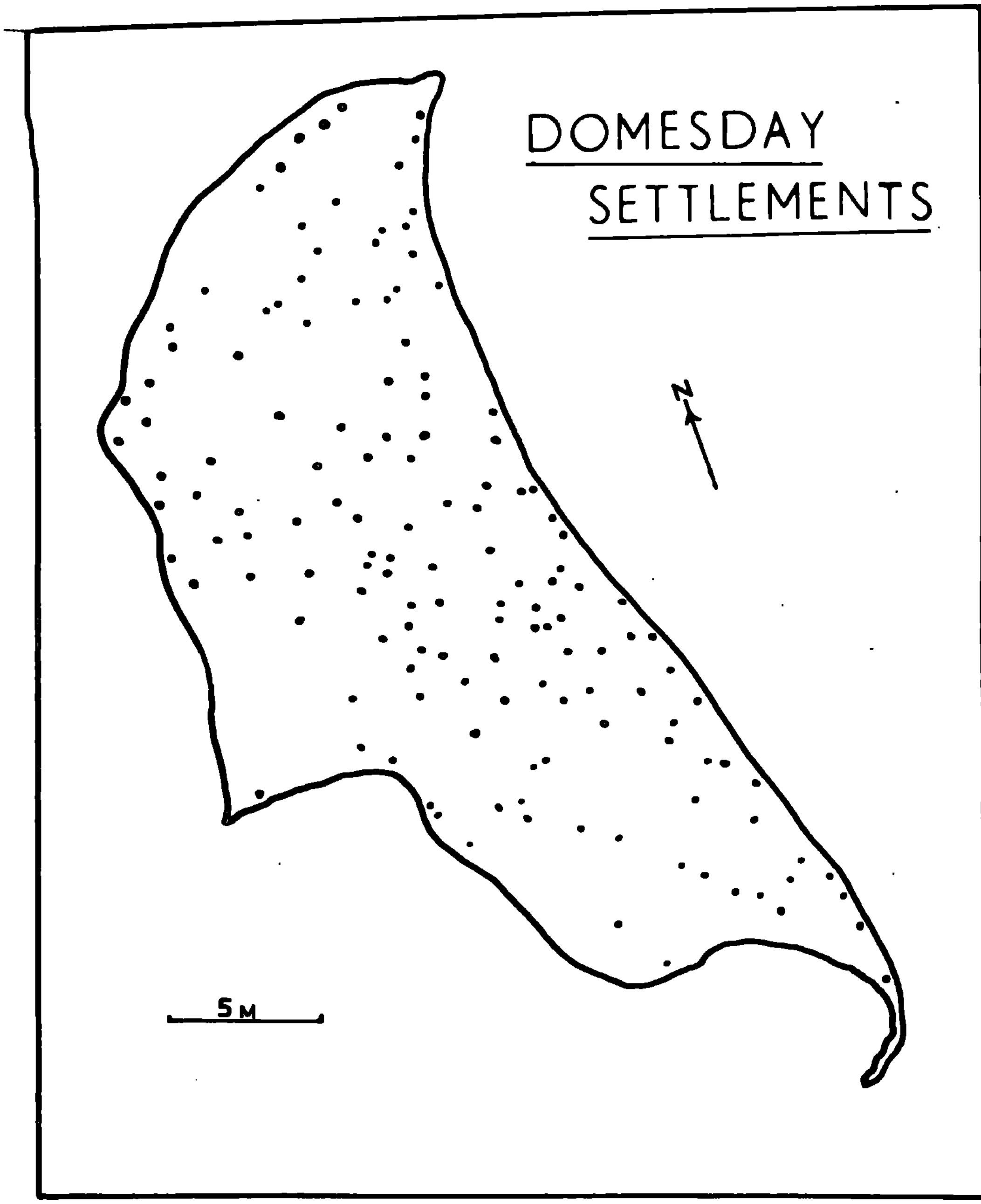


FIG 20

<u>Evidence of Prosperity-</u> : It seems that there are reasonable grounds for rejecting the possibility that either agriculture, or animal farming, (nor indeed, a combination of these elements) gave Holderness its air of relative prosperity in the early mediaeval period.

Holderness supported the highest population density in the East Riding in 1086.(43) It must be admitted that this was only an overall density of between 2 and 4 per square mile. Nonetheless, there is a clear distinction between this area and either the Wolds or the Vale of York, where the density is frequently lower than one per square mile. (fig. 19).

It is possible that there was a movement down to Holderness after the Norman wasting, for apart from small areas along the periphery, Holderness escaped devastation.(44) (Appendix I c) Several factors make this unlikely. Firstly there was a fairly close pattern of settlement with Saxon and Danish place names in Holderness. (figs, 20,25,26). This pattern of villages is much closer than in the Vale of York

(43) Maxwell - op.cit. p.226. The highest density 3.6/sq.miles occured in south Holderness where the propertion of marsh and lake was greatest.

(44) Wasting is evident only along the Beverley - Leven causeway and on the sandy soils in the North. Insulation and apparent sterility would appear to have saved the region. V.C.H. V01.11.p 117.

where this, lower density of rural population would have made re-settlement more feasible.

There are, moreover, strong indications that the removal of the Holderness wood-cover from the clay hummocks was, by this time, almost total.[45] It is clear that only a fairly considerable concentration of rural population over a period of time could have caused such wholesale depredation.

It has been demonstrated that probably a quarter of the total acreage of the region was available for cropping that the only crop likely to grow even reasonably well on the undrained clays was oats that animal farming scarcely supplemented the crop deficiency.

One is, therefore, forced to conclude that it was reliance on marsh and lakeland area which made such a population concentration possible. There is a considerable body of evidence in favour of this view.

The most obvious uses of these tracts of water were for fishing and wild fowling. The Domesday record is incomplete in this respect. Lakes bearing considerable quantities of fish were not mentioned in the survey. Only Cottingham with

---

(45) Chap. 16. (i)

"five fisheries and a lake of 8,000 eels " and " three fisheries at North Frodingham " (46) are mentioned specifically.

There is little doubt that ~~either~~ these values were concealed or tacitly included in other geld reckonings. Later mediaeval records dwell upon the value of several other large fisheries;

> " Take of eels from Skipse and Fitthowker worth 10s."
> " Sutton mere has a lake of 4,000 eels, worth 24s "
> " Pidsea has eels worth 5s "
> " There are four meres and a half (in Lord Albamarle's estate) Fitthouker, Withornesse with fishery throughout the whole also a fishery with eels in a lake called Langwath." (47)

These examples refer to a Fourteenth century inquisition of the estates of Lord Albamarle, and all are lakes (with the exception of Sutton mere) which lie within the boulder clay area. They were not the only lakes in this area, and they were by no means the only areas where fishing was possible in Holderness.

The Carrs of the Hull valley were equally productive. Inventories of Seventeenth century farmers from the Hull valley frequently list " carr boats, and fowling nets " (48)

---

(46) V.C.H. Vol. (ii) p.195.
(47) Y.A.S.R.S. X 11 p.81 - 83.
(48) Probate of wills - York.

If the carrs were thus used at this time, after the Reformation made fishing less profitable, and after the drainage operations of the period, it seems reasonable to suggest that it must have been of much greater importance in earlier centuries.

Even during the drainage of the Hull valley, the word " filling " often occurs in contemporary records to denote an area over which nets could still be drawn, despite diminishment by drainage.(49) Parish registers in Sutton and Leven reveal that several people listed their occupation as "fisherman" even as late as 1830. (50) In Sutton, Blashill notes that a "Fishing Feast " (whereby the mayor of Hull claimed fishing rights in Sutton mere) continued as a major annual event until the Nineteenth century. (51)

It is also probable that wild fowl formed a major item of the return from all stretches of water in Holderness.

---

(49) Y.S.S.R.S. Vol. (53) p.58.

(50) Other parish registers e.g. Brandesburton, Lockington give similar references.

(51) Blashill " History of Sutton-on-Hull " (1890) p.264.

The area lies on one of the main bird - migration routes; particularly for water birds.[52] Many early charters and deeds note rights of "fishing and fowling " [53] Even as late as 1790 it was possible to take 400 ducks per day from Watton fen in the Hull valley. [54]

One of the several early references (in the Public Record Office files) to this activity is the Humberstone Report for 1570; An inventory of all the property of the Earl of Northumberland in Yorkshire;

> " To the sayd manor (of Leconfield) belongeth a grate fen called the Carr, the Earl hath a gate mark of Swannes and very much wild fowl. And very profitable fishing which the Earl has always reserved for the use and commoditie of his house, and appoynted four keepers as well as the fowle as of fish. And whereas the tenants had common pasture in dry years, the dryft of the cattle doth disturb the wilde fowle." (55)

The last sentence of this quotation is interesting in another context. Reference has already been made to the value of the carr-lands as summer pasture for cattle. The tracts of lowland which were marsh in winter would usually dry sufficiently during the summer to allow the pasturing of cattle. (fig 15.) .

---

(52) The estuary mud flats of the N.Humber are now a Bird Sanctuary
(53) Poulson; op.cit. Vol. 11 p.299 - from Frodingham Court Rolls.
(54) Y.A.S.R.S. L. 111 p.29.
(55) P.R.O. E. 164/37/249.

although as the above extract indicates the practice was not always popular with the Lords of the manors.

" Stinting " was a common method of keeping cattle within a limited area on the carrs, and the fact that it was necessary indicates the extent to which they were used for this purpose. These bottom-land meadows were usually rated as of higher value than arable land. The 1401 Inquisition of lands lost, drawn up at Hedon after the Humber floods, is a valuable record of this fact. Ottringham lost a hundred acres of arable land worth 2/- per acre and 40 acres of meadows worth 4/- per acre.(56).

In Wawne in 1290 arable land was valued at 6d per acre and meadowland at 12d per acre.(57)

The value of Burton Pidsea carr, even at the time of Enclosure in the Eighteenth century was rated at 20d per acre. (58)

Similar records are frequent in mediaeval documents. The Lay Subsidy Returns of 1297 (Appendix IV) have been mapped to show the importance of areas of seasonally inundated bottom-land as pasture. The highest land values occur where such areas occupy a considerable acreage. (fig. 21)

---

(56) Boyle op.cit. p. 89.

(57) Y.A.S.R.S. Vol. X.11. p.71.

(58) Poulson op.cit. Vol.11 p.37. & C.M.M. Vol (iii) p.283.

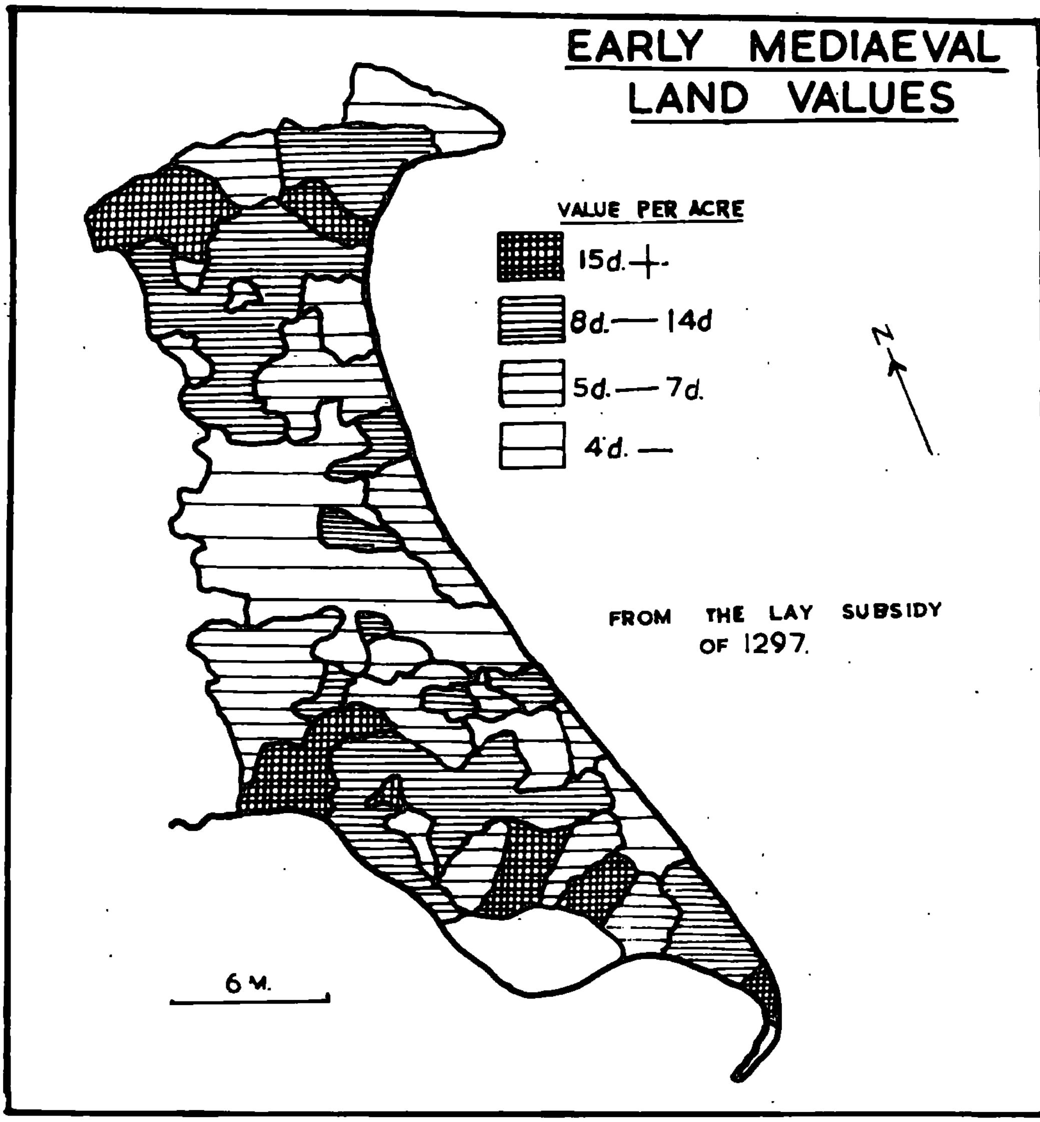

EARLY MEDIAEVAL
LAND VALUES
VALUE PER ACRE
15d.+
8d.— 14d
5d.— 7d.
4d. —
N
FROM THE LAY SUBSIDY
OF 1297.
6 M.

FIG 21

<u>Turbiary</u> : It was not only for fishing fowling and cattle pasture that Holderness marshes and meres were important. There is little doubt that the compressed and decaying vegetable matter allowed the accumulation of turf. The use of this material for fuel seems to have been a common practice.

> " Monials etiam ipse in marisco quod est inter Wagnam synam Fodientes turbas nostras, is nostram nobis moleste fuerunt." (59)

These turf cuts appear to have been of sufficient size and importance to have been a source of commerce not only within the region but, possibly, to the sparsely vegetated chalk Wolds. There are records of large quantities and areas of turbiary in the Hull valley.

> " Peter de Wagna........dedit cuidam Reginaldo de Ulram unam dailam et <u>carectatas turbarum</u> in Wagna " (60)

and again,

> " et quad commumam in praedictis sex acris marisi .... in qua turbas fodere consuevit." (61)

The most impressive reference to this use of marshland is found in a Thirteenth centuury inquisition for North Holderness

---

(59) C.M.M. Vol (i) p. 356
(60) C.M.M. Vol (ii) p 5.
(61) C.M.M. Vol (ii) p.216 and also p.365.

which refers to the right of the priory of Bridlington to dig " 50 cart-loads of turves " annually from an unspecified marsh near Bridlington.(62)

There are also references in the Melsa Chronicle of the stopping of holes in the road with " reed stumps " and it is probable that reeds and mud played an important part in house building and thatching.

If further indication of the importance of marsh and carr to the prosperity of the region is needed, it is only necessary to examine the number of parishes which are aligned to include carrs and other bottom-lands within their boundaries. Of the parishes within the region there is not one which did not contain an area of marsh or lake. For some marsh and lake occupy a large proportion of the total parish area. (e.g. Keyingham).

<u>Conclusion</u> :

It is now possible to resolve the paradox with which this chapter was introduced; that whilst Holderness was a barren and watery wasteland, with soils fit only for the cultivation

---

(62) Y.A.S.R.S. Inquisitions XCV p.139.

of oats it was, nonetheless, one of the most prosperous and economically most stable areas in the East Riding during the Middle Ages. No other area in Yorkshire could claim so well balanced an economy; nor such a range of resources.

The 'upland' hummocks may not have yielded rich crops, but they provided an agricultural staple which was considerably supplemented by the wealth of the marshes, carrs and lakes. The crop harvest may fail; cattle and sheep may be depleted by disease, but the wealth of the marsh for food, for fuel and for construction materials was always possible.

The wealth of Holderness was not obviously exploitable. To the first Norman barons, with a concern for rich profits it must, indeed, have appeared a useless liability, fit for 'nothing but oats.' The variety of resources inherent in the clay hummocks insulated by fen, were nonetheless, sufficient to support a considerable density of rural population. If these tracts of marsh and lake were so important to the mediaeval economy, it is reasonable to suppose that land drainage was not only un-necessary but positively undesirable.

Only in the areas where rich agricultural profit would accrue or where tidal salt from drainage often robbed the marsh of value, was such work carried out. The whole orientation of the economy would seem to have been towards preserving water rather than removing it.

CHAPTER 4. SETTLEMENT AND THE WATER SURPLUS.

(1) Introduction.

Domesday records show that all but six of the eighty one settlements which lie within the boundaries of Holderness today were established by the middle of the Eleventh century.[1] It was after the time of the Survey that the first primitive land drainage operations were undertaken.[2] We must therefore, presume that the present pattern of nucleated settlement was established during the period when surplus surface water was the main feature of the landscape. It is, in fact, possible to show that this was the main physical factor instrumental in the formation of this pattern.

Evidence which has been collected to support this view is based on four main sources. For the earliest settlement period (Late Bronze Age) the distribution and nature of archaeological finds, was found to be of some significance. For the major period of colonisation, by Saxon and Scandinavian invaders, place name evidence gives information of value. For the period during which these settlements were consolidated (800 A.D. - 1200.A.D.) there are three useful historical sources; the writings of Bede; the Meaux Chronicle, and the Domesday Survey.

(1) V.C.H. Vol. 11 p.265. (Farrar transcription); the settlements which post-date these records are, Lelley, Burshill, Hempholme, Nunkeeling, Wansford, Arnold.

(2) Chap. 2.

Finally, by a careful examination of the distribution of settlement in relation to various contour heights, it has been possible to further substantiate semantic, historical and archaelolgical evidence.

(II) Primary Colonisation;

The distribution of Neolithic and Early Bronze Age finds in East Yorkshire suggests that many of the people of earlier cultures who settled in the area avoided marshy low-land areas.(3) The discovery of sheep and cattle bones and other objects indicate that many of these invading groups were semi-nomadic herders.(4) For these people the Yorkshire Wolds, - with free-draining chalk soils, and thin soil and vegetational cover, - would present a more favourable habitat than the marshes, lakes and woods of Holderness.

With one notable exception (5) it was not until the Late Bronze Age (1000-500 B.C.) that a group of immigrants entered Holderness, and found this area of swamp and lake not only congenial but preferable. These late Bronze Age settlers were people accustomed to such areas of marsh and lake, living as they did on pile structures built on the base of shallow lakes.

(3) F.Elgee: " Early Man in N.E.Yorkshire " p.42, 60,77,79,89.
(4) op.cit. p.52.
(5) Neolithic finds in Holderness are discussed on p.62

Where these Lake Dwellers came from is by no means certain. Despite some dissension [6] Munro is probably correct in his tentative assumption that these people were part of a wide culture which extended through Hungary, Germany, France Holland and Britain, and that they originated along the shores of the Swiss lakes where Ferdinand Keller first discovered their distinctive pile dwellings. Whatever their origins it is certain that a number of these people entered and settled in Holderness during the Late Bronze Age.

Five sites have, so far, been discovered in the region; the main group in the North at Kelk, Gransmoor, and Barmston; with one isolated find at Sand-le-Mar in the south (fig. 22). From the nature of pile structures which have been un-earthed, [8] and the objects found among the timbers (preserved by lacustrine deposits) it is possible to build up a picture of the way of life of these people.

The structure consists of large tree timbers laid in a rectangular pattern on the bed of a shallow lake-fringe or stream. These timbers were covered with brushwood and bark,

---

(6) Notably by E.Vogt. " Euopean Lake Dwellings " (1954)
(7) K.Munro. " Lake Dwellings of Europe " (1890) p.28.
(8) The writer has examined a cross-section of one os these structures exposed by erosion of Barmston Drain. See (fig.23).

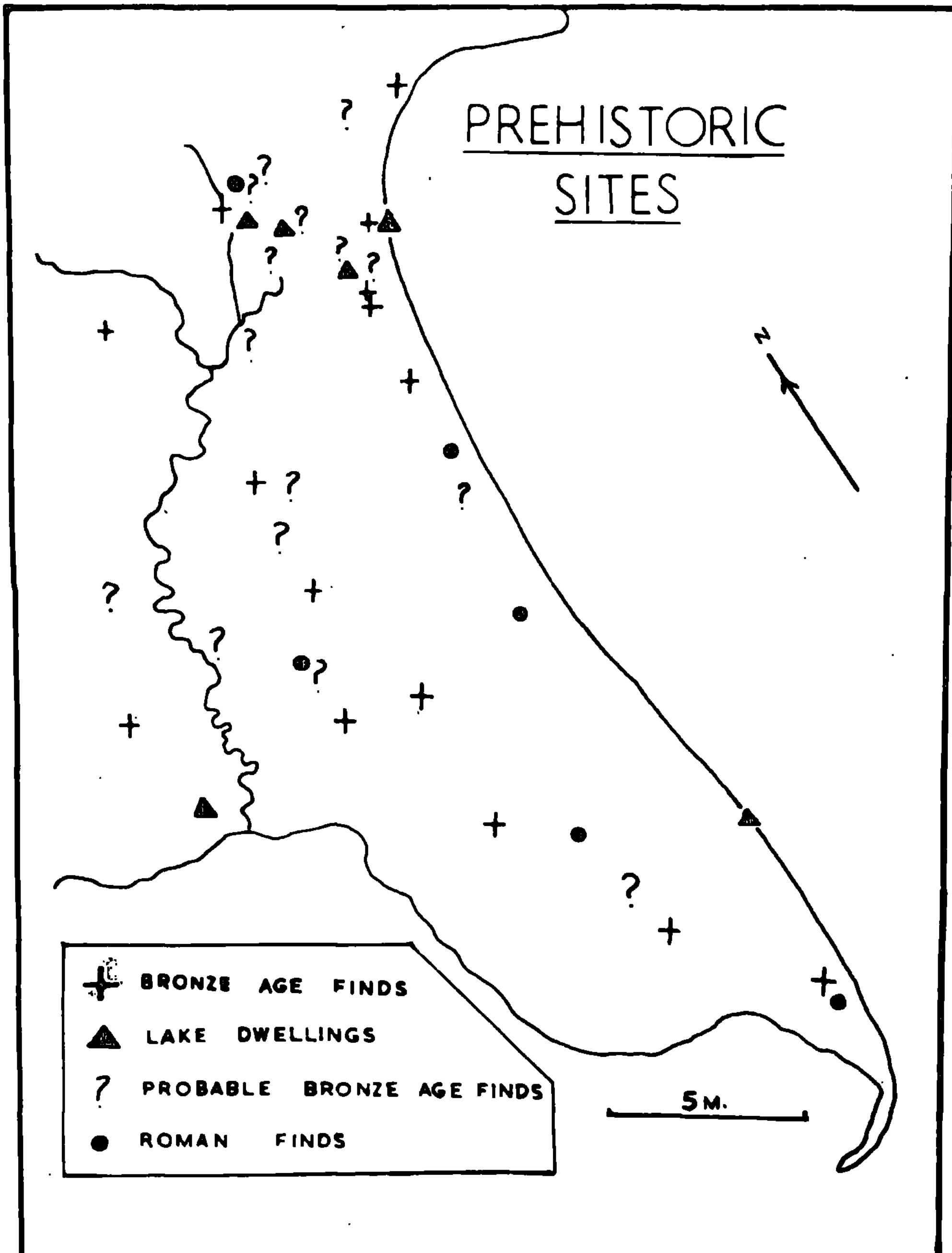

PREHISTORIC SITES
BRONZE AGE FINDS
LAKE DWELLINGS
PROBABLE BRONZE AGE FINDS
ROMAN FINDS
5M.
N

FIG. 22

which in turn were sprinkled with sand to give a dry base for the wooden huts erected on the platform protuding above water level. The whole unit was probably connected to firmer ground by a timber causeway, (fig.23).

Finds among the timber structures of the pile include the bones of sheep, pigs, goats and oxen, of stags and wild boar; grains of emmer wheat, barley and flax; bronze tools and grinding stones. (9) The people were obviously both pastoralists and agriculturalists. Surrounding woodland and scrub would be cleared and used for pasture crops.

In so far as four or five lake dwellings sites can form a pattern, this one is made interesting by a remarkable discovery in the Ulrome 'dig' of 1890. Excavation revealed a Neolithic pile structure of similar type, <u>directly underneath</u> the Bronze Age structure. Both structures are Lake Dwellings; of their authenticity and period there is no doubt. The exclusion of the normal processes of oxidation by marsh deposits preserved a set of implements tools characteristic of each period within the structure of each group. The concentration of sites in the Barmston over-flow area may suggest that this break in the coastline (fig.24) was a line

---

(9) The first of these discovered in 1880 at Ulrome see T.Wildrige "Bygone Yorkshire" Also Y.A.J. Vol. 1.p. 89.

of entry both in Neolithic and Late Bronze ages if not continuously between these times.(10) Even at these periods the boulder clay was, apparently, insulated from the rest of East Yorkshire by the Barmston over-flow and Lake Humber/Hull.

The implications of this discovery of vertical juxtaposition from two periods are however, more significant. Elgee maintains that this choice of site by peoples widely separated by both time and cultural origin was no more than coincidental and concludes that if such a co-incidence is possible then ;

> "It is also possible that a large number (of Lake Dwellings) are concealed in the peat filled hollows of Holderness" (11)

The suggestion seems unlikely for a number of reasons. An examination of the total distribution of Late Bronze Age finds in Holderness, (if we presume from the marshy nature of the region that they all derive from people of Lake-Dwelling culture) is illuminating. (fig.22) There would seem to be a strong relationship between this distribution and lighter morainic outwash gravels which fringe the boulder clay areas.(fig 3).
(12)

(fig. 3)

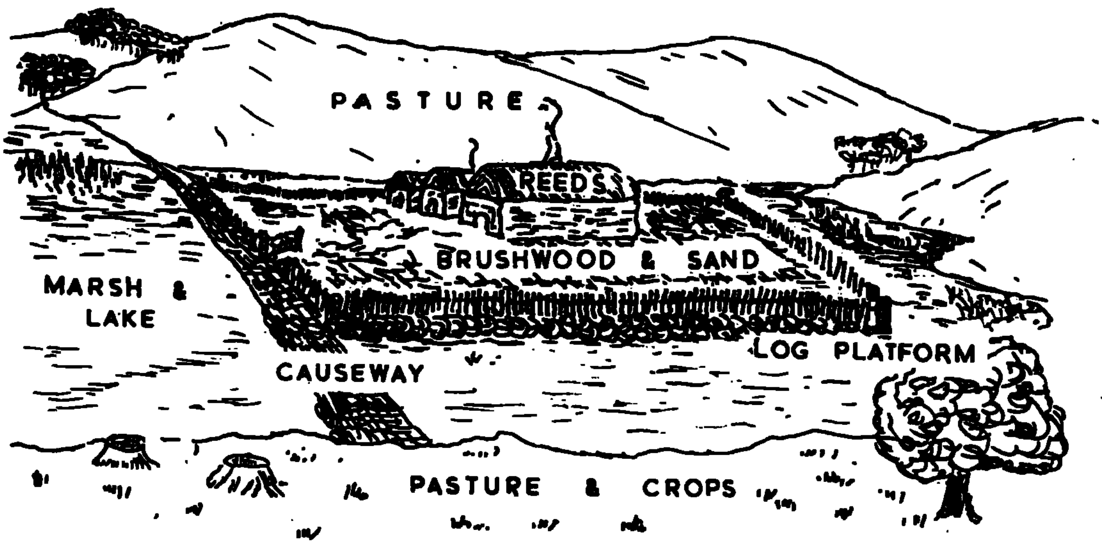
---

(10) Chap.15-information regarding fluctuation of sea level.
(11) F.Elgee, "Archaeology of Yorkshire" p.103.
(12) Chap. 1.

1	MARLS & REDEPOSITED CLAYS
2	BRUSHWOOD & SAND
3	BRUSHWOOD & TWIGS
4	LARGER TIMBERS
5	PEAT
6	LAKEBED GRAVELS

FIG. 23A

RECONSTRUCTION OF THE BARMSTON LAKE DWELLING



PLAN OF DWELLING NEAR PICKERING (AFTER ELGEE)

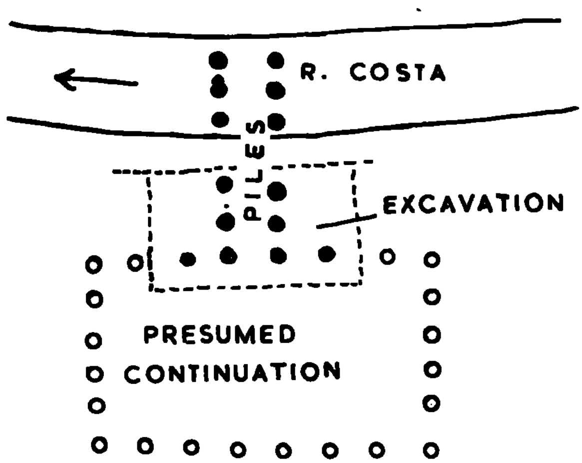


FIG 23 B

All the pile-structures so far discovered conform with this relationship.

When one remembers that these people were both agriculturists and animal rearers, and that they could only build in certain firm-bed shallow waters, where marsh was juxtaposed with light soiled easily cleared areas, the range of possible sites for such structures is considerably restricted.

Light soiled outwash gravel areas would be much more easily cleared than the heavier boulder clay soils.(13) These were, in any case, almost impossible to cultivate without a heavy plough and remained in a virgin condition until the introduction of the mould-board by Saxon invaders. Light soiled gravels were only of use if they abutted onto marsh or lake, for the construction of lake-dwellings was the dominant element of the culture. This lake must have a shallow fringe with a solid gravel base. The structures were not rafts. Only along the porous fringes of the boulder clay were these requirements met. In the more continuously impervious and insulated clay hollows of 'the interior' lakes

---

(13) Pile structures are birch,ash,alder,hazel and willow. There are few timbers of Oak and Elm or heavier trees, for descriptions of other sites in Britain of similar origin see Fox -op.cit.p.67. Darby "Historical Geog; of England Before 1800" p.14.

would be deeper and without firm beds.

The "co-incidence" upon which Elgee bases his theory can even be dismissed on other grounds than these. The population of Europe was at this time too small to allow for a considerable influx of these people. Certainly it would be scarcely likely to lead to such a concentration in Holderness, as Elgee suggests. Moreover, a considerable number of lake dwellers would have made a concomitant impression on the limited amount of agricultural land ; assarting would have been necessary to a greater extent at this time, than evidence suggests was possible.

Within the restrictive range of requirements needed for the foundation of such settlements, the choice, by two archaeologically separated peoples, of the same site would seem less co-incidental than Elgee suggests. The factor of juxtaposition itself lends weight to the argument that such a restrictive range of requirements operated.

These people did, it seems, find a means of coming to terms with their difficult environment which expressed a considerable ecological refinement. By building their dwellings in the marsh the Lake Dwellers served several ends. In an area where easily cleared sandy soils were relatively scarce, the lake-pile would be the most economic way of using limited resources. Valuable crop and pasture land would not thus be occupied by houses. Foraging for forest products could be accomplished within the security of a safe line of retreat. The causeway severed, the Lake dwelling would be an impregnable fortress.

Compared with their nice balance of use of natural resources many of the later attempts to use the region are primitive and clumsy.

(iii) Secondary Colonisation:

In the Iron Age, Holderness was probably once more avoided by settlers in favour of the Wolds.(14) The La Tène culture, unlike the swordsmen of the late Bronze Age, were charioteers and naturally preferred this area. Of the twenty four finds in East Yorkshire, eighteen are on the Wolds and only one in Holderness.(15)

During the period of Roman colonisation Holderness received little attention. It is possible that Beverley was connected to Aldborough and Patrington by Roman roads(16) and apart from this and a vague suggestion from Ptolomy's compass

---

(14) Elgee. op. cit. p.187-201.
(15) V.C.H. Vol. 1. p.121.
(16) Knox - "E.Yorkshire ". (1855) p. 122.

findings, that Aldborough was a port,[17] the Romans found little use for this region of swamp and marsh. Tacitus [18] refers to battles with Gallic off-shoots of the La Tène Charioteers, (the Parisi), who "took refuge in the swamp and marshlands." This was the most use of Holderness during the period from the end of the Bronze Age until the Saxon and Danish invasions.

Of the most important colonial period in Holderness between the Fifth and Tenth centuries A.D. little information survives. The Romas withdrew from Britain about 410.A.D.[19] leaving Eastern England open to the incursion of vigorous North Eureopeans.

The Anglo Saxon was a armer, accustomed to working heavy, undrained clay soils.[20] He brought with him the mould-board plough and probably cleared the woodland cover of Holderness,[21] building settlements on the highest of the clay hummocks.

The Danish settlement of Yorkshire would seem to have taken place between 850 and 875. A.D.[22] From this time

---

(17) Elgee op.cit. p.161.
(18) Quoted by Young "Geology of Yorkshire" p.42.
(19) C.Fox. "Personality of Britain " Univ. of Wales (1942)
(20) Paulson "Holderness " Vol.11. p.120 - quotes Bede Chronicle as stating that the Angles came from Sleswig, an area very similar to Holderness.
(21) Chap. 16. (i)
(22) E.Ekwall in "A Historical Geog. of Eng; Before 1800" p.133.(1936)

FIG. 24

onwards they settled and began, as the Anglo Saxon Chronicle records, to "plough and till lands".

From the distribution of both Anglo Saxon and Danish place names in Holderness it is possible to draw some interesting conclusions. In a region where movement was almost impossible by land, and by water made difficult by aquatic vegetation, it is safe to assume that the distribution of settlement would fairly reflect the line of entry. Those who settled the region would have sought the first suitable site accesible by boat, and founded a settlement there. The strong relationship between known points of entry and the distribution of settlement, would suggest that this was so.

Using reliable information produced by the English Place Name Society,[23] it has been possible to devise distribution maps to show the nature of this relationship. (figs.25 and Appendix I5)

The grouping of Early Saxon place names (fig.25a) suggests that the region was first approached from the Humber. These peoples settled along the Northern bank of the estuary,(then further north than it is now; after the effects of silt deposition)[24] They would spread Northward into the boulder

(23) "Place Names of the E.Riding of Yorks.) E.P.N.S. (See Appendix I)
(24) Chap. 16.(i).

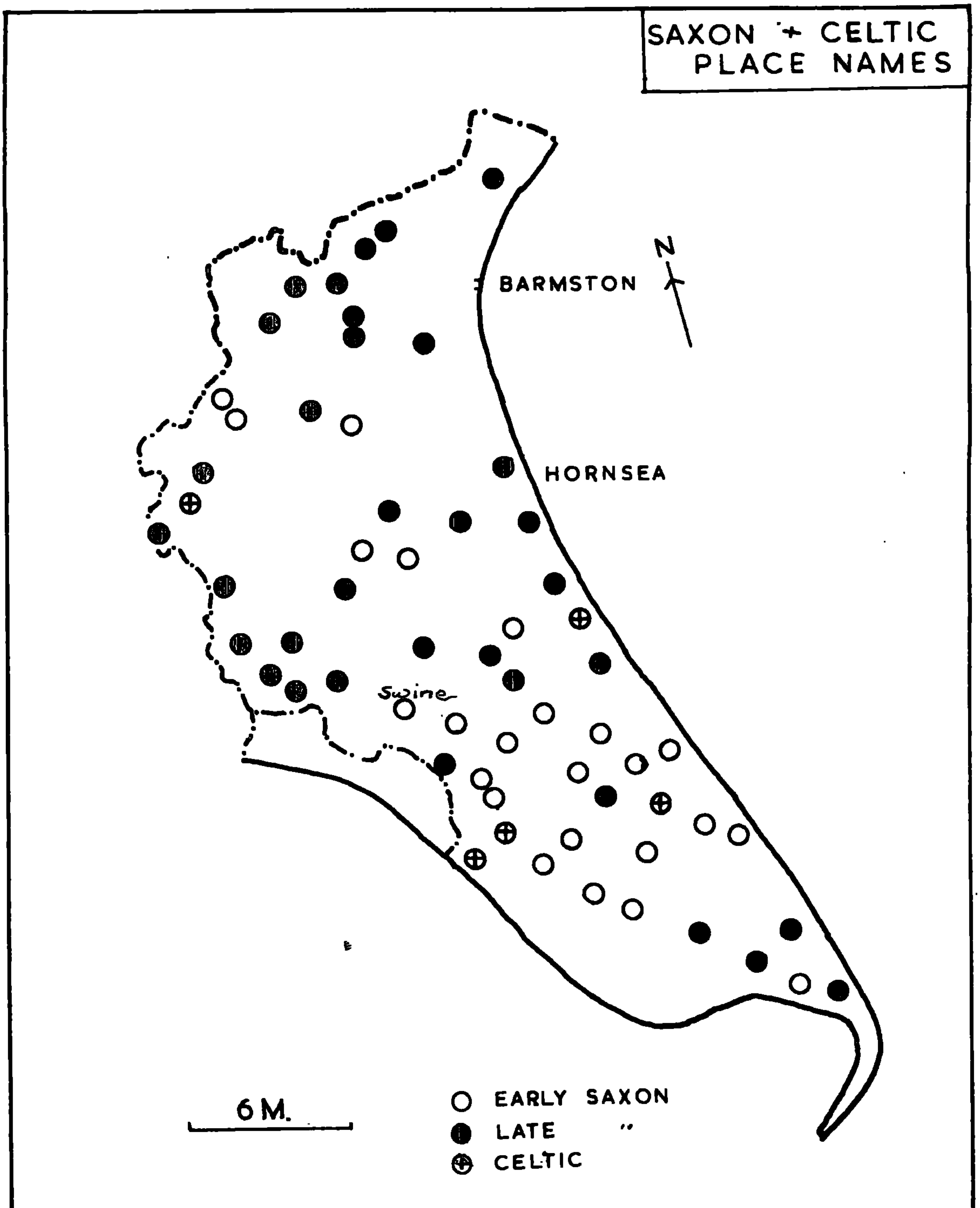

SAXON + CELTIC
PLACE NAMES
BARMSTON
N
HORNSEA
Swine
6 M.
EARLY SAXON
LATE "
CELTIC

FIG. 25A

clay area only slowly, and few found their way into the "Great Hollow"(25) of the Hull Valley, settling the eastern and western shores of this lake. Of the twenty early Saxon place names only five lie further north than Swine. There would seem to have been difficulty in penetrating the complex of lake, hummock and marsh which formed the boulder clay area.

The distribution of late-Saxon place names is much more diverse. Three lines of entry recommend themselves: these newcomers may have entered by Hornsea meres finding Lake Hull by means of a glacial overflow channel (figs 4 and 5.) They may have spread eastwards from earlier Wolds settlements along the Western shore of Lake Hull similar to that along the Humber shore established by the first Saxon arrivals. It is also possible that groups entered the area by means of the Barmston overflow channel (used by the Lake Dwellers) (figs 4 and 24).

Of the thirty five places with Late Saxon names, twelve lie along the Wold flanks, and only five are found south of Swine. Apart from a small group of four names near Spurn point(which may in any case have grown longer during the period between the first and final Saxon invasions) the

(25) Chap. 1. (ii)

Southern area (settled early) seems to have been avoided.

It is of course, probable, that a movement northwards through the region by 'overspill' elements of the earlier Saxon invaders, took place. Nonetheless, the relationship with depressions and breaks in the coast-line cannot be neglected If these were not 'newcomers' (26) then the first settlers would seem to have used the Hornsea and Barmston inlets travelling around the coast by sea, rather than spreading north by land.

The distribution of Danish place names is also interesting to this problem of entry lines (fig 25.b.) Only one Danish place name is found further South than a line between Swine and the sea. They would seem to have entered the area at three points. In the North the Barmston overflow (figs. 4 and 24) would present the first depression in the cliff line of Bridlington Bay and it is reasonable to suppose that this was the main line of entry. The grouping of Danish place names in the overflow area and on the mounds of the northern silt-lands of the Hull Valley support this view.

Further south, the next opening in the coast-line was the channel connecting Hornsea mere to the sea. Eleven places are associated with the grouping. Further openings in the

---

(26) The Saxon Chronicle suggests settlement by small waves of incursionists rather than a general influx.

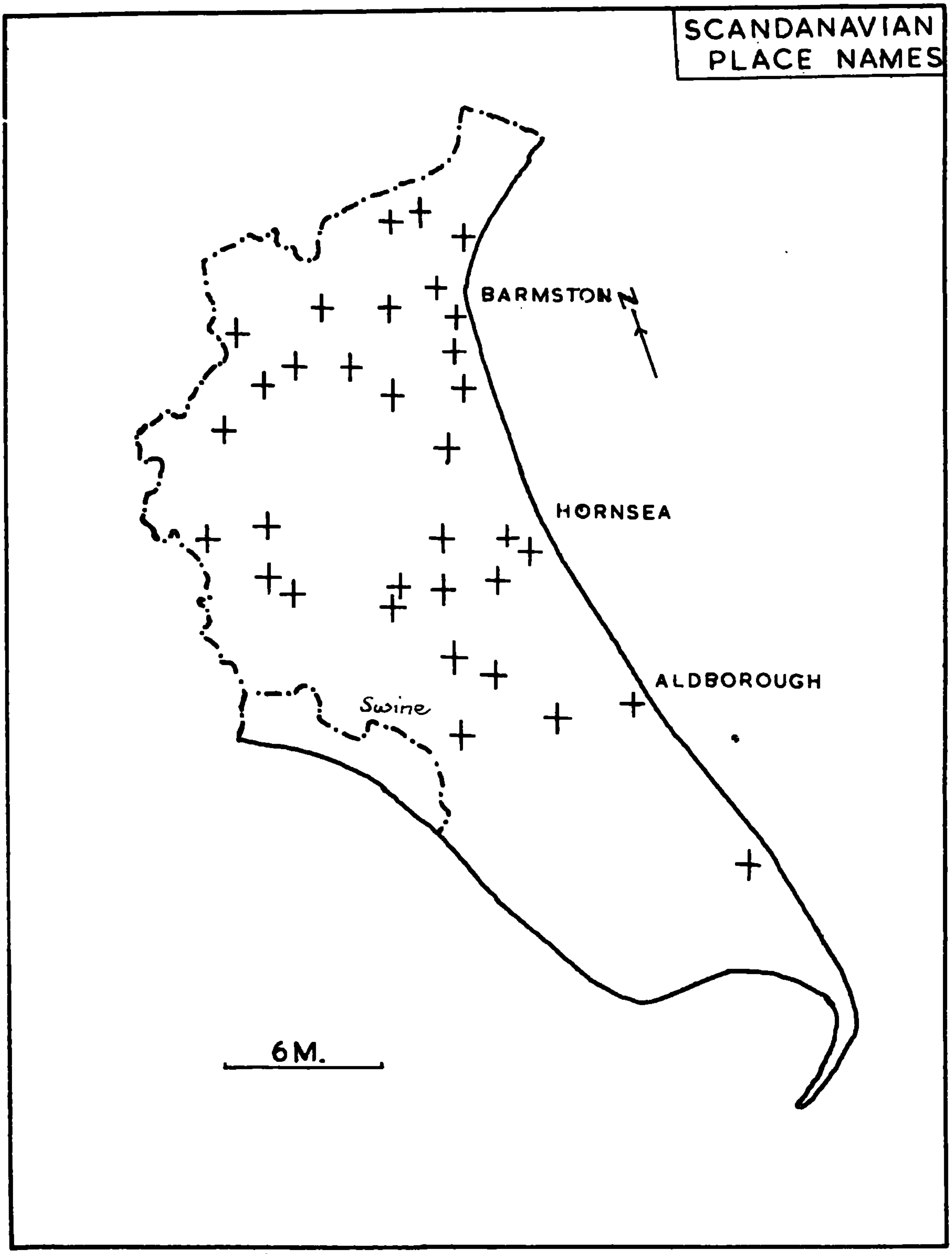

SCANDANAVIAN PLACE NAMES
BARMSTON
N
HORNSEA
ALDBOROUGH
Swine
6M.

FIG. 25B

cliff line at Aldborough and at Sand-le-Mar have possibly led to the establishment of other small Danish settlements.

The unique physical disposition of Holderness would seem then, to have exerted a considerable influence upon the distribution of settlement sites both of the earliest lake dwellers and the later agriculturists. The relationship which these sites have with the higher clay hummocks reflects even more clearly the importance of water and lake and its effect on the distribution of settlement.(27)

(IV) Settlement Sites and Relief Variation:

It has been suggested above that the nature of the pre-drainage landscape of Holderness influenced considerably the type and distribution of early settlement; that the clay hummocks, separated by stretches of marsh land and covered by a dense vegetational growth made movement hazardous, if not impossible, except along certain restricted lines of entry. Fluctuations in Holderness relief are not great; rarely is the gradient of the clay moraines sufficient to allow more than transient natural drainage. Yet the influence of these variations in terms of the distribution of settlement sites would seem to have been of considerable importance. That this

---

(27) Many Settlements disappeared in the rural depopulation of the 18th and 19th centuries.

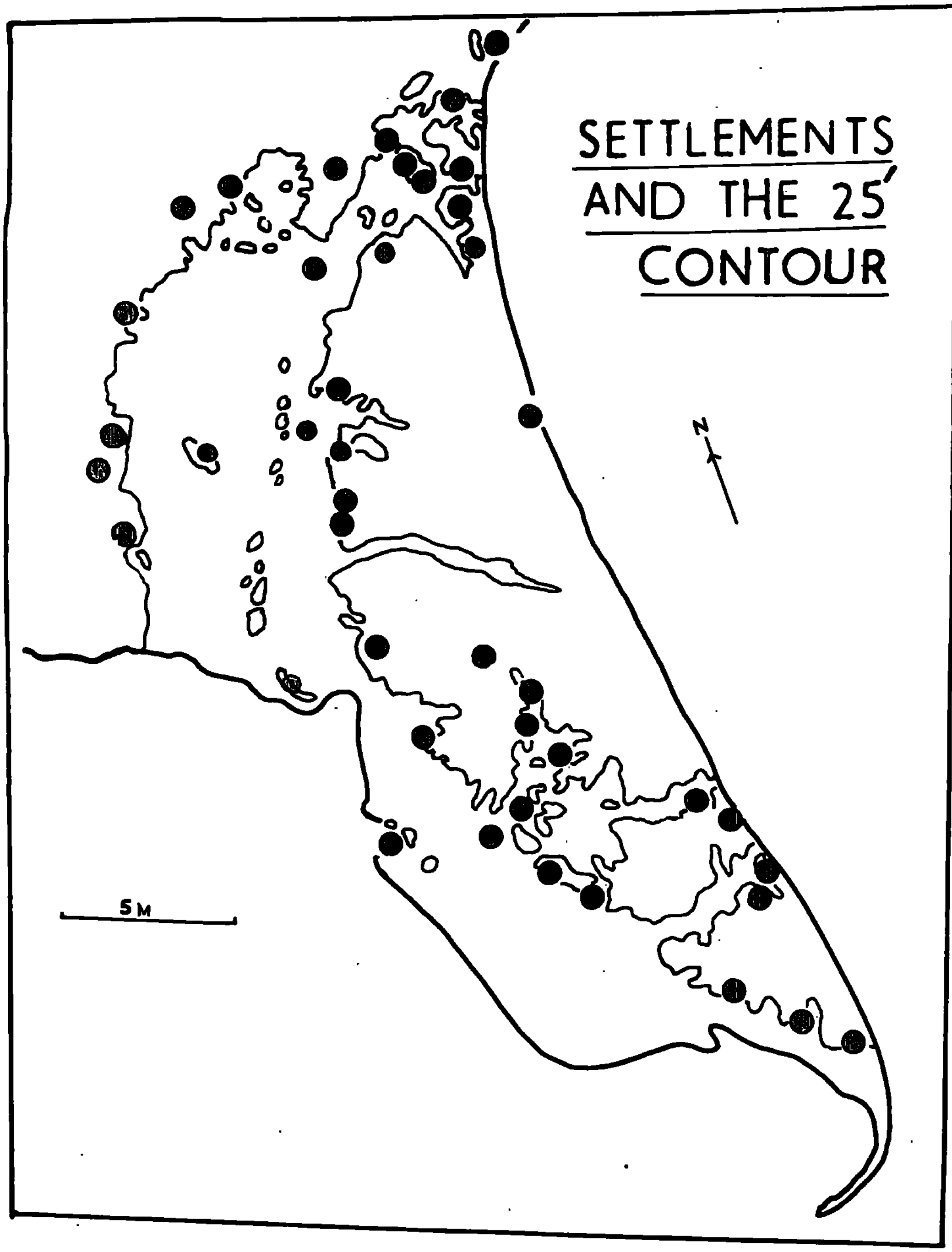


FIG. 26A

should be so is further evidence of the over-all importance of the water surplus in the determination of the settlement pattern.

Maps have been devised to show the relationship between the choice of settlement sites and height above sea level. Of the forty settlements below fifty feet O.D. and with the exception of the water towns of the Hull Valley, only one village lies below 25ft contour lines, and that stands on a sandridge (Thorngumbold) (fig 26 a). The relationship between this contour line and settlement is remarkable. Only seven villages are more than a hundred yards from the 25' O.D. line and most of them are situated along the line itself (i.e. thirty three out of forty). These settlements mark the boundary between the clay-lands, and the silts of the main bottom lands of the Hull Valley and Humber shore. Parishes were arranged to include land of each type (fig 27a) and it is along the fringes of the boulder clay area that outwash gravels and sands occur, providing easily cleared settlement sites.

The map of settlement and the 50ft contour line is equally revealing (fig. 26b) It would appear that wherever possible the highest settlement site was chosen. The result is an almost complete absence of sites between 25ft and 50ft, especially in North Holderness where natural drainage was least effective. This absence of settlement sites between the two land levels may be due to the fact that earliest Saxon settlers chose the highest land for their villages, establishing granges at the junction between the clay slopes and the marshes, (which often co-incides with the 25ft contour) and that these granges later developed into settlements. This would seem unlikely, however, for of the earliest place names several are villages on the 25ft contour (e.g. Ottringham, Keyingham, Burstwick.) It must also be remembered that the region was settled at different times by people of different cultural origins, first by the Saxons and later by the Danes, and several changes in the level of inundation may have taken place before the second phase of conquest and settlement. Certainly the line of settlement along the Wold flanks, particularly in north Holderness is largely of Saxon origin. (fig 25b) shows a strong relationship to the 50ft contour line, and the settlements above 25ft in north Holderness are of later Scandinavian origin (fig 25 b). Without a change in lake and marsh level, it is

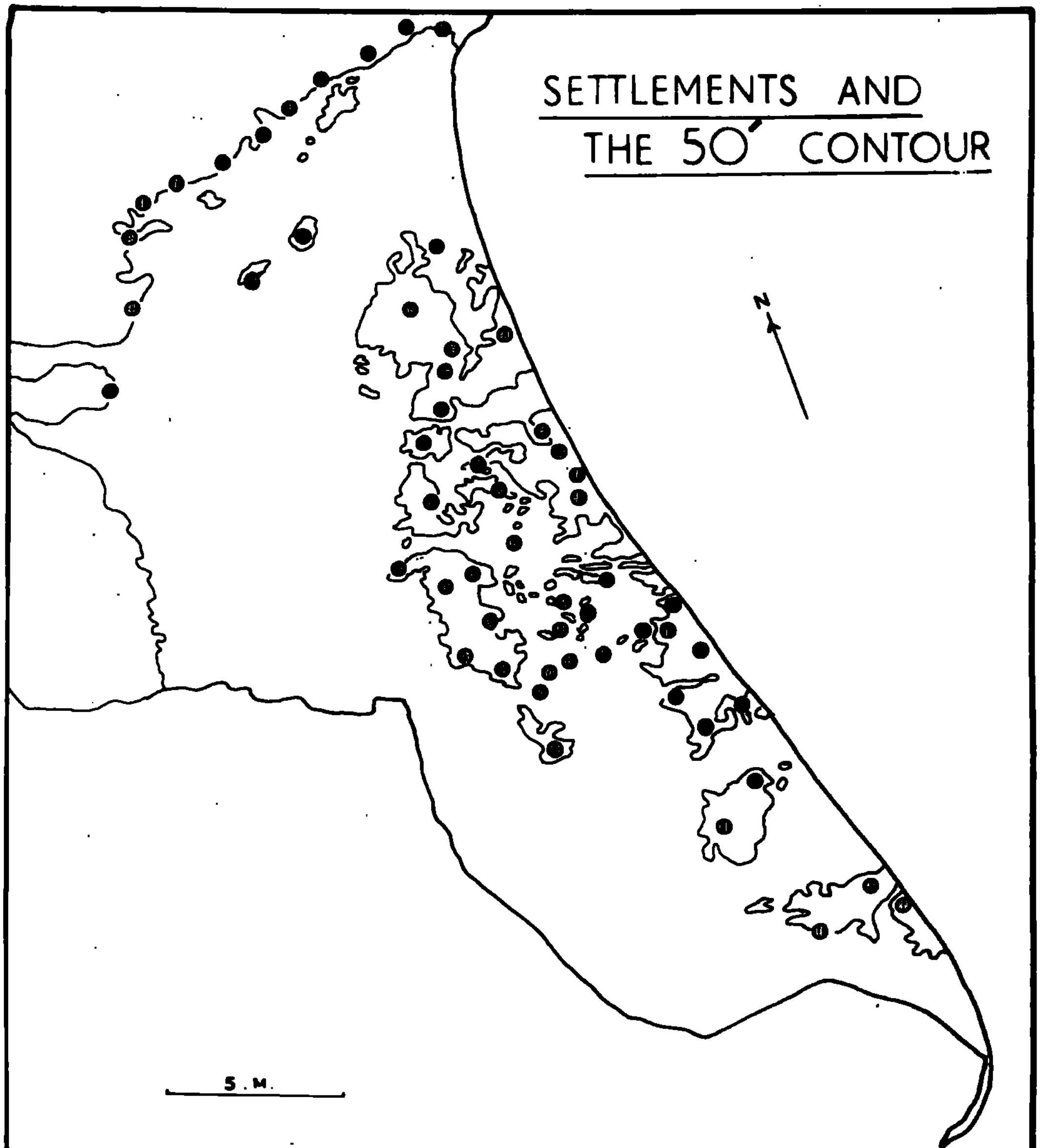


FIG. 26B

difficult to account for this avoidance of hummocks where a higher proportion of sands and gravels made clearing relatively easy compared with the heavy clays of South Holderness. It is possible in fact to postulate a breach of the of the (Barmston Overflow) before the later incursions, which would have lowered the water table throughout north Holderness. Whatever the cause of the distinction between the two main contour levels and the ~~and the~~ chance of settlement sites, it seems clear that the level; (or levels) of the water table in the region, was a considerable factor in the choice of site.

(V) The Pattern of Settlement.

The pattern of settlement in Holderness was firmly established by 1089. Although de-population and nucleation has removed many of the smaller hamlets only six entirely new ones have been added since this time. The distribution of Domesday settlements is a striking one. There would appear to have been a marked concentration of hamlets in the Southern part of the clay hummocks, the central wapentake of the region. (fig 20). This concentration can be contrasted with the smaller number of settlements in the northern claylands, the southern silts, the Hull Valley, and the Wold flanks. Only in the Barmston Overflow is a similar concentration noticeable.

The reason for this diffusion are not immediately apparent. Both areas of settlement concentration are notably ones most affected by rural depopulation in the Nineteenth century, and would therefore appear to have been least fertile. The most southerly of these concentrations, and the largest, is not one containing a high proportion of free draining gravels, which would have been more easily cleared for cultivation than the heavy boulder clays of the area. There are areas containing higher proportions of sandy soils which were less densely settled.

There is a striking relationship between areas which contain a considerable diversity of physical elements over a small surface area, and those in which one single element dominates. Where there is a frequent juxtaposition of steeper gradients, sandy soils, and stretches of marsh and lake, over a small surface area settlement sites are more frequent: where one of these physical elements is absent, or one dominates to the exclusion of others, settlement sites are more dispersed. There would appear to have been a strong need for all three elements within the parish unit. Where they were widely separated or absent, fewer settlements were possible. Another factor emerges in this pattern. Few settlements occur far away from marsh or lake - and this would seem to have been the dominant siting factor.

In order to demonstrate this singular relationship three maps have been devised (fig 27). The areas where there is proliferation of settlement, are represented by townships within the area of the modern parishes of Aldborough, Garton, Roos, Burton Pidsea, Elstronwick, Burstwick, Sproatley, Bilton and Skirlaugh in the south, and Beeford, Frodingham, Bewholme, Skipsea, Burton Agnes and Foston in the North. An area where settlement ~~where settlement~~ is dispersed is represented by townships within the modern parishes of Brandesburton, Seaton, Leven, Catwick, and Routh. The first area (I in fig. 27) in the Barmston Overflow, shows clearly this relationship between settlement sites and juxtaposition of sand gravels with mere and marsh. The second (area 2) in the Hull Valley shows that even where quite extensive stretches of free draining, easily cleared gravels occur, similarly large areas of marsh or lake, or boulder clays, make settlement less attractive. The third (area 3) is that of South Holderness where the greatest concentration of rural settlement coincides with an area where small patches of sands, small meres and diverse relief occur.

SETTLEMENTS AND THE DISTRIBUTION OF SANDS/GRAVELS AND MERE SITES

- MERE SITES–AREA NOT KNOWN
- DEPOSITS OF GLACIAL SANDS & GRAVELS
- + SETTLEMENTS

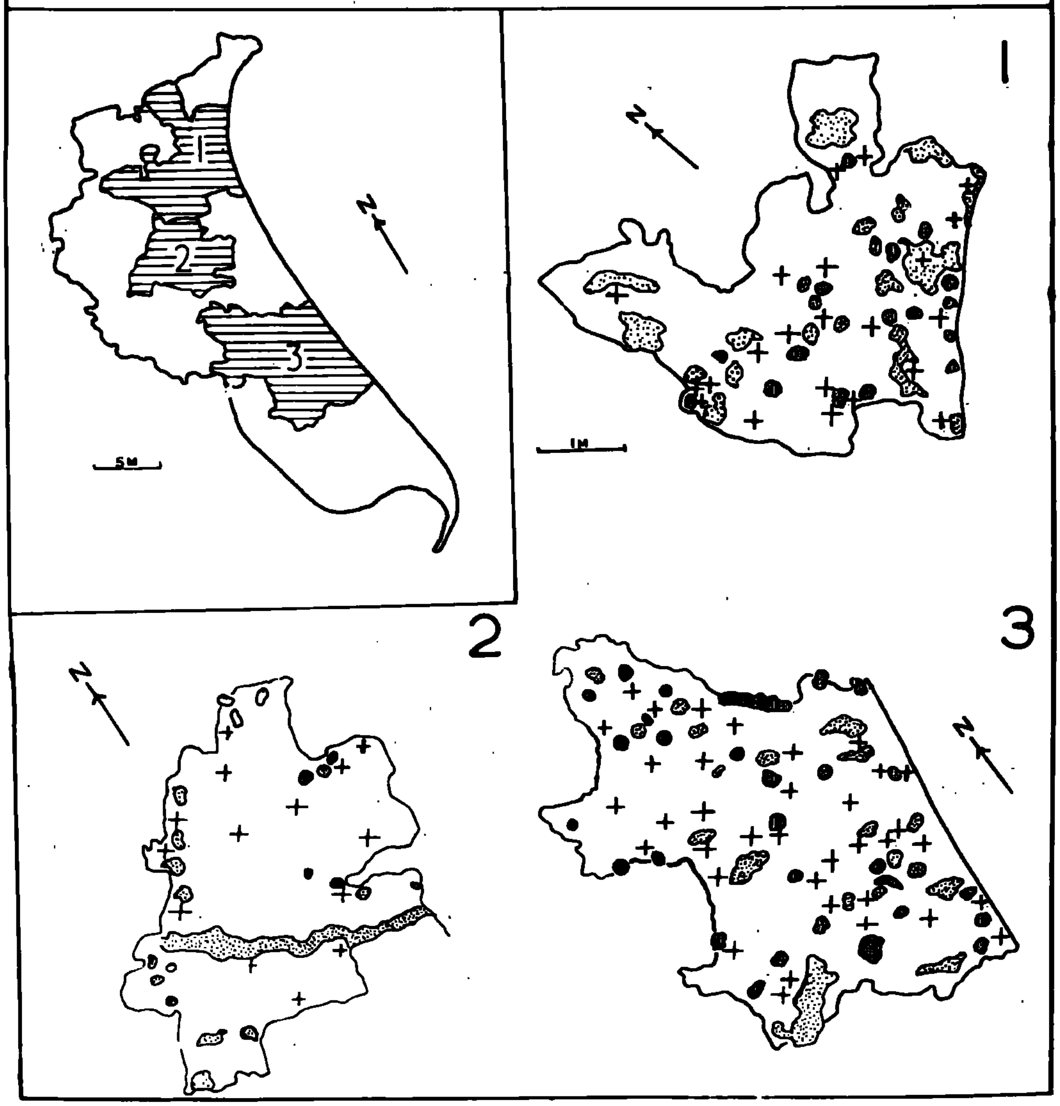


FIG. 27A

SKIPSEA MEDIAEVAL MERE SITE

SKIPSEA 'MERE' AFTER DRAIN BLOCKAGE

FIG. 27

HORNSEA – VILLAGE & MERE

BRIGHAM – VILLAGE & CARRS

FIG. 28

Here the relationship between these features and settlement is clearly illustrated.

Although it is not possible to make more than tentative suggestions there is sufficient evidence to indicate that the pattern of settlement bears strong relationship not only with the general level of inundation in any area at a particular time (fig. 28) but also with special features of the pattern of physical morphology.

(VI) " Water Towns "

One group of small townships deserve special attention. These are the settlement of small hummocks in the lower silt-lands of the Hull Valley which the Meaux Chronicle refers to as " Water townships " (29) The largest of these are Wawne, Tickton, and Sutton (figs. 29,58). all of which would seem to have existed largely on the products of the marsh, supplemented by crops grown on the lands of the village hummocks of the Hull Valley moraine, which were, except in the case of Sutton, higher than the villages themselves. Probably these were deliberately preserved for agriculture despite the fact that they were better sites for settlement.

(Vii) Conclusion;

From all the evidence cited in this chapter, it is

---

(29) In the marshy sea of Holderness (i.e. The Hull Valley) the villages stand out like islands" A.Earle, op.cit. p.34 quoting from the Chronicle.

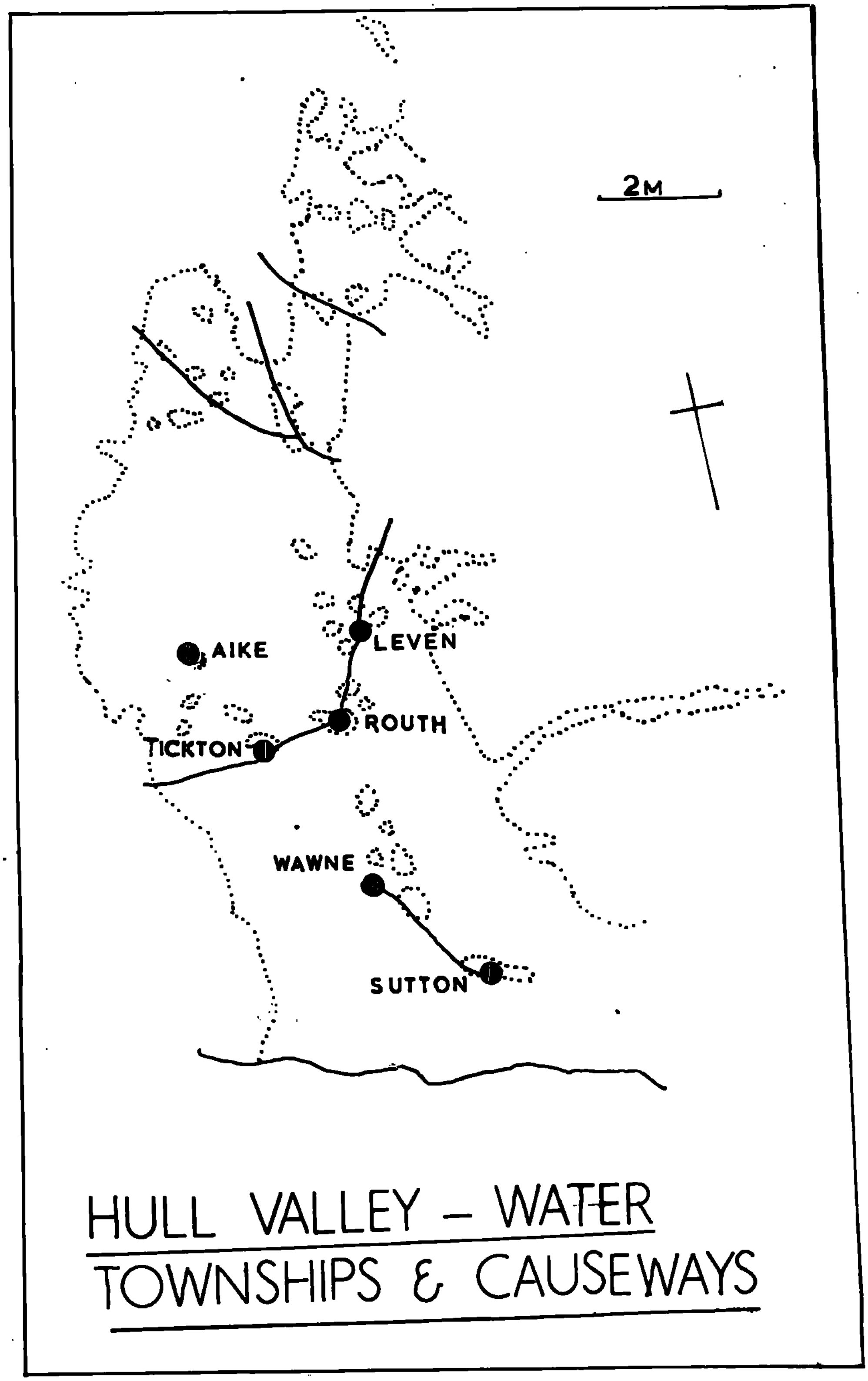

2M
AIKE
LEVEN
ROUTH
TICKTON
WAWNE
SUTTON
HULL VALLEY – WATER
TOWNSHIPS & CAUSEWAYS

FIG. 29

possible to suggest that the water surplus in Holderness closely conditioned the pattern and distribution of each wave of settlers, and that the contemporary settlement pattern still clearly reflects this relationship. (fig. 62)

CHAPTER 5. COMMUNICATIONS AND THE WATER SURPLUS.

(1) Inadequacy of land routes.

There is strong reason to believe that surplus surface water in the mediaveal landscape of Holderness was of considerable importance in conditioning the type and pattern of communications. Evidence suggests that travelling by water was, in fact, much more important in the region than that of traffic by road until the mid Eighteenth century.

Roads in Britain before the Nineteenth century were bad even on the free-draining chalk uplands. Many records testify to the apalling condition of roads. The physical disposition of Holderness did little to encourage their growth. The great swampy hollow which was the Hull Valley was a great obstacle in finding land route-ways to the boulder clay isles in the east which it insulated. With a tidal sweep of twenty miles and a fall of only seven feet in this distance, the valley was little more than a continuous morass, four miles broad.

Only three roads were built to cross this area from the Wolds; the first, from Frodingham to Driffield, and the second, from Leven to Beverley, were man-made causeways raised above the level of the marsh, the third used a natural causeway of boulder clay and gravel between Hempholme and Rotsea, (fig 29) There is no record when these were first constructed. The main route, between Beverley and Leven (fig 30) was certainly in use as a main route by the Fourteenth century. The Meaux Chronicle refers to this route as the " region viam " to be left un-hindered by their new dike (Monkdike) The limited amount of Domesday " wasting " in the region (1) took place along the line of this causeway and would suggest that the way was already in use by this time, pointing to a possible Roman origin.

The settlements on mounds in the eastern part of the valley, (the Hull Valley moraine) at Routh, Wawne, Tickton, Weel and Sutton were probably completely insulated. The Meaux Chronicle refers to them as " water townships " (2) accessible only by causeway in winter (fig. 29 + 58).

Elsewhere in the region conditions seemed to have been little better. Villages on the eastern boulder clay moraines were probably difficult of access at least in the winter months. The Saxon word " outgang " used throughout the region for the village road, is explicit enough(3)

---

(1) Which, by its paucity, suggests the impenetrable isolation of the region at this time.
(2) C.M.M. Vol. 11. p.250.
(3) Continually mention in 'Books of Paines and Presentiments ' E.R.P.R.O. - CSR.

The mediaeval village community of Holderness would seem to have existed as an independent entity in a more than usual way. Records of roads or ' common ways ' built or improved in the area are not frequent in mediaeval records. It is certain that they were poor everywhere. The 1367 Commission[4] was instructed to inspect ' roads, ways and sewers ' and found all in a very poor condition. Between Burton Pidsea and Keyingham in South Holderness, for example;

> " The common way is stopped, which the tenants aught to repair by reed stumps or in some other fit way." (5)

This method of using marsh reeds to mend roads would seem to have been a common practice. The Melsa Chronicle notes that " trunks were laid across marshy parts and stones in the larger holes " [6] Two further of the presentements of the Fourteenth century must suffice to illustrate the poor condition of roads in the region:

> " (There is) a road which aught to be repaired by the abbot of Thornholme between Frodingham and Holme which is obstructed, dirty and impassable." (1392)
>
> " The Roads from Dunswell to Woodmansy and from Anlaby to Hull is deep in mudde and impassable." (1366) [7]

---

(4) Chap. 2. (i)
(5) C.S.R. HI/I E.R.P.R.O.
(6) Earle op.cit. p.112.
(7) C.T.Flower " Public Works in Mediaeval Law ". p.310. 312.

FIG. 30

There is little doubt that roads continued to remain 'dirty and impassable ' until the end of the Eighteenth century. Jeffrey's map of Yorkshire (1770) showed that there were few roads which linked villages. Many petered out into marshes.

At the beginning of the Eighteenth century, Robert Banks vicar of Hull, was able to write in a letter to his bishop

> " The ways of Holderness are next to impassable at this time of year. Some have lost their lives, who have ventured through them. " (8)

Burton, writing in the same period, noted that

> " Swine is a secluded place where roads are so deep it is impossible to reach it." (9)

Villages wre often isolated after heavy rain. In 1719 Keyingham carr was;

> " so oppressed with water that......... in winter the road from Roos to Halsham is flooded." (10)

There is little wonder that Arthur Young avoided the area altogether, travelling along the post-road to Beverley and relying on hearsay for such information that he gives.(11)

---

(8) Poulson op. cit. Vol. 11 p.230 - (letter of Jan; 17th 1707).
(9) Burton's " Monasticon ". Yorkshire p.68.
(10) C.S.R. Petition 1719.
(11) Young's Tour. Vol. <u>II</u>

(ii) Water as a Means of Communication.

There is a considerable body of evidence to support the view that within this region of multiple insularity, long journeys were made by boat rather than use tracks and pathways ; routes which were ill - defined and poorly maintained.

Two types of movement might be distinguished; barge traffic from the Humber inland along the littoral creeks of South Holderness - and the use of channels in the Hollow of the Hull Valley for penetration of the Claylands.

The Humber littoral between the River Hull mouth and Spurn Point was broken by a number of long, tidal creeks which drained the Southern part of Holderness. These creeks supported a number of small ports at or near their mouths; notable at Patrington and Hedon. There is every reason to suppose that a certain amount of barge traffic penetrated even further inland than these townships along natural and improved streams..A presentment of an inquisition of 1392 refers to the channel known as Skirthdike from Burstwick to Hedon:

> " Whereby from time immemorial boats laden with merchandise passed from the high sea." (12)

---

(12) Flower op.cit. Vol.11. p.356.

This traffic was sufficient to support small port development along this coast of considerable importance, as 1580 Chart testifies (fig 56). Hedon became one of the main ports of the east coast sending two members to Parliament in the Fourteenth century. These barge channels must have served a considerable inland area of the Holderness clays. Silting along the foreshore (13) soon diminished the importance of these small ports however, but even as late as 1802 the Keyingham Drainage Act was making provision for;

> " The carrying of corn, lime and coals in boats along suitable cuts." (14)

The second type of water traffic involved internecine movement within the region, in the Hull Valley and Barmston Overflow, with limited penetration of the claylands.

For long the marshy tract on either side of the River Hull was difficult to passage by foot or boat. These carrs,(15) were often covered by shallow waters in winter, but in summer large parts of the area often dried sufficiently to allow pasture of stock. (Fig 15.)

---

(13) Chap. 16. (i)
(14) ' An Act for Draining Low Grounds in Keyingham ' (1802) E.R.P.R.O.
(15) Carr = Kjór - Danish for " marshy area."

Several ephemeral water-courses brought seepage from the boulder clay areas, into the Hull Valley, which acted as a large sump. The monks of Meaux and the Friars of Beverley Priory were first to appreciate the advantage which would be gained by deepening and widening the existing streams, and by digging others to supply the deficiencies. East-West cuts across the direction of slope were made, obviously with the intention of communication rather than drainage (fig 31+ 11). Once constructed these channels would allow entry to the heartlands of Holderness, especially along the three glacial overflow channels which connected this area with the interior, along the Lambwath, and between Leven and Hornsea: Frodingham and Barmston (fig 4). It is reasonable to suppose that barge traffic plied from the Hull Valley well into these claylands.

The Meaux Chronicle furnishes proof that this activity was common. Between 1221 and 1225 Forthdike was constructed to connect the Lambwath(16) with Meaux. A bridge over the former stream prevented boats from passing down it.

> " Qui pontes ita in altum
> exigerentur ut naviculae sine(17)
> nostris subtus eos transire possent."

---

(16) The Lambwath was probably a lake at this time; (fig 7.)
(17) C.M.M. Vol. 1. p.409.

MONKDIKE

EARLESDIKE
(BARMSTON DRAIN)

FIG 31

There are also records of carr turves transported by boat along canals and ditches.[18] These were valuable throughout the region as a source of fuel. Timber was scarce, and woodland jealously guarded (fig 56)[19]

The 1367 Inquisition of Drains and Sewers[20] gives ditch sizes; many of these channels, even within the main morainic area of eastern Holderness, were built wider than necessary for drainage, and against flow line direction,(Appendix I) It has already been suggested in a previous chapter that drainage was not of great interest to the early medieaval people who maintained an economic equilibrium by preserving their marshes and lakes and not draining them.

Even the channels which followed the flow line and were built for drainage (e.g. Monkdike in the Hull Valley, fig 31) were used or abused to facilitate barge traffic. A Fourteenth Century dispute between the abbot of Meaux and the merchants of Beverley occurred because Monkdike was blocked;

> " with straw,hay,timber,logs,dirt,twigs, elders, and hurdles, in order to ship goods to market in Beverley." (21)

---

(18) Chap. 3 (ii)
(19) Chap. 16. (i)
(20) Chap. 1 and Appendix I.
(21) Flower op.cit. p. 312.

Dugdale, in his general history of draining and embanking written in the mid Seventeenth century, notes that:

> " the channels made for draining did yield no small, advantage to those parts for carrying of corn and merchandise ".[22]

In the North there is evidence that for a long period Earl's dike, the forerunner of Barmston Drain (figs 31 + 24), was used for smuggling sea borne produce into the region, using flat bottomed boats.[23] Poulson maintains that this practice was possible until the Eighteenth century.

Blashill in his "History-of-Sutton "[24] suggests that the current of traffic was considerable between Skipsea Brough the first seat of the Holderness earls (fig. 32), and the River Hull. There would seem every likelihood that this fortress, connected to the rest of the region only by water, (fig, 32) and within easy reach of the Barmston outlet two miles away, was a northern port for the region; although no record (beside Blashill's Speculation) remains to substantiate this view.

---

(22) T.Dugdale " History of Embanking and Drayning " (1662) p.VIII
(23) Poulson op.cit. Vol II. p. 303.
(24) op.cit. p.23.

FIG. 32

CHAPTER 6. THE MEDIAEVAL LANDSCAPE OF HOLDERNESS 1000 - 1760.

In the preceding chapters an attempt has been made to prove that patterns in the mediaeval human geography of Holderness were the result of a series of responses to the dominence of the water surplus. The broad outline of these responses has been discerned in the evolution of a settlement pattern, the development of a rural economy, and the nature of the communications network. It has been suggested that the modern complexities of the drainage pattern owe as much to the early evaluation of water as a means of transport, power, food and fuel as they do to diversity in relief mosaic.

The insularity of the region ensured the slow rate of change which enabled the writer to regard this period as a whole. By the end of the Middle Ages, marked in Holderness by the growth in the number of Inclosures and the inception of public drainage schemes, the pattern of responses had altered little.(1)

---

(1) Berisford " Lost Villages of England." p.228. Beresford points out that earlier Elizabethan inclosures were rare in Holderness, and those which did occur were restricted to limited areas of 'bottomland' usually on silt accumulations at the edge of meres. (fig 58+59.)

The marsh land still played a valuable part in the economy of each village community although it is probable that this importance was gradually decreasing at the end of this period. It was partly due to this that the drainage work of the Eighteenth century could take place.

Evidence of the beginning of reduction in value is conjectural.

The growth of Hull as a port would allow the shipping of fuel and growth of agriculture markets; and the Reformation would cause a decrease in fish consumption; and growth of hunting as a sport, at the expense of shooting, released the marshes from noble patronage.(2)

On the claylands, compact villages were still virtually isolated from each other by meres, marshes and broad sluggish streams. Inter - connecting roads were passable only in summer, and in winter each parish community lived its autonomous existance.

The two field system (the only possible economy on hap - hazardly drained wet clays,) dominated everywhere, and each parish still placed considerable reliance on its area of 'carr - land ' for meadowland and fuel. The bare denuded

---

(2) Chap. 16. (ii)

hillocks would be cropped with oats and wheat. The stock was fed on the carrs in summer and only the breeding animals retained and fed on oats, some peas and beans in winter. Barley and turnips, were, for ecological reasons rarely a feature of the economy.

In the siltlands, isolated farm communities and hamlets were established late in the period, and granges placed on higher ground. Crop yields were probably better where drainage was good. Camden(3) notes that Sunk Island was valued at £800/an and produced chiefly oats and barley in 1753. Frequent flooding (e.g. 1764) caused by blocked drainage outfalls, often hampered both farming and communications.

The peatlands of the Hull Valley, still remained impassable for much of the year, a water logged tangle of fen vegetation, with the mediaeval system of navigation ditches still useful despite the fact that it hampered drainage work. The few areas of improvement by local progressive landlords standing out against the predominant waste of sedge marshes.

(3) Camden op.cit. p. 319.

Apart from the value of marshland in terms of its fuel, fish, reed, and fowl it had an annual ephemeral value as summer pasture, worth as much as 30s/acre.(4) In winter it was still possible to sail boats from Hull to Barmston through the valley, and in 1763 everywhere 6' of water was general on most of the Hull Valley carrs.(5)

Out of the general morass the valley townships, standing out on hummocks of the (first) main ice - still, retained their appearance of islands of isolated fertility Beverley was accessible from Holderness only by means of the Leven, Routh, Tickton causeway the Regiam Viam, which still remains as a feature to-day. (fig. 30) It is necessary to stress firmly the haphazard, inadequate primary drainage network which the improvers of the Eighteenth and Nineteenth century inherited.

The drainage of the Fenlands of East Anglia and of the Romney marshes(6) was undertaken with ~~the~~ foresight and intelligence by skilled drainage engineers. From the inception their work was organised with one purpose in view. In Holderness the drainage 'pattern' of 1760 was the result of a perambulation of historical events which had little relation to the idea of drainage. This was confused still further by

---

(4) Young op.cit. p. 173.
(5) "Observations on the Drainage of Certain low grounds on the East side of the River Hull in consequence of a View of the works" (H.C.R.L. 6181. p.5.)
(6) H.C.Darby " The Draining of the Fens."

a range of physical factors which contributed to make drainage at first un-necessary and afterwards extremely difficult. It also seems clear that the agricultural economy (based on the exploitation of carr, lake and marsh, and with arable farming as a secondary and supplementary activity,) was as distinctive in the usual economy of Yorkshire as that of the Fens was in East Anglia. W.H.Long has shown conclusively by his examination of 79 farm inventories lodged in the Probate Office in York, that the evaluation of various aspects of farming even at the end of the mediaeval period in the late Seventeenth century showed a strong influence of poor drainage in the region.(7)

Long noted the average value of each item of the inventory as a percentage of the total value of the farm. Of the total value, 40% was in cattle 22% in wheat and oats, and 12.6% respectively for sheep and horses.

The place of cattle was an increasingly important one. A special breed of dairy cattle had evolved on these wet pastures, known as the 'Holderness shorthorn.'

---

(7) Enclosure Plans in Registry of Deeds - Beverley.
(8) W.H.Long "Regional Farming in 17 Yorkshire
1961 A.H.Rev. V. Vlll. part 11.

Drayton's pictorial map of Yorkshire (1622) symbolises Holderness by the drawing of a cow and milkmaid - the only animal symbol on the map. Camden notes "Hoderness is a flat land, excellent for producing large cattle and good breed of horses." [9] By 1812 they were noted as a general feature of the whole East Riding landscape.[10] This was probably due to the only new factor in the agricultural economy at the end of the period, however,-growth of Hull and the needs of its growing population.[11] The entry of vegetables into the economy is indication of this phenemenon, as is the growing importance of sheep which could be used for meat, and wool, and shipped from Hull to the growing West Riding factories. But at the end of this period, despite the lack of surface and sub - surface drainage, the germinating elements of improvement pricked the general atmosphere of 'laissez faire.'

---

(9) Camden " Brittannia " (1753) p.135.
(10) Strickland op. cit. p.137.
(11) Young op.cit. p.173. - notes the practice of growing potatoes on material thrown from ditch bottoms.

S E C T I O N 11

Part A

THE DRAINING OF HOLDERNESS.

1764 - 1865.

Introduction

The land drainage movement in Holderness began in 1763 with the growth of Public Drainage Authorities, and ended with the growth of under-field drainage in the middle of the Nineteenth century. The process was encouraged and accelerated by the Inclosure Movement, and by the growing demand of agricultural products.

The transformation of the English landscape during the Eighteenth and Nineteenth centuries is the main feature of the social history of this period. The growth of urban units; the rise of a capitalist farming system after the inclosures movement; agricultural improvements; the increasing mobility of rural population with the rising tide of the industrial revolution; all these features were reflected in changes in the pattern of the land-scape of Holderness.

It is the aim of this section to attempt to prove that land drainage was, nonetheless, the dominant factor influencing the emmergence of a distinctive regional mosaic, just as it had conditioned the pattern of human responses during the mediaeval period, and that all others were subsidiary to this influence.

Three types of activity associated with land drainage can be distinguished during this period:

(I) Public Drainage Activity 1760 - 1860.
(11) The Inclosure Movement 1730 - 1840.
(111) Field Underdrainage 1840 - 1960.

The history of the main system of public arterial drains has been well documented and the first chapter in this section is merely a summary of previous research in this field. [1] Attention has not, previously, been focused on the importance of the Inclosure Movement to the evolution of drainage however, particularly of field underdrainage and private ditches. Nor has the evolution of underdrainage received much critical appreciation. The second and third chapters in this section are an attempt to amend this deficiency, and to assess the wider implications of such activity.

---

(1) By Sheppard and Lythe op.cit.

CHAPTER 7. ARTERIAL DRAINAGE WORK 1764 - 1860.

(1) Leglislation

By the middle of the Eighteenth century, the growing need for the improvement of drainage on the 'bottom lands' of Holderness was clearly recognised, and the years between 1760 and 1880 are marked by a succession of Drainage Acts relating to this period. These acts fall into two groups; between 1760 and 1807 was a period of initial leglislation;

Holderness	Drainage	Act	-	1764
Cottingham	"	"	-	1766
Thorngumbold	"	"	-	1766
Keyingham	"	"	-	1772
Winestead	"	"	-	1774
Beverley & Skidby		"	-	1785
Hessle	"	"	-	1792 (2)
Beverley & Barmston		"	-	1798
Ottringham	"	"	-	1807 (fig. 33)

The primitive leglislation of some of these earlier laws was amended in a series of acts in the Nineteenth century.

Holderness	Drainage	Amendment	-	1802
"	"	"	-	1832
Keyingham	"	"	-	1845
Embankment & Reclamation Act			-	1865
Beverley & Barmston Amendment			-	1880 (3)

---

(2) C.S.R. / 26 / 1 - 8. E.R.P.R.O.
(3) C.S.R. / 26/ 35 - 40. E.R.P.R.O.

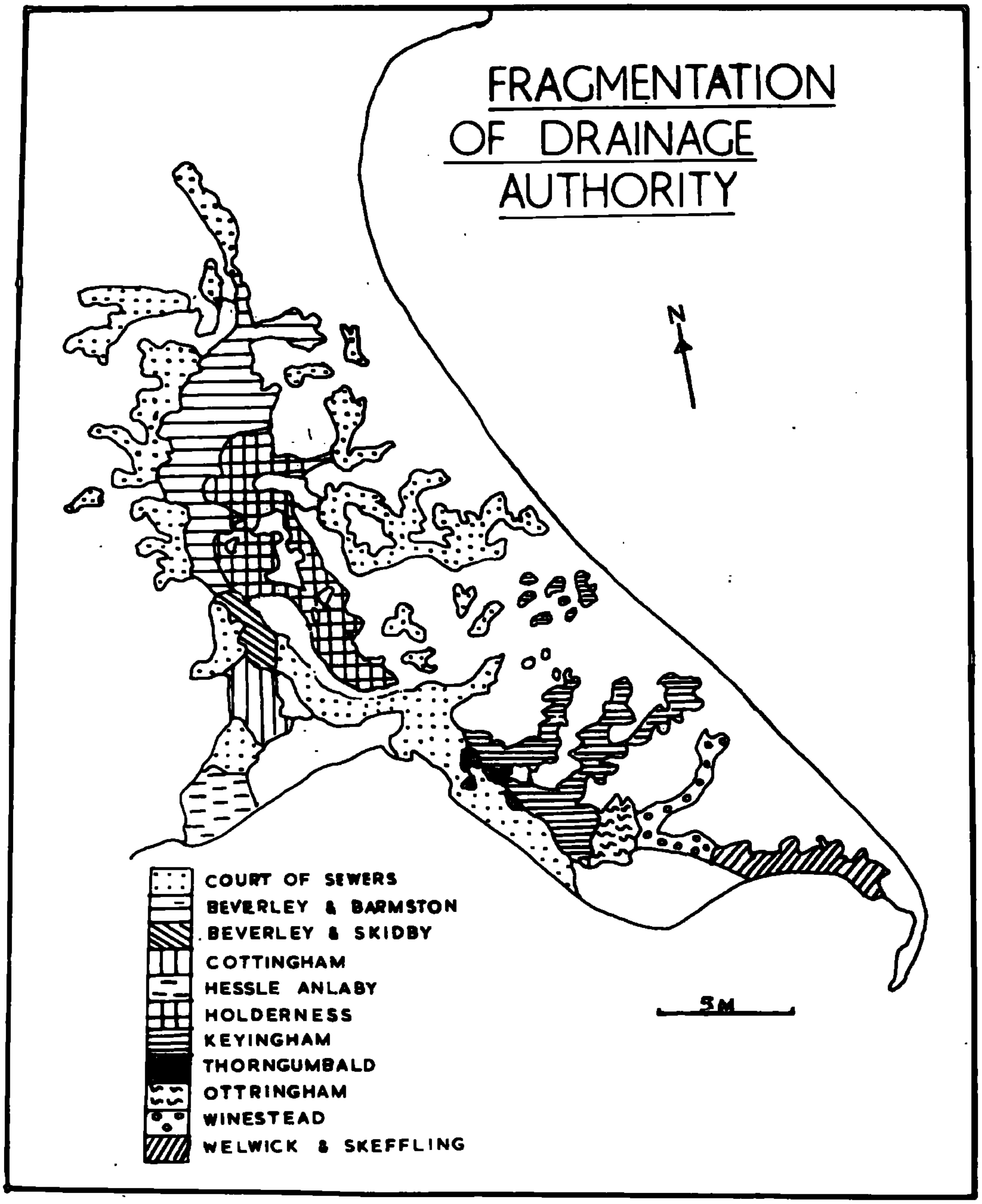

FRAGMENTATION OF DRAINAGE AUTHORITY
N
COURT OF SEWERS
BEVERLEY & BARMSTON
BEVERLEY & SKIDBY
COTTINGHAM
HESSLE ANLABY
HOLDERNESS
KEYINGHAM
THORNGUMBALD
OTTRINGHAM
WINESTEAD
WELWICK & SKEFFLING
5M

FIG. 33

(II) The Hull Valley:

The Holderness Drainage Board was established as a response to the growing demand for agricultural products by the expanding urban population of Hull. The Board was established in 1763, by landowners of the Eastern side of the Hull Valley who recognised " the inefficient and arbitrary"(3) jurisdiction of the Court of Sewers. The east side of the valley was to be drained as far as Brandesburton and Burshill (fig 34). John Grundy, a local engineer, devised a scheme for two North-South channels to flow one on either side of the Hull Valley moraine. The western drain was to enter the River Hull at Stoneferry, and the eastern one was to be joinded to Old Fleet, a natural stream flowing into the Humber at Marfleet. Because of financial difficulties and the objections of Hull shipping authorities, who feared silting, the scheme was abandoned. As an alternative, one major drain instead of two, was constructed. Much less practical than the original plan, this drain took waters from the eastern carrs, by the old monastic navigational cut of Forthdike, to the River Hull at Stoneferry (figs 11, 34).

---

(3) J.A. Clarke "Prize Essay on Trunk Draining " J.of R.A.S. 1885 p.20.

The activity on the east side of the valley stimulated improvement in similar areas on the west side. In 1766, Cottingham obtained a joint Enclosure and Drainage Act. A new main drain was cut to join the river opposite Stoneferry clow. Similar acts created new boards for Skidby and Beverley, Hessle and Anlaby, in 1785 and 1792 respectively; both cuts finding outlet at Hessle Haven, on the Humber foreshore west of Hull.

All these early acts were associated with the lower part of the valley. In the north the situation was little altered by these new drains. The northern carrs acted, in fact, as a sump for northern waters, and the new authorities in the south of the valley made no provision in their calculations, for taking off this surplus. When drainage of these northern carrs was tabled in 1796, it was natural that organisers met with considerable opposition from land owners of the newly drained lands of the southern area. The problem was further complicated because the proposed outfall of the new drain to Dairycoates, onn the Humber, raised objections from Hull port authorities who again feared silting of the lower reaches of the river.

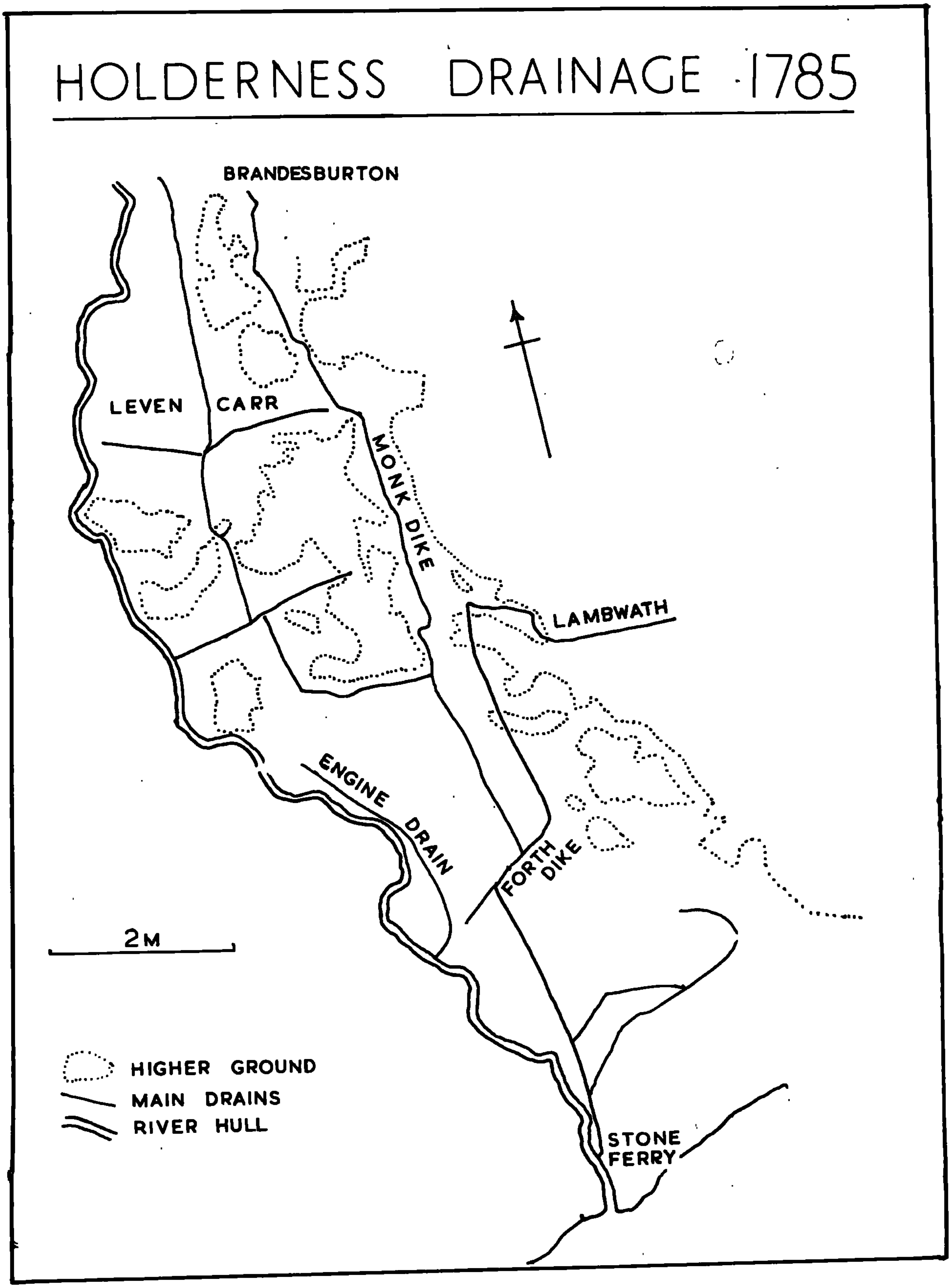

HOLDERNESS DRAINAGE 1785
BRANDESBURTON
LEVEN CARR
MONK DIKE
LAMBWATH
ENGINE DRAIN
FORTH DIKE
2M
STONE FERRY
HIGHER GROUND
MAIN DRAINS
RIVER HULL

FIG. 34

Their opposition prevailed once more. An alternative outlet was found into the River Hull near Cottingham Clow, the banks of the river being raised to prevent floodwater flowing onto the Holderness Drainage lands on the other side of the river. The new Beverley and Barmston Drainage Board also improved various channels in Northern Holderness, diverting some of the streams which flowed westwards from the claylands into the Hull Valley, so that they now found outlet to the sea at Barmston. A barrier in Earl's Dike at Foston prevented back-flow, and a new drainage area was created. (Barmston, Sea End, fig. 3.)

All these drainage schemes were reached by compromise. Periodic flooding continued in the area until new docks for the city of Hull removed the major obstacle which had prevented efficient improvement. The fear of silting in the Hull mouth no longer caused concern. In 1832 Holderness Drainage Board obtained permission to make the diversion along Old Fleet to Marfleet suggested by Grundy in 1764. The problem of draining the East side of the valley was thus solved.

The Beverley and Barmston Authority still had more serious difficulty. A new channel southwards to the Humber was an obvious solution. The objection of the Hull port authorities which prevented this scheme in 1796 was no longer a factor to be considered, but others had come in to play. The growth of rail connections with the West Riding (across the area where such a channel could be cut,) created problems of engineering which were sufficiently costly to be prohibitive. The Commissioners sought a temporary solution by scouring and dredging the River Hull near its mouth to increase the speed of flow. In 1864, 16,000 tons of silt were removed from the bed of the Old Harbour. The resultant increase in speed of flow under-mined new port installations, and the Commissioners hastily lined the river with three feet of chalk to prevent subsidence. The advantage of dredging had been lost and much money wasted.

A steam pump erected at Arram in 1868 to pump water from the drain into the river higher up the stream to the Cottingham outfall gave temporary relief. Overloading soon caused flow-back into the drain near Grovehill and the advantage was lost.

A solution was finally discovered in 1880. A new act allowed dredging of the stream-bed of the River Hull as far up-stream as Driffield. It also made provision for the raising of the banks. The increased capacity of the stream allowed a new pump to be constructed at Hempholme. (fig 36,5). This worked, with its predecessor at Arram, to pump water from the drain into the River, reducing pressure on the outfall near Cottingham. The solution was not ideal, but it was effective. Flooding of the northern carrs was brought to an end.

The total system of drains in the Hull Valley has remained with little alteration, and is that which operates to-day. It is still a somewhat awkward piece of drainage surgery. (figs. 35, 36a).

(iii) South Holderness Drainage 1764 - 1880:

The chief difficulty in designing an efficient draining system for South Holderness lay in overcoming the instability of the Humber shoreline. Silting and the size of Sunk Island (fig. 13) had increased considerably during the Eighteenth century, particularly in the west. Channels and outfalls were made useless by reduction in gradient due to silt deposition and the blocking of cloughs. Keyingham catchment area (figs 8, 36) was the first to appreciate this difficulty. The outfall clough was moved further south

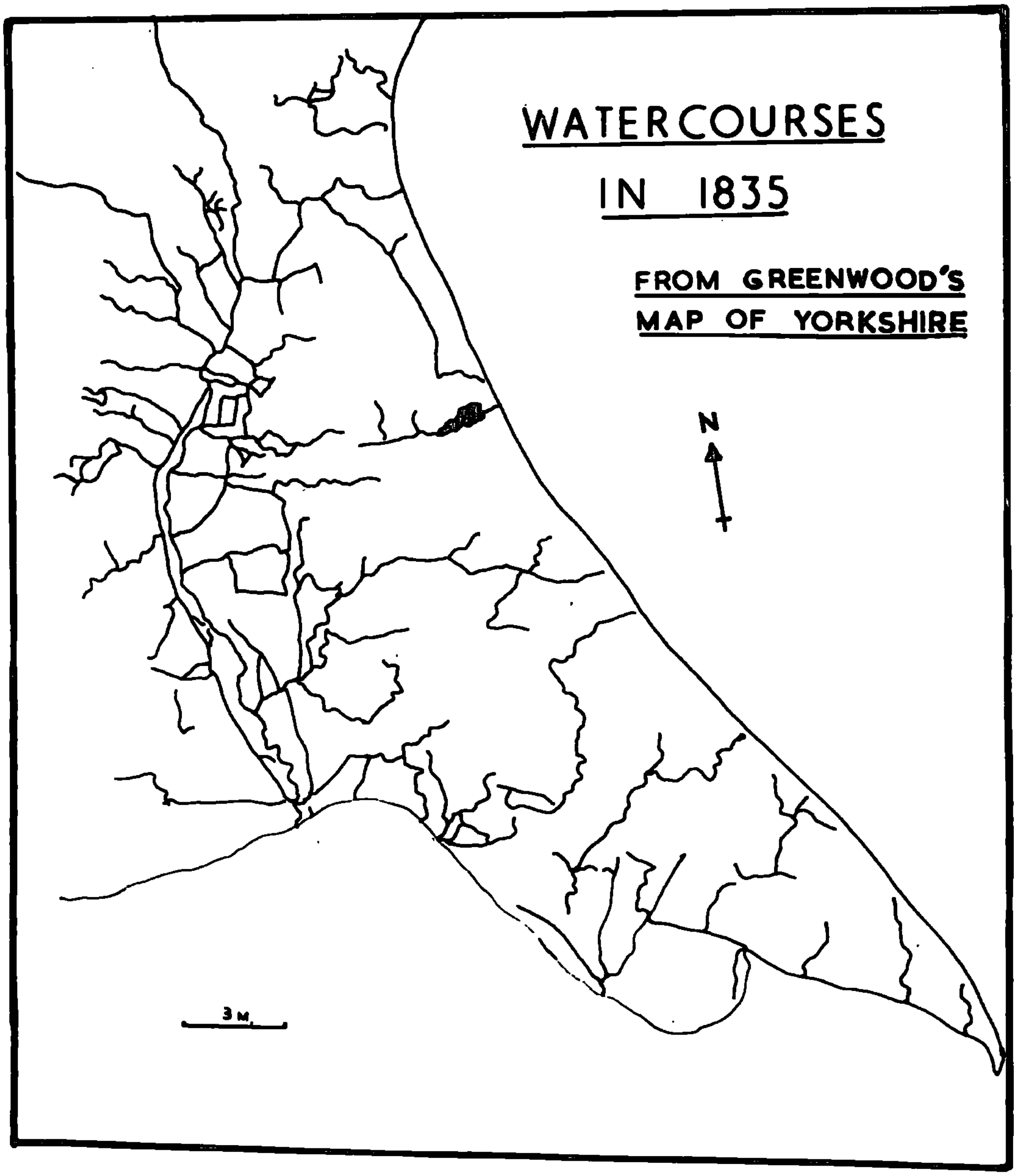
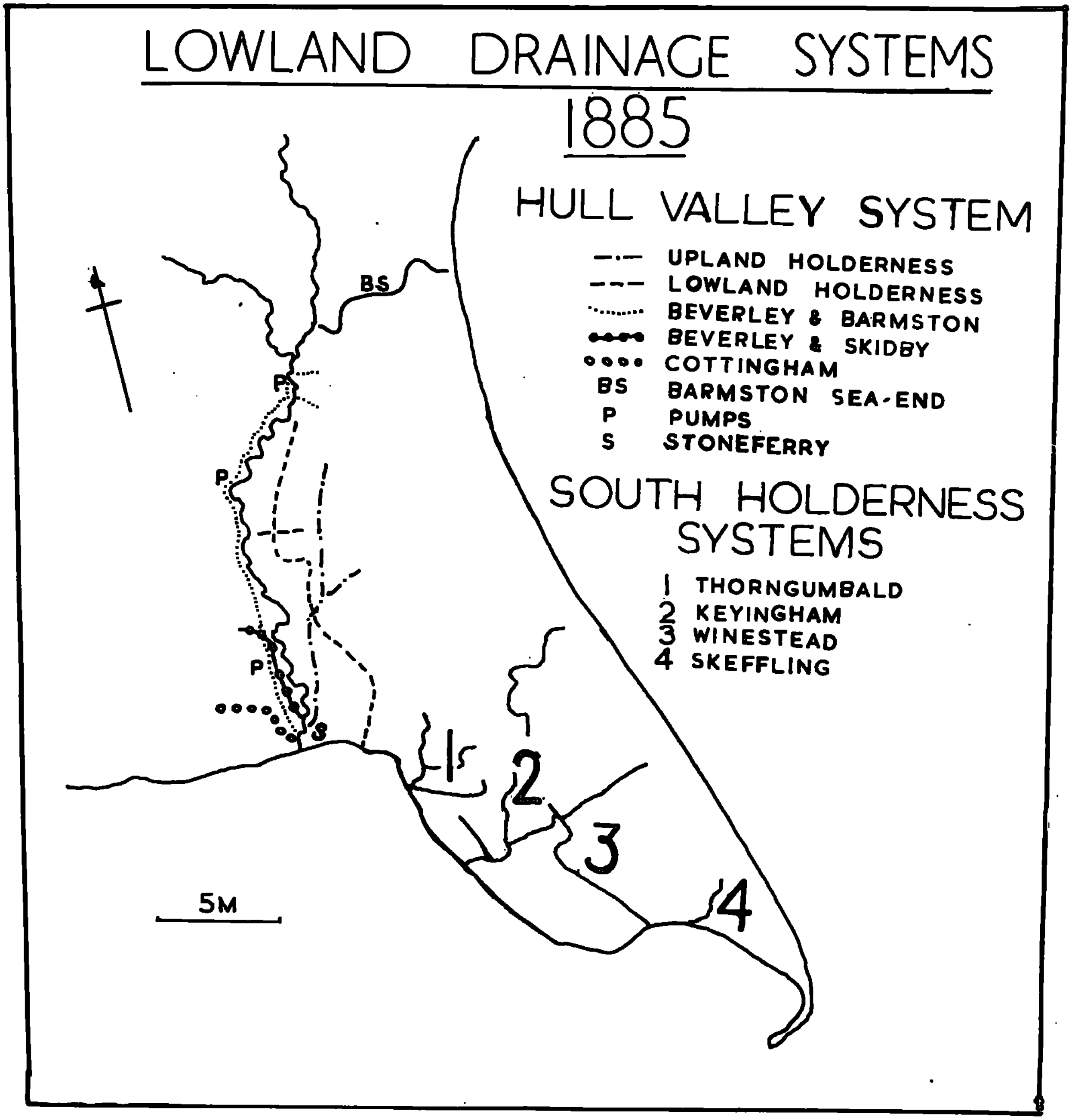


FIG. 35



LOWLAND DRAINAGE SYSTEMS
1885
HULL VALLEY SYSTEM
UPLAND HOLDERNESS
LOWLAND HOLDERNESS
BEVERLEY & BARMSTON
BEVERLEY & SKIDBY
COTTINGHAM
BS BARMSTON SEA-END
P PUMPS
S STONEFERRY
SOUTH HOLDERNESS SYSTEMS
1 THORNGUMBALD
2 KEYINGHAM
3 WINESTEAD
4 SKEFFLING
BS
P
P
P
S
1
2
3
4
5M

FIG. 36A

several times during the Eighteenth century. The Keyingham Drainage Board was established in 1772 to deal with this problem, The Commissioners soon found that moving the clough only resulted in reducing the gradient of the stream bed and any advantage was soon lost by increased silting. In 1802 a new act made provision for the diversion of Keyingham Drainage to a new channel to the Humber further east at Stone Creek, (fig. 13). Some solution was reached. Goldbourne, the engineer in charge, had warned, however, that this diversion would be the cause of increased silting at Ottringham Clough, and that eventually silt would develop at Winestead clow and Patrington Haven. This ' chain reaction ' happened as he had forecasted. In 1807 Ottringham were forced to seek an act to allow them to move their clough further towards the low-water level. Keyingham contributed to the costs. By 1819 Winestead Drainage Board was forced to deal with the same problem and sought a similar solution. By 1840 fishing smacks using Patrington Haven were forced to anchor in the mouth of that channel.

In 1845 Keyingham Drainage Board were again forced to move their clough further south. The effects of increased silting once more caused difficulties further east. In 1862 only between 8,000 and 10,000 tons of shipping used Patrington Haven. In 1869 it was closed, and Patrington became a market village. (fig 15).

CHAPTER 8. THE INCLOSURE MOVEMENT AND LAND DRAINAGE. 1700 - 1830.

The effect of the Inclosure movement on agricultural improvement is a simple case of stimulus and response. The stimulation of private ownership encouraged the introduction of new practices in all aspects of farming. The system of collectivisation in totalitarian states has shown too clearly the effects on farming of a common ownership. That which is everyone's is no man's. It is in everyman's interest to improve but no one's business to increase the efficiency, and tempo of effort.

The open field system, in fact, precluded efficient land drainage. No one could organise such undertakings in a common field with its complications of tenure. Arterial ditches were, in any case, so neglected that underdrainage would have been ineffective.

The considerable effect of Inclosure on land drainage has not been sufficiently appreciated. Not only did the Inclosure Awards act as an incentive in a general improvement of attitude to land drainage, but in many cases this aspect of improvement was an explicit part of the Inclosure agreement. The main phase of Inclosure took place, in the East Riding, between 1700 and 1780, and was completed between 1801 and 1815, after the General Inclosure Act of 1801.

Before this period mediaeval inclosures accounted for approximately only 1500 of the 750,000 acres in the Riding.(4)

A study of Inclosure Awards in the Registry of Deeds for the East Riding reveals the extent of the influence of inclosure on land drainage. The Inclosure Commissioners were empowered to instruct " ditching and diking" not only as a means of dividing properties before quick-set hedges were grown,(5) but to demand new cuts purely for drainage purposes.

The Withernwick Award (1812), for example, not only states that a drain should be constructed from the north east field for:

> " receiving water from a certain ditch intended to divide lands to be alloted by the Commissioners".

but that:

> " such internal cuts and drains be made as may be necessary to drain the land." (6) fig.59)

The responsibility for ensuring that this work was carried out was vested with the Commissioners. Similar clauses are a re-occuring feature of most of the later drainage awards and in the case of the Cottingham Drainage Act of 1766 (7) the

(4) Olga Wilkinson "Agric Revolution in the East Riding " E.Y.L.H.S. Series No.5. p.7.

(5) Strickland op.cit. p.12.

(6) Withernwick Drainage Award (R.D.B.) p.266.

(7) E.R.P.R.O. D.A./2/15.

inter-relationship of drainage and ~~enclosing~~ inclosure was recognised in the formation of the legislation, as an Inclosure Award and Drainage Act. The same Commission administered both elements.

The Inclosure movement encouraged all types of private drainage enterprise. Clean perimeter ditches were essential, for the quickset hedges which eventually divided property would not grow in wet ill-drained clay. The improvements in run-off ditching during the inclosures prepared the way for under-draining.

CHAPTER 9. FIELD UNDERDRAINAGE 1847 - 65.

(1) The evolution of under-drainage.

Field drainage is that system whereby surface and immediately sub-surface water is led to ditches along the field perimeter. Two methods of effecting under-drainage bare used.(1) The most primitive means is to dig parallel two feet trenches across the dip field and at a slight diagonal to the gradient to allow run-off to the perimeter ditch. The trenches are most often between 1½ and 2½ feet ~~deept~~ depending on soil texture. They are bedded with briars or hazel stems to prevent blocking, and the earth is laid back over the top. This method (known as "mole drainage") of sub-surface drainage has largely been superseded by a system known as "tile drainage." Clay-tile sectional pipes take the place of briar and thorn bush as a check to soil blocking in the drainage trenches.

Tile drainage is much more expensive than the old mole system. The method, is, howver, not only three times more efficient, but also less succeptible to decay and failure. With proper maintainance tile drains will serve efficiently for an almost indefinite period.

---

(1) For a full account see Nicholson "Land Drainage" (1930)

Documentary evidence of the extent of under-drainage and its nature is not easy to acquire. Records and plans were made for individual landowners, and no national record was kept. Most of the work was accomplished during the last century and such records whibh remain are probably in the strong boxes of local solicitors who are not willing (or are unable) to search for the information. A questionaire sent by the writer to farmers in Holderness provided some valuable information concerning the extent of agicultural under-drainage which seems almost universal in the region,(2) but it is impossible to verify, accurately, the efficiency of the system.

It would seem that the system of under-drains in Holderness was laid down in the twenty years following the General Drainage Act 1847, which made statutory provision for such activity. Primitive methods of carrying field water to perimeter ditches have a longer history than this, however, and these were used wherever low-graded clay slopes and agricultural demand combined to make necessary.

It is probable that many of the exaggerated ridge and furrow patterns of Holderness (especially pronounced at Sproatley. fig 37.)

(2) Chap. 13.

FIG. 37

(fig. 37) were the result of such attempts to lead away water. J.Clarke, writing in the journal of the Royal Agricultural Society, notes that in the Seventeenth century Somerset farmers used;

> " a log drawn along the furrow to allow the let off of surface water" (3)

This practice is referred to elsewhere as the 'Marcite' [4] system and often used in lowland areas as a means of dividing strips in the common field instead of using balks.

The first attempts at under-drainage in England probably date from the Seventeenth century. Blithe noted in his remarkably progressive "English Improver", written in 1652,[5] that "3 to 4ft trenches filled with elder boughs was a useful method of removing 'field pools'", although there are no records of general acceptance of the idea. Clarke [6] notes the discovery in Essex of lines of bullock horns laid in lines under a field at a uniform depth of 3 feet. These would appear to have been the first attempt to evolve a tile draining system. This example was probably an anomaly. Elsewhere mole drainage pre-dates the idea of pipe drains.

Although it is possible that bush drains were used as early as the Fifteenth century, information is based upon

---

(3) J.A.Clarke "Prize Essay on Trunk Draining" J.R.A.Soc; Vol 111. (1845) p.43.
(4) Barley "Yorkshire By-Laws" Y.A.S.R.S.(Vol.XXXV) Also J.R.Ag;Soc; Vol.11 (1843)p.25.
(5) Blith "English Improver"1652.Lib. B.M.
(6) Op.cit. p.31.

an oral tradition, by which a usage for two generations constitutes "time immemorial". Nicholson is probably deceived into this assumption by early Eighteenth century reports which follow this fallacy.(7)

The first reference to mole drainage as a general means of under-draining is possibly ~~that of~~ found in an early Eighteenth Century Agricultural Magazine (8) and it is unlikely that the system was used in any general widespread way much before this date. Vancouver mentions that fields in Norfolk were dug with trenches 2½ yards apart and 26" deep, filled with wood and straw," and that the practice derived from the late Seventeenth sentury.(9) This would appear to be a more likely suggestion than that of Nicholson.

Whenever mole draining began there is reason to deduce from the many references to the practice in the Royal Agricultural Society's Journal that it was widely in use in the South Eastern Counties in the mid Nineteenth century, and that as much as two thirds of Essex was under-drained by this time.(10)

---

(7) Nicholson " Land Drainage" p.10.
(8) Practica; Fruit Gardner 1724. Lib. of B.M.
(9) Vancouver's "Survey of Essex " (1795) Lib of B.M.
(10) J.R. Ag. Soc, Vol.11. 1843. p.43. and many more - see Index Volume.

(11) <u>The Invention of Tile Drainage:</u>

The date of the introduction of tile drainage is more easily assessed because it depended on the invention of a pipe making machine which could produce the pipes of sufficient quantity and quality to make the practice economical. This was not done until the mid Nineteenth century. In 1843, John Reade perfected a means of making clay pipes cheaply and two years later Scragg invented the first pipe machine.(11) Tile draining system spread quickly after this date.

<u>Field Under-Drainage in Holderness.</u>

The date of the introduction of under-drainage to Holderness is difficult to gauge, even approximately. It is unlikely that it was used before the efficient system of public drains was built in the late Eighteenth century. Little benefit would accrue from attempts at draining the moraines before bottom-lands and carrs were served by an efficient system of arterial channels. Landlords would be more likely to invest in lowland draining before new methods of drying the clay lands were evolved.

In 1796 the newly formed Holderness Agricultural Society debated the problem

> " Is Holderness sufficiently drained and if not what are the best means of effecting a more perfect drainage".(12)

---

(11) J.R.Ag, Soc, Vol.V1 (1850) p.126. Ernle -"English Farming Past and Present" p.13.

(12) Minutes Hold.Ag.Soc, 1795-1850 p.16. (Bev.Ref.Lib)

Several suggestions of varying fatuity[13] were made and it was noted that "under-draining is not at all practiced in Holderness". It is evident that even its principles were not understood; much less was it practised.

Although the problem was raised again in the proceedings of the Society in 1817 and 1833 there is no record of the discussion which ensued. It is unlikely, however, that under-drainage was general before 1840, despite the growing concern.[14]

The reasons for this are largely historical and economic. The first half of the Nineteenth century was a period of agricultural depression, with the low wheat prices, and several catastrophies; the bad harvests of 1816-17, prevalent sheep rot in the 1830's; riots, and agrarian Luddism.[15]

The repeal of the Corn Laws in 1846, better harvests of the Fifties, and "high" farming improvements began an era of prosperity in British farming. It was during this period between 1846 and 1867, that the system of under-drains was established in Holderness, by farmers and landowners spurred by the incentives of individual ownership after the Inclosures, and liberated from economic restrictions.

---

(13) One of which involved 'boring down to the gravel and draining the country that way"
(14) I.Leatham "Agriculture in the East Riding of Yorkshire" (1794)p23.
(15) S.Best "Agriculture in the East Riding of Yorks;" p.30

The first account of under-drainage is found in a contemporary record of a Brandsburton estate, dated 1844:

> " New roads have been formed and drainage of a very extensive nature formed by deep cuttings in the old enclosure to carry water from the newly enclosed lands " (16)

Local interest in drainage increased quickly. Readers of the 'Hull Advertiser" in 1850 were advised to visit the farm of Mr William Marshall at Enholmes, Patrington, where " an extensive system of tile drains had been laid down " (17) and Legard mentions considerable improvements everywhere in the region by 1853.(18)

General recognition of the value of under-drainage was evident by 1861. In that year Wright was able to speak of improvements in glowing terms:

> "Deep drainage is the foundation of any improvement in agriculture and a new era in farming, began in 1848 after the General Drainage Act, has seen the blossoming of agriculture in lowland Yorkshire, two thirds of which is now drained by 2" pipes parallel drains at a depth of 4feet." (19)

---

(17) 26th Apr, 1850, see also Mar; 1850 16th Aug, 1850."Hull Advertiser"
(16) C.L.R.O. Report on Brandsburton Estate M 6(C) H.C.R.L
(18) Legard "Prize Report of Farming in the E.Riding" J.R. Ag.Soc, Vol. IX. p.101.
(19) Wright "Improvements in the Farming of Yorkshire (1861) p.11.

The cost of this massive transformation is not recorded, but an excellent table published by the Royal Agricultural Society gives some indication of the cost of under-draining at this time (Appendix Ij). It is probable that on the heavy silts and clays of Holderness drains are everywhere between 3 and 4 feet below the surface and in parallel lines separated by between 33 and 34 feet of draining land. If this surmise is correct, the cost would have been about £1-15s per acre; a very considerable undertaking. Replies to the questionnaire (Appendix III) on land drainage revealed that it is this system of drains, with few alterations, that has been inherited by present farm owners.[20]

---

(20) Chap. 13

SECTION 2. PART B.

B. LAND DRAINAGE AND AGRICULTURAL IMPROVEMENT.

1801 - 1962.

CHAPTER 10. LAND DRAINAGE IN AREAS OF CLAY LOWLAND.

Although many factors were at work in the process of agricultural revolution ~~revolution~~, there were none more important and crucial to an area of lowland clays, than land drainage. All over farming improvements depended upon the reduction of sub-soil saturation. Without it no amount of lime, manure, improved plant and stock breeding could bear fruit.

It is valuable at this stage to state the extent of the influence of improved drainage technique upon this type of region. The wide variety of advantages were scarcely appreciated until modern methods of agricultural science revealed, experimentally, the results of which Nineteenth century farming improvements had given practical demonstration.

Soil temperatures are everywhere increased by effective drainage, which reduces the specific heat in soils and lowers the amount of heat lost in surface evaporation. Plant temperatures are increased. When soils are wet, plants take in more moisture for every unit of plant food. The extra water contained in the plant is removed by excessive transpiration, and loss of plant heat is reduced. Both excessive soil and plant moisture retard early growth. Germination is is impossible below certain soil temperatures.[1] These temperatures are more quickly achieved in dry soils.

Soil improves both physically and mechanically after drainage. Heavy clays become more friable, and offer less resistance to agricultural implements. Air is allowed to enter the soil, increasing its nitrogenous content. Decomposition processes - halted during water-logging- are speeded and soil sourness made less likely. Bacteria are thus liberated which contribute to the speed of chemical break down.

Drainage lowers the water table, plants are therefore obliged to grow longer roots. This has two advantages, it makes the plant less susceptible to periods of surface drought and allows it space to draw on a wider range of nutrients. In the case of cereal crops a longer root will also have the advantage of making the ripening plant less liable to wind damage.

Drainage can also eliminate iron pads in the soil; poisonous substances are leached away and quicker maturation

---

(1) Depending largely on the crop, but for most temperate varieties about 34° F.

encouraged. Many blights and mildews, rusts and other plant diseases depend on damp conditions. The virulence of these diseases is reduced by drainage, and a greater number of seeds are allowed to germinate. On drained pastureland, purer grasses develop and sour marsh plants are eliminated. Manures and limes are always more effective on a well drained soil. Where surface saturation is prevelant, manures are washed over the surface by rain and are not carried into the soil.

The effect of such improvements in terms of farming practice are far-reaching. Earlier sowing, earlier germination, a wider range of crops, a larger area of potentaal arable land, improved pasture and stock, improved yields, fewer insect pests and a better quality of stock are the chief advantages which efficient drainage imparts. The effects of drainage upon[2] farming practice in Holderness are considerable, and the following chapters will attempt to determine the extent of its influence.

---

(2) The information included on Drainage and Agriculture improvement is a distillation from a number of sources, the most important of which are:

(i) J.McBean " The Soil" Chap. 111.
(ii) I.Nicholson "Land Drainage " Chap. 1.
(iii) J.A.Watson & J.More "Agriculture" p.55-66.

Evidence of improvements to agriculture in Holderness which were due entirely, or almost entirely, to land drainage are based upon historical sources, and upon a distillation of statistical and cartographic information for the period improvement. Historical evidence (in growing quantity during the Nineteenth century) is largely derived from writings of the agricultural improvers of the period. The statistical evidence is culled from the agricultural statistics of the Nineteenth and Twentieth centuries.

CHAPTER 11. HISTORICAL EVIDENCE OF THE INFLUENCE OF LAND DRAINAGE ON AGRICULTURAL IMPROVEMENT.

The imrpovements in arterial drainage during the latter part of the Eighteenth century were not probably appreciated by the farmers until the early Nineteenth century. Arthur Young noted that many of the new inclosures in Holderhess were "over-run with rushes and aquatic weeds - too wet for cattle even in summer" (1) Leatham writing in 1794 notes that ;

> "Although considerable attention in draining has been paid to this division (Holderness) much remains to be done ". (2)

He remarks on very few improvements; the ague "much prevalent in these parts is much reduced " and the higher land, once drained was able to grow barley and even turnips. The public drains were apparently ill served by subsidiaries "However good the main drains, if the smaller are not in proportion, the water will be impeded and mischief will ensue" (3) He was still reporting that

> " it was not extraordinary to see starving stock on 500 acres soaked in water." (4)

By 1812, however, Strickland was able to write of a

---

(1) Arthur Young "Tour of N.Eng" Vol. 11. p.172.
(2) I.Leatham op.cit. p.11.
(3) I.Leatham op.cit. p. 19.24.
(4) " " " " p.26.

change in the agriculture of the region, especially in the northern area. The old system of crop and fallow had begun to break down. New crops were being introduced. Turnips and barley had gained in importance. Nevertheless, the situation was still poor;

> " Much land is suffered to remain useless in consequence of the subsoil being saturated by redundancy of water " (5)

Later writers began to notice a more general improvement. In 1832 the writer of the County History of York speaks of " the general goodness of the land " and the "improved mode of agriculture which allows the farmers to live in considerable style ".[6] Cobbett, writing two years earlier is eloquent in his approval of agriculture in the Southern part of Holderness.

> " I have never seen land quality to compare with the banks of the Humber and Holderness." (7)

Howard, in his study of Holderness farming based on a farm at Ridgemont near Burstwick, in South Holderness, remarks that summer fallowing occured in rotation only three times in eighteen years, comprising "a mere one sixth" of the annual arable acreage.[8]

---

(5) Strickland " A General View of Agric. in the E.R.of Yorkshire (1812) p.306.

(6) T.Baines "History of County of York" 1832. p.142 op.cit p.142.

(7) Cobbett " Rural Rides" (1830) Vol. 11. p.648.

(8) C.Howard " General View of Agric. in E.R." (1835) p.136.

In 1853 Legard was writing of the overall improvements afforded by all types of, drainage. On the carr lands of the Hull Valley a four course rotation was possible, and even turnips were cultivated, although the area had become especially noted for its " prodigious " crops of rape.[9]

<u>Under Drainage and Agriculture:</u>

Of the specific effects of under-drainage upon agriculture there are few reliable appraisals. Wright suggests that 'a new era'[10] in Holderness farming began after the introduction of more general sub-soil drainage. Whereas Howard comments on the practice of sending sheep to winter on the Wolds to avoid wet pastures in 1835,[11] Wright was claiming such general improvement by 1861, ' that sheep losses are much reduced in rainy seasons". He sites the example of a farmer who moved sheep in winter from wet pastures to newly drained lands and had no losses. His father left his on the bottom lands and lost the whole flock.[12]

Increasing land values were an inevitable result of such improvements. Burton Pidsea Carr, valued at 4d per acre,

(9) Legard " Prize Essay on Farming " J.R.Ag. Soc (1853)
(10) A.Wright " Improvements in Farming of Yorkshire " (1861)
(11) Howard op.cit. p. 53.
(12) op.cit. p.39 and 7.

in the middle of the Eighteenth century, was raised to 1/- per acre by the time of its enclosure in 1831.(13) Ottringham Drainage Board had increased the annual value of lands by amounts varying from £135 - £300 during the years 1819 and 1849.(14) Wright remarks that the general tide of increased land prices in the area showed little succeptibility to fluctuations in the price of grain.(15) Changes in land values are extremely difficult to assess. Not only do many other factors enter into the valuation, but figures are difficult to discover. Few references do not necessarily indicate a lack of increase in value.

It is clear however, that by 1870 eight tenths of the area of South Holderness was under the plough.(16)

Improvements continued, and by 1907 Newton was writing of the 'tremendous improvements' lately afforded by the growth of drainage work. Turnip culture was, by that time, common on most farms and most remarkable on those in which only 'stunted herbage' had previously been produced.

---

(13) Burton Pidsea Drainage Award. R.D.B. Bev.
(14) Crust Todd and Mills Ottringham Drainage (Solicitors) Board Mins;
(15) Op.cit. p. 17.
(16) Baines "Yorkshire Past and Present " p.24.
(17) V.C.H. Vol. 111. p.459.

CHAPTER 12. LAND DRAINAGE AND THE AGRICULTURAL CENSUS RETURNS OF THE NINETEENTH AND TWENTIETH CENTURY.

(1) Treatment.

There is sufficient historical evidence to suggest that a strong relationship exists between improvements in land drainage technique in Holderness, and the changing pattern of agricultural responses in the region. Historical evidence is, however, of only limited value if no statistical materials exists to re-inforce this impression. The Agricultural returns of the last two centuries, collected first by the Board, and then by the Ministry of Agriculture, provide the basis for a more conclusive assessment of the influence of land drainage on agriculture, and this work forms the most important part of this section.

The problems involved in converting these statistics into meaningful data can be divided into four categories; (a) problems of standardisation (b) problems of comparative analysis, (c) methods of approach and (d) assessment of the specific inlfuence of drainage.

(a) Problems of Standardisation:

The utility of agricultural returns to the purpose of this work, were not immediately apparent. Returns were based upon the number of acres in each parish devoted to each crop. This is not the most useful figure for comparison. There has been no attempt to collect information concerning yields per acre, and for earlier years many of the returns have been lost, or inaccurately recorded. Parish boundaries have been considerably altered by the process of disintegration and absorption, and few areal units have remained the same during the period. Many of the parishes peripheral to the city of Hull in 1801 had been absorbed by urban growth in 1867.

(b) Problems of Comparative Analysis:

For the purpose of this thesis, Ministry returns for the years 1801, 1867, & 1956 were taken.[1] The 1801 returns were chosen not only because they were the first available figures, but also because they marked a suitable point in the Drainage history of Holderness; immediately after the major improvements of public drainage in the Hull Valley, and before the effects of this work had been followed up by field drainage. It also marks a period of higher agricultural prosperity, when the Napoleonic Wars had forced an upward spiral in the price

(1) For 1801 - P.R.O. HO/76/26; For 1857 & 1956. Min.of.Ag:

of grain.[2] The year 1867 is also a suitable one to examine the structure of the farming economy - for it marks the high point of Nineteenth century farming prosperity, (and in this, it's returns are comparable with those for 1801,) and it is at a time immediately following the major improvements in ditching and under-drainage which would seem to have taken place between 1840 and 1860.[3] The 1956 returns were the latest available contemporary figures and were found to be useful as a yardstick for comparison.

The problems of comparing these sets of returns were largely ones of separation. A simple analysis of the figures would reveal little of value. Many other factors of ecological, social, and economic importance are involved as well as those of land drainage improvement.

Ecologically, the region is one of considerable variety. There is a complex juxtaposition of free draining slopes, sandy or clay soils, flat morainic ridges, alluvial hollows, salted and fresh water silts. These are often drained by streams following tortuous and easily impeded courses.

It is also vital to remember that great social changes were taking place during the period.

(2) S. Best op.cit. p.89.
(3) Chap. 9 (1)

The growth of industrial enterprise and trade; the increase of urban population, and gradual rural depopulation; personal evaluations by individual landowners; illogical farming preferences; all these elements played some part in the development of the agricultural landscape.

Only by careful analysis was it possible to isolate the influence of land drainage and to determine the extent of its influence in the evolution of the agricultural economy of Holderness.

(c) Methods of Approach:

Several attempts were made to find a method of mapping the returns for the three years chosen for comparison. Efforts were made, for instance, to correlate parishes containing varying proportions of several physical elements; but the number of variables made few groupings reliable, and changing parish boundaries prevented accurate statistical comparison. It was not possible, in fact, to find a method which eliminated all possibility of inaccurate deduction, but the writer considers that the interpretation of data eventually conceived reveals sufficient information of significance to warrant its adoption.

In order to standardise the material for comparison several methods were used. To eliminate the difficulty of changes in parish boundaries, individual crop acreages for any parish were worked out as a percentage of the total arable acreage in that parish for each of the three years under consideration. (Appendix II). Parishes for which returns were obviously inaccurate in 1801 (e.g. Kirkella and Rise) were ommitted from the records of all three years, as were those which were amalgamated into the city of Hull, and for which returns were lost in 1801. This elimination reduced the number of parishes to be compared from over eighty to under fifty. Anomolies were the inevitable result for such treatment. Most of the lost returns in 1801 were for parishes in the northern part of the region. This had the effect of over-loading the representative importance of South Holderness (fig 38). Likewise the absence of data for blocks of parishes in south-east central Holderness and the Hull Valley in 1801 created gaps in mapping which could lead to false evaluations of distributions. Both these anomolies must be borne in mind in making such judgements. Parishes not covered by the survey are indicated in (fig. 38).

HOLDERNESS PARISHES
CARNABY
HAISTHORPE
BURTON AGNES
HARPHAM
NAFFERTON
BARMSTON
KELK
DRIFFIELD
ULROME
FOSTON & BRIGHAM
SKERNE
SKIPSEA
BEEFORD
NORTH FRODINGHAM
DUNNING-TON
HUTTON CRANSWICK
ATWICK
WATTON
BRANDESBURTON
SEATON
HORNSEA
BESWICK
SIGGLESTHORNE
LOCKINGTON
LEVEN
CATWICK
MAPPLETON
HATFIELD
LECONFIELD
ROUTH
RISTON
RISE
TICKTON
WITHERNWICK
MOLESCROFT
SKIRLAUGH
BEVERLEY
BURTON CONSTABLE
ALDBOROUGH
WAWNE
ELLERBY
DUNSWELL
SWINE
FITLING & GARTON
HUMBLETON
CONISTON
SPROATLEY
WILLERBY
GANSTEAD
BILTON
ELSTRONWICK
ROOS
BURTON PIDSEA
MARFLEET
PRESTON
HESSLE
DRYPOOL
BURSTWICK
RIMSWELL
HALSHAM
THORNGUMBALD
PAULL
HOLLYM
OTTRINGHAM
KEYINGHAM
PATRINGTON
HALSHAM
WELWICK
SKEFFLING
SUNK ISLAND
EASINGTON
5M.
PARISHES COVERED BY THE ANALYSIS OF AGRICULTURAL RETURNS (SEE CHAPTER 12)

FIG. 38

The crude percentages of arable acreage under each crop were found to be of little use in comparing the crop structure for the three years under consideration. By finding a mean percentage of the arable acreage for each crop for the forty five parishes and working out deviations from this mean for each individual parish, a more accurate assessment of areal preference and suitability was found. (Appendix Y1). This method eliminated the effects of ecomomic change and poor and good harvests by reference to a purely intra- regional scale of relationships and allowed a representation of a more accurate and meaningful kind. It also showed the changes in scale of variation within the region, which Long notes as an important effect of land drainage.(4) In order to give a more complete idea of historical changes in emphasis, a supplementary set of figures, comparing increase and decrease in percentage under each crop for each parish was worked out for the years 1801 and 1867 and for 1867 and 1956. These maps show more clearly how emphases changed between the two years. They distinguish intra- regional variations in the importance of a trend 'towards' or 'away' from a particular crop, and they bring out clearly any areas which have maintained an opposite direction to this trend.

---

(4) op. cit. p. 20.

The difficulty of equating fluctuating parish units with standard units of comparable cartographic representation was overcome by dispensing with the parish boundary as a standard unit for mapping and using a proportional symbol which could be standard throughout the series of maps. This allowed, moreover, that negative and positive variation; increase and decrease, could be differentiated on the same map, by placing the centre of the symbol approximately over the centre of the parish area a large measure of verisimilitude was retained.

One further difficulty in mapping deserves preliminary mention. Where acreages in a crop were small and there was a low average proportion under that crop, negative deviation was limited. In the case of Barley for instance, the mean percentage of the arable acreage in 1801 was 6.4% allowing only a small negative variation below this mean, whereas a variation above the mean of over 30% was found in the case of one parish (Burstwick). To reduce the anomolous impression which this gives, a symbol showing the mean proportion has been placed next to each map. (figs. 40 - 45.)

Measurement of Influence of Drainage:

The only suitable method of judging the influence of drainage on subtleties of crop choice in each area was found

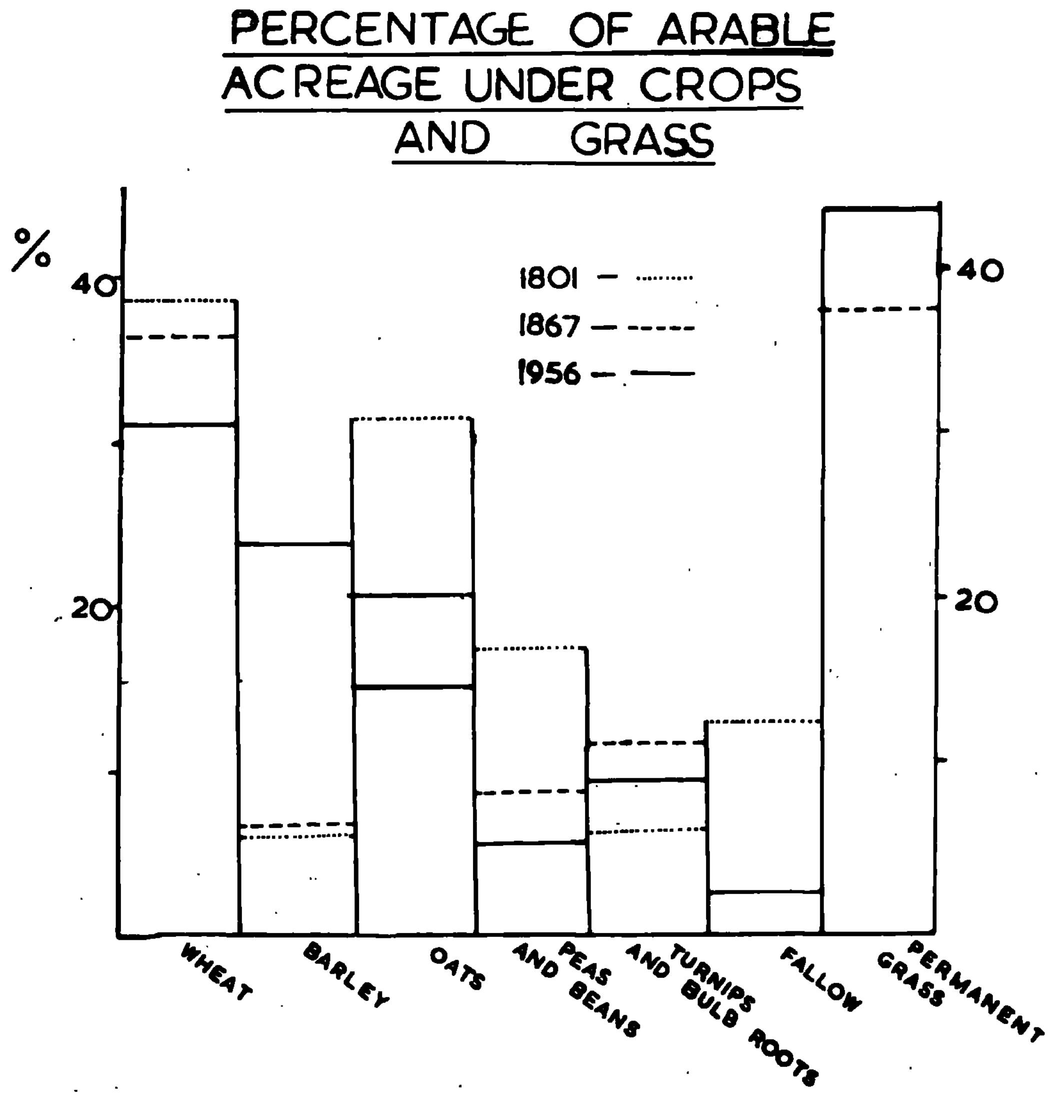

PERCENTAGE OF ARABLE ACREAGE UNDER CROPS AND GRASS
%
40
20
40
20
1801 — ....
1867 — -----
1956 — ——
WHEAT
BARLEY
OATS
PEAS AND BEANS
TURNIPS AND BULB ROOTS
FALLOW
PERMANENT GRASS

FIG. 39

to be that of comparing maps of each physical element at work in the pattern, with those of each crop. Several maps showing distribution of soils types, drainage areas, relief and succeptibilities for drainage were devised and used with this end in view.

(II) Crops chosen for Comparison:

A preliminary examination of change in the percentage of the arable acreage for each parish under each crop revealed an apparent overall effect of improved drainage.(fig,39)

In 1801 the overall dominance of crops least susceptible to damp soil conditions, (Peas, Beans and Pasture) is clearly shown.

% of Tot; Arable Acreage Under Crop - Averages for Forty Holderness Parishes 1801.

Wheat	38.35%
Barley	6.0%
Oats	31.07%
Peas & Beans*	17.33%
Turnips & Rape	6.6%
Pasture as % of Total Arable Ac. (approx)	61%

That this crop structure was a feature of environment rather

* Although Peas & Beans are recorded seperately by the Ministry of Agriculture, the optimum conditions for growth and use for each are similar enough to warrant their consideration as one crop.

than a response to purely economic factors is illustrated by comparison with similar figures for seven large parishes from the free draining chalk Wolds (Huggate, Rudstone, Middleton North Dalton, North Grimston, North Cave, Helperthorpe.)

% of Arable Acreage Under Each Crop for 7 Wold Parishes in 1801

Wheat	18.7
Barley	27.6
Oats	29.0
Peas & Beans	4.5
Turnips	20.1.
Pasture as % of Total Ar.Ac.(approx)	64%

The reliance upon Oats and Wheat as main cereals in the rotation, alternating with Beans or Peas in Holderness is a clear reflection of soil conditions. Oats can yield well on very damp, heavy soils. Wheat, although more prone to rust and other moisture diseases, also yields quite well in such conditions. Neither barley or turnips thrive on any other but free draining soils. The absence of such soils in Holderness in 1801 is clearly reflected in the figures. Peas and Beans were often grown as a substitute fodder crop, as both crops cam withstand a considerable quantity of soil moisture. The soils of the Yorkshire Wolds are naturally more amenable and the crop structure is consequently much more balanced than that of Holderness.

If the public drainage schemes of the late Eighteenth and early Nineteenth century in Holderness made little immediate impression upon farming in the region, it is probable that by the middle of the Nineteenth century the considerable improvements in public and private, open and under-field drainage were having a proportionate influence on the possible choice and range of crops which could profitably be grown.

By 1867 the crop structure had changed considerably. This was during the period of maximum agriculture prosperity when the demand for foodstuffs had reached its peak. It is therefore profitable, first, to examine changes in the structure of the Wolds economy, on land where radical physical improvement is neither possible nor necessary. Here, reaction to changes in the general economic situation will be shown more clearly: (See over).

% of Total Arable Acreage Under each Crop for 7 Wold Parishes 1867.

Wheat	26.1
Barley	14.7
Oats	22.5
Peas & Beans	2.4
Turnips	27.5
Fallow	1.0
Per. Grass as % of Ar. Acreage.	14.7

A considerable increase in the proportion of land under Wheat between 1801 and 1867 (a reflection of higher wheat prices) is offset by similar reductions in the acreage under Oats, and Barley (27.6% - 14.7%) This was probably to make way for sown grasses, which by this time exceeded permanent grass almost everywhere in the area by often as much as three times the acreage. This was probably to feed the increased quantity of sheep. Although no figures are available for 1801, there were, in 1867 30,678 sheep in these seven parishes alone, and it is reasonable to believe that this was a very considerable increase on the number reared in 1801, for the increase in sown grasses was supplemented by an increase in the proportion of turnips (20.1% - 27.5%) which are used as winter feed.

In Holderness, alterations in the economy are similarly impressive, but by no means parallel.

% of the Arable Acreage Under Each Crop, Averages for Forty Holderness Parishes 1867.

Wheat	35.9
Barley	6.4
Oats	20.57
Peas & Beans	8.5
Turnips	11.09
Fallow	11.8
Per. Grass as % of Arable	38.33

Permanent grass occupied a considerable acreage in almost every parish, but was less important in the economy than it is to-day. Arable land certainly played a much larger part than it had done at the beginning of the Nineteenth century.

Most significant in this change is the reduction in acreages under wheat (38.35% - 35.9%) peas/beans, (17.3 - 6.4%). and Oats (31.1% - 20.6%) and the increase in the acreage under Turnips (6.6% - 11.09%) and Barley (6.0 - 6.4%).

There were also small acreages under vegetables, cabbages for stock feeding and potatoes, although these still played an insignificant part in the farming structure.

The increase in acreages under turnips and barley, essentially crops which thrive only where land is clearly drained, has obviously been made at the expense of earlier wet-land staples in rotation, peas, beans and oats. This is made more significant when one remembers three factors; that in 1801 no distinction was made in the returns between rape and turnips, and quite a high proportion of the 6.6% noted above occurred on the new drained lands of the Hull Valley; secondly that the small decrease in the acreage under wheat is made more important by the fact that elsewhere (i.e. the Wolds) the acreage under crops had increased from 18.7% to 26.1% of the arable acreage under grass; thirdly, that the slight increase in the average percentage of the arable acreage under barley between 1801 and 1867, is made more significant by the generally considerable reduction in the average acreage under this crop on the Wolds (i.e. from 27.6% to 14.7%).

Between the statistics for those of 1867 and 1956 there is generally a continuation of the trends noted.

Percentage of the Total Arable Acreage Under Each crop Averages for 40 Holderness Parishes 1956.

Wheat	31.6%
Barley	23.6%
Oats	14.9%
Peas & Beans	5.4%
All Bulb Roots, Mangolds, Suedes, Turnips	9.7%
Fallow	2.8%
Per. Grass as % of Arable Acreage	44.0%

The dominance of the wet, heavy soiled crops reduced still further, wheat (35.9% - 31.6%) Oats (20.57% - 14.9%) and Peas/ Beans (8.5 - 5.4). The emergence of barley as the second cereal crop to wheat is a significant measure of continued soil improvement during the period (6.4% 6 23.6%) Although it must be conceded that farming subsidies have played an important part in this increase.

It is also worth drawing attention to the decrease in fallowing between 1867 and 1956. In the mid Nineteenth century (5)

(5) Unfortunately statistics for fallow were not collected in 1801.

an average of 11.8% of the arable acreage was fallowed each year. By 1956 only 2.8% of the arable acreage was judged worthy of this treatment. It must be admitted that increasing use of nitrogenous and other fertilisers has played an important part in this reduction, but these benefits were a corrolary of drainage improvement, without which any fertilisation would have had extremely limited effects.

This general survey of agricultural statistics re-inforces and substantiates the contentions of the Nineteenth century drainage improvers who maintained that the "profitless system" of the old four course rotation(wheat, oats, fallow, beans or peas) depended upon the badly drained condition of the subsoil and the sub-fertility of clays which were in any case heavy and impervious. It is possible to postulate that the most important improvement, (and that which most influenced the farming structure on heavy clay soils of Holderness) was the increasing efficiency of land drainage of all types during the Nineteenth and Twentieth centuries. In order to further substantiate this view, it is necessary to examine these returns in more detail.

(a) Wheat: Parish Deviation from the Mean Percentage of the Total Arable Acreage under Wheat (fig.40)

1801: At the beginning of the century the price of wheat was considerably inflated by the Napoleonic blockade. It is reasonable to suppose, therefore, that the highest possible acreage in any one year was given over to this crop. The wide deviation from the mean percentage (38.5%) of the arable acreage under wheat for forty Holderness parishes[6] can, therefore, be reasonably attributed to some physical element rather than to factors of determination or human preference.

Long[7] has suggested that considerable intra-regional deviation from the average farming practice in a clay lowlands is attributable largely to wide variation in land drainage efficiency within the unit. When one remembers the number and extent of benefits which accrue from draining such areas, it is hardly possible to offer any better explanation. In fact it can be suggested that the extent of deviation from the mean number of acres under wheat for any

(6) -26(Barmston) to + 19 (Goxhill).
(7) H.Long op.cit. p.22.

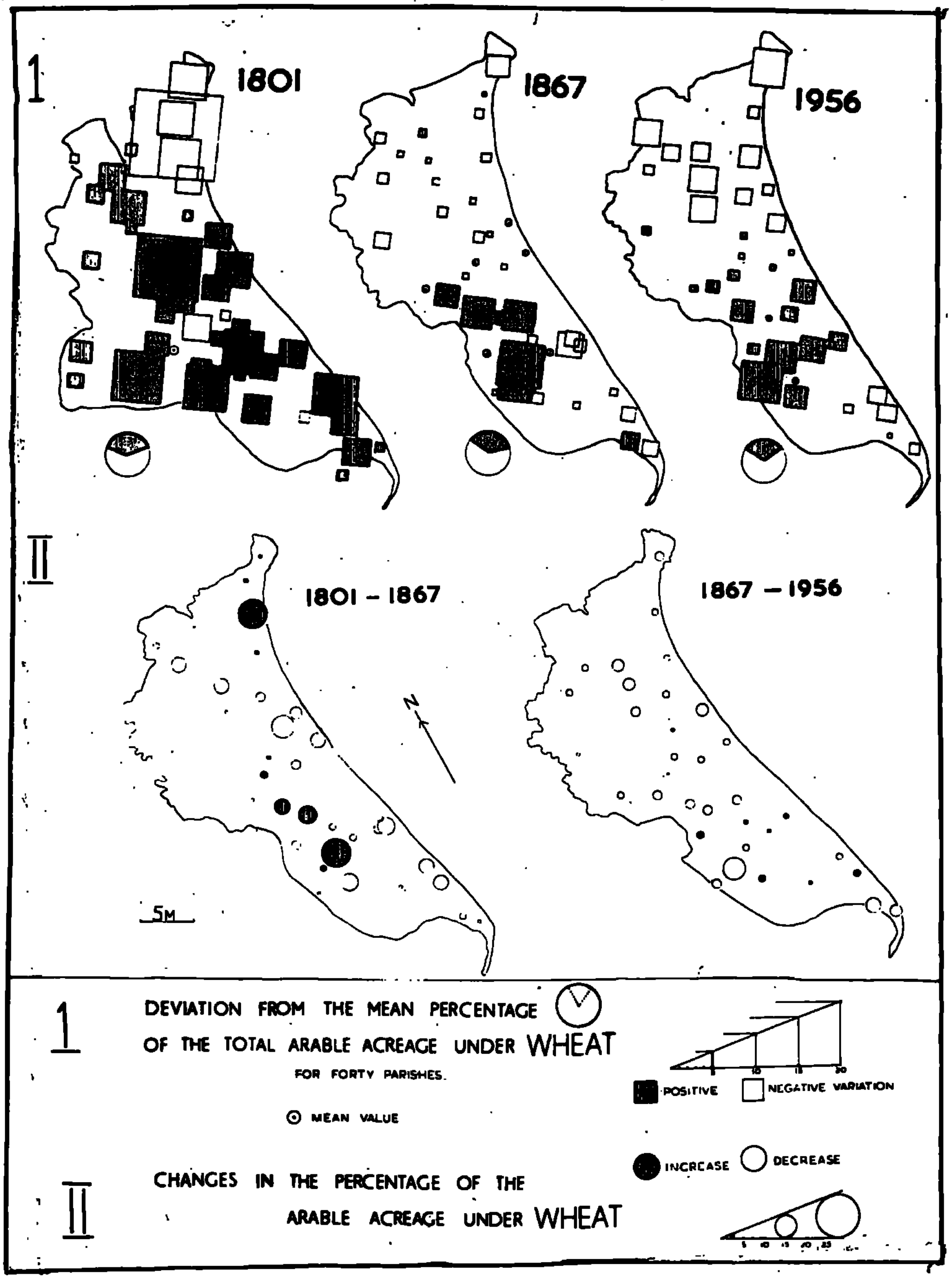

I
1801
1867
1956
II
1801 - 1867
1867 - 1956
N
5M
I
DEVIATION FROM THE MEAN PERCENTAGE
OF THE TOTAL ARABLE ACREAGE UNDER WHEAT
FOR FORTY PARISHES.
MEAN VALUE
5
10
15
20
POSITIVE
NEGATIVE VARIATION
INCREASE
DECREASE
II
CHANGES IN THE PERCENTAGE OF THE
ARABLE ACREAGE UNDER WHEAT

FIG. 40

parish in 1801 was a true index of the quality of land drainage in that parish at that time. Certainly a comparison between this map, and that for deviation from the mean acreage under oats (fig 41) reveals a certain relationship. Oats was the cereal usually relied upon to yield well on soils too poorly drained to sustain more profitable cereals.[8] If it is possible to generalise at all upon such a diverse variation over such a small regional area, the north eastern parishes (Barmston - 26, Fraisthorpe - 10, Ulrome - 12, Carnaby - 11) of the Barmston overflow area would seem to have been least suitable for wheat cultivation in the region. It was indeed, precisely this area which was worst served by the new drainage schemes of the late Eighteenth century (Barmston Sea End Drainage was not begun until 1798) and was, therefore, least well drained. In contrast the parishes which had the highest proportions of their arable acreages under wheat in 1801 were neither those on well drained lower silts in the Hull Valley (Drypool + 15,) or parishes containing within their limits a high proportion of higher morainic watershed (Goxhill + 19, Hollym and Withernsea + 13, Mappleton + 10,)

---

(8) Chap, 3. (ii)

1867: If wide deviation from the mean percentage per parish is a feature of the 1801 wheat acreages, approximation to that mean is the feature of those for 1867.

This radical reversal is made all the more remarkable because economic conditions were similar to those of 1801: wheat prices were high and the crop still maintained its dominant position in the farming economy of the region.(9) (fig 40)

With little change in the amount of wheat sown in the region as a whole, the factors which caused this change in the structure and stability of the regional distribution can more readily be assessed.

New crops, and new techniques of ploughing, sowing, plant and animal breeding had shaken the hegemony of the old featureless rotations which dominated Holderness farming at the beginning of the Nineteenth century. New fertilisers had been introduced and the regions of heavy clays and light sandy soils had both been affected by such improvement. It is doubtful, however, whether all these improvements together had more than a fractional effect on Holderness wheat farming compared with the influence of land

(9) In 1801 it occupied 38% of the arable acreage, in1867 - 35%

drainage. New systems of under drainage and maintainance and construction of field and arterial drainage was encouraged and incepted with great enthusiasm. These enthusiasms of private ownership asted as a considerable spur to all types of drainage improvement. The whole system of drains was probably better maintained in this period of general progress than it is to-day. The range of soil improvements imparted by better drainage(10) have already been considered above and there is no need to reiterate them. It would seem, in fact, that this map (fig 40) bears out Long's contention(11) that a variety in farming practice over a small area is indicative of poor land drainage. The acreage where drainage is worst will stand out in clear relief against those where steeper slopes or sandier soils allow freer drainage. This will be especially true in an area of considerable topographical diversity like Holderness. If it is true that great variety of farming practice in clay lowlands indicates poor and irregular drainage, then it is also possible to maintain that the converse will be equally true. Over-all drainage improvement will cause greater standardisation of farming practice. In 1867 it would seem that such a liberation from the old regime was evident everywhere in Holderness. By this date most of the wide variation between

(10) Chap. 10.
(11) op.cit. p.22

parishes with low and high proportions of their arable acreages under wheat had disappeared. The parishes with the greatest positive variation were those of the boulder clay lands nearest the developing city of Hull, and here it is likely that economic factors were of over-riding importance, and drainage only a secondary factor in the pattern.

1956: If the conclusions concerning the distribution and extent of the parish wheat deviations in 1867 are correct (i.e. that they demonstrate a release from the dominant controlling element of poor drainage) then the map showing the distribution and extent of such deviations in 1956 demonstrates a logical extension of this argument.

A marked concentration of preference for wheat in the south - central Holderness is off-set by the below average wheat acreages in northern and south eastern Holderness. The area of central Holderness is one where heavy clays predominate and these (once suitably drained, and economic conditions favourable) would naturally produce the highest yields. It may also be true to assert that the area North Holderness is one where larger areas of sand and gravel soils would, under similar conditions, be less suitable for wheat cultivation. South East Holderness may represent an isolated area where drainage is poor. Cerntainly beans and peas, and oats - "wet heavy " crops - cover a larger acreage than other areas in the South of Holderness.

Changes in the Percentage of the Arable Acreage Under Wheat. (40. (ii)

1801 - 1867. The map changes in the percentage of the arable acreage under wheat, for forty parishes serves two purposes, Firstly it shows the distribution of varying wheat in the economy of the region. Secondly it throws into clear relief the areas where the importance of wheat increased, despite the general trend towards lower wheat acreages. The most significant feature illustrated by this map is the increase in the wheat acreage of the Barmston overflow parishes, particularly of Barmston itself (+ 23.4%),(Appendix 11) and the extent of the increase in wheat acreage in clay-lands nearest Hull (Burstwick + 22.6% Spraatley + 12.0%, Bilton + 10%).

The considerable increase in the amount of wheat grown in the north eastern area of Holderness can only be the result of drainage improvement for the area had shown a marked preference for oats in 1801.(12)

---

(12) see p.47 where other factors possibly involved in this violent fluctuation are discussed.

1867 - 1956: This map illustrates the continued trend towards mixed farming, and the concommitant decline in the percentage of the arable acreage under wheat. The only areas showing an overall increase in the percentage under wheat are silts of South Holderness; Patrington, Keyingham, Preston, Paull and Elstronwick (Appendix V1), where the soils once efficiently drained, yield better than elsewhere in the region.

Oats: Parish Deviation from the Mean (fig 41)

1801: Oats is the least succeptible of cereals to extreme conditions; reasonable yields can be obtained from soils with a wide range of texture and porosity, and under climate conditions which range from dry and semi-arid to cold and wet. Generally the areas which concentrate on oats in 1801 as the main cereal in rotation, or give it an important place in that rotation, are probably those in which other cereals will not give better yields. It seems reasonable to suggest that a more than average acreage of oats in any area indicates soils conditions which are less suitable for cereal cultivation than elsewhere in the region.(13) In 1801 a wide deviation from the mean proportion of the parish acreage under oats (31.1%) was apparent everywhere, with a range of + 38 (Brigham) to - 31.0 (Rise). The significance of this variation has already

(13) The predominance of Oats as the major cereal in early mediaeval Holderness is dealt with in Chap; 3 (ii)

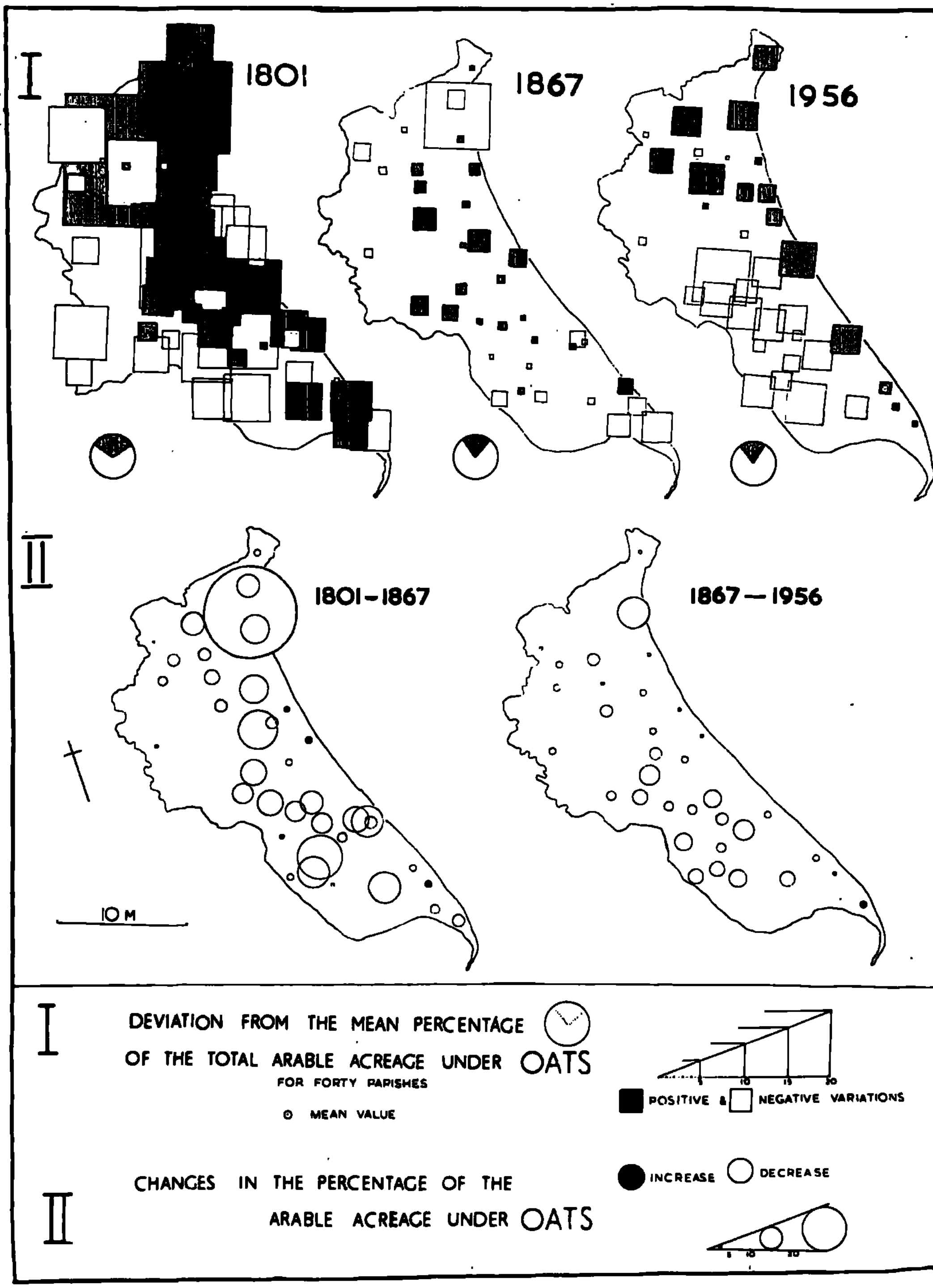

I
1801
1867
1956
II
1801-1867
1867—1956
10 M
I
DEVIATION FROM THE MEAN PERCENTAGE
OF THE TOTAL ARABLE ACREAGE UNDER OATS
FOR FORTY PARISHES
MEAN VALUE
POSITIVE & NEGATIVE VARIATIONS
II
CHANGES IN THE PERCENTAGE OF THE
ARABLE ACREAGE UNDER OATS
INCREASE
DECREASE

FIG. 41

been indicated,[14] and it is necessary only to distinguish as far as possible, the reasons for the general distribution. Although it is clear that the parishes containing the largest acreages of oats were those which also had a high proportion of poorly drained land, this is also true of several parishes with a fairly high drainage potential, only tentative conclusions can therefore be made.

It would seem that the worst drained land (i.e. that land least suitable for good yields of wheat or barley, and therefore with a higher percentage given over to oats) lay in three areas in centre and north of the eatsern claylands, in the Barmston " overflow" and the North Hull Valley, and in a smaller area of the south eastern siltlands. Similarly, the areas with the lowest acreages of oats (and the highest in wheat and barley) are the lower siltlands of south Holderness The Hornsea mere catchment area (Mappleton, Goxhill, Hornsea), and the flanks of the Yorkshire Wolds, (Leconfield, Hessle, Driffield, Skerne (Fig. 38)

It is, in fact, reasonable to suppose that drainage improvement was lowest in the North, particularly in the northern carr-lands and the Barmston overflow (Barmston Drainage Award was not made until 1798), despite the fact that it

(14) see p 140.

was in these areas that the highest proportions of sand and gravel free draining soils occur. In the central claylands those parishes with a high proportion of land under oats were those occupying land in the 'basin' between two main moraines, within the catchment area of Lambwath Stream, which was a most inadequate outlet for the waters of this area (fig 4) (e.g. Withernwick, + 14)

The areas with the lowest acreages of oats are noticeably those where drainage was not so likely to have been difficult. The southern siltlands were well known, even by this time, as areas where efficient drainage was a prerequisite for the heavy yields of wheat these lands could then produce. If drainage was efficient anywhere in Holderness it was in these regions and the catchment areas of streams which drained them (Paull, -11 Keyingham - 13). It would also seem that the minor catchment area of Hornsea mere was sufficiently improved (or naturally effective enough) to allow wheat to supplant oats as the main staple cereal.

It is also reasonable to suppose that the Wold flank claylands were sufficiently well drained by the continuously regular declivity of the Wolds dip slope overburden to the floor of the Hull Valley, to allow wheat and barley a natural predominance over oats. (Leconfield; - 7 Oats, + 8 Barley)

Generally there would seem to be a considerable correlation between draining properties and the choice of oats as a main cereh crop. One factor of considerable importance must be borne in mind, however, when making out a case of this sort. Oats with peas and beans, were the main feed for cattle during the winter. Holderness was a stock rearing region, noted for its special breeds of cattle,[15] and although the numbers of cattle are not mentioned in the 1801 Returns, it is reasonable to suggest that a fairly arbitrary farming preference towards either wheat or stock rearing may have played a part in this distribution of oats. Nevertheless, it has already been suggested that this was a time when wheat prices were generally high (i.e. during the Napoleonic blockade) and it might be suggested that farmers would naturally prefer to sow for wheat on all land where reasonably high yields could be expected.

1867: If one is correct in assuming that poor drainage leads to violent fluctuation from the mean of the proportion of land under any crop, then the drastic modifications which are apparent in the map of variations for 1867

---

(15) Chap. 6.

compared with that for 1801, would seem to bear out this contention. Variation from the mean value for oats (14.7%) is rarely greater than + 6 in 1867. The greatest variation (Barmston - 19) is made more remarkable because in 1801 this parish showed a positive variation (of + 27, - i.e. a reduction from 457 acres in 1801 to 280 acres in 1867). It may be supposed that this impressive change took place after the improvements in drainage which followed the development of Barmston (Sea-End) Drainage until one notices that this parish had below average acreages in every crop, and that perhaps some special feature accounted for this phenomenon. Certainly rural depopulation was greatest in this area during the mid Nineteenth century.[(16)] It is in fact possible that a number of farms were left un-tenanted during this period. This factor does not account for the less significant alteration in south east Holderness. (e.g. Patrington + 10 in 1801 and - 2 in 1867) where only drainage improvements could have been the main reason for the change.

Elsewhere the major features of distribution which were deduced for the 1801 map, would still apply here,(although of course, much modified,) with oat growing slightly predominant

---

(16) S.Best "Agricultural Geography of E.Yorkshire " p. 170.

in the north and central Holderness. The most important feature of the map is, however, the close approximation to the mean value, compared with the statistics for 1801. Similar conditions are a feature of the maps and statistics for wheat acreages, and it is only possible to draw similar conclusions; that improved drainage eliminated the need to depend upon large acreages of oats in those parishes worst affected by poor drainage.

1956; The distribution of variation for oats in 1956 is a most significant one. The parishes in which oats are most important fall into two groups; those of north Holderness, and those which lie adjacent to the coast. It seems that the factors which have caused this distribution, are in the case of north Holderness the smaller ~~the smaller~~ area of heavy clays unsuitable for wheat, and in the case of the coastal parishes - the winds from the sea, which tend to 'lay' the heavier cereals. Certainly there appears to be no reason to suppose that drainage conditions are in any way directly important in determining the distribution, and a total emancipation from this factor thus demonstrated is a logical extension of the argument of this chapter.

Changes in the Percentage of the Arable Acreage Under Oats. (fig 41. (ii)

1801 - 1867: The over-all reduction in the average percentage of the arable acreage under oats (from 31% to 20.8% between 1801 and 1867) is clearly reflected in this map, with the greatest reductions in parishes of the clayland morainic watersheds(17) (e.g. Sigglesthorne - 29, Skipsea - 21, Bilton - 19, Skirlaugh - 19, Bewholme and Nunkeeling - 20) where improvements in drainage would naturally be first appreciated. Reductions are least in the Hull Valley and certain parishes of the southern siltlands and interior basins (Keyingham — [illegible]/3 Preston + 26, Withernwick - 5, Leconfield - 1.2.) where drainage benefits would be least appreciated. It would also seem that the influence of coastal winds was already a feature important enough to be reflected in the returns.

1867 - 1956: The greatest decreases in the percentage of the arable acreage under oats between 1867 and 1956 were often in the parishes with a large area of "bottomland" (e.g. Burton Pidsea - 14, Preston - 13, Keyingham - 13, Paull - 10).

---

(17) The special case of Barmston parish with a reduction of 56.7 has already been mentioned above.

It is therefore possible to suggest that the improvements which reached 'upland' clay farms between 1801 and 1867, affected 'lowland' farms between 1867 and 1956. This is, however, no more than a tentative suggestion, for several lowland parishes show equal rates of diminishment in oat acreage between 1801 - 67 and 1867 - 1956, (e.g. Withernwick - 5 between 1801 and 1867, and -6 between 1867 and 1956.)

Beans and Peas :- Parish Deviation from the Mean, (fig 42)

1801: In 1801 the wide diversity of variation in the proportion of the whole arable acreage under beans and peas both in area and numerically is further indication of the state of the drainage at this time. Beans and peas were, with oats, the main fodder crops The heavy heads, and stalks, and the short roots make heavy soils essential to good yields. It can be suggested that the parishes which relied most on peas and beans planted those crops instead of oats, either arbitrarily, or because beans and peas were chosen where the soil was both heavy clay and wet, and oats chosen where land was wet but too light in texture to hold beans or peas. Comparison of the two sets of statistics and the maps lends weight to this argument. (See Appendix XI).

In only three parishes are there 'negative' returns for both crops, and two of those (Driffield and Hessle) are Wold parishes where other factors of farming organisation are beginning to operate. For all other parishes, except the 'bottomland' parishes of Ulrome and Withernwick (which grow above average amounts of both crop) a more than average acreage in peas and/or beans is balanced by a below average in oats, and vice versa. This relationship is often almost exact parallel.

Deviation from Mean % of The Total Arable Acreage under (a) Oats (b) Peas and Beans for selected parishes in 1801. (See figs 41,42,38)

Parish	a	b
Atwick	+15	-12
Atwick	+3	-5
Easington	-11	+9
Fraisthorpe	+13	-14
Frodingham	-19	+21
Hornsea	-14	+14
Elstronwick	-23	+24
Keyingham	-13	+14
Leconfield	-7	+7
Mappleton	-11	+13
Bewholme & Nunkeeling	+12	-13

It may be that this is as clear as an index of the character of soil drainage as it is possible to achieve from returns which are extremely difficult to interpret.

1867: By 1867 the average percent of the arable acreage under peas and beans had fallen from 17.3% to 8.5%. Apart from a closer approximation to the mean value (which this reduction would, in any case, encourage) the most important feature of the map of deviations from 1867 is the concentration upon peas and beans on the heavier soils of south Holderness compared with the generally below average acreages in the north. If drainage were a factor in determining the choice of fodder crop, then the emphasis had moved by this time. The elimination or reduction of drainage problems in north Holderness, with its larger area of freer draining soils, may have been important in this change.

1956: By 1956 there is no clear pattern of relationship between type and quality of soil and the distribution of variation in acreage under beans and peas. As in the case of other crops dealt with above, a new scale of determinants which have become of greater importance than land drainage, probably operate to produce the distribution. The

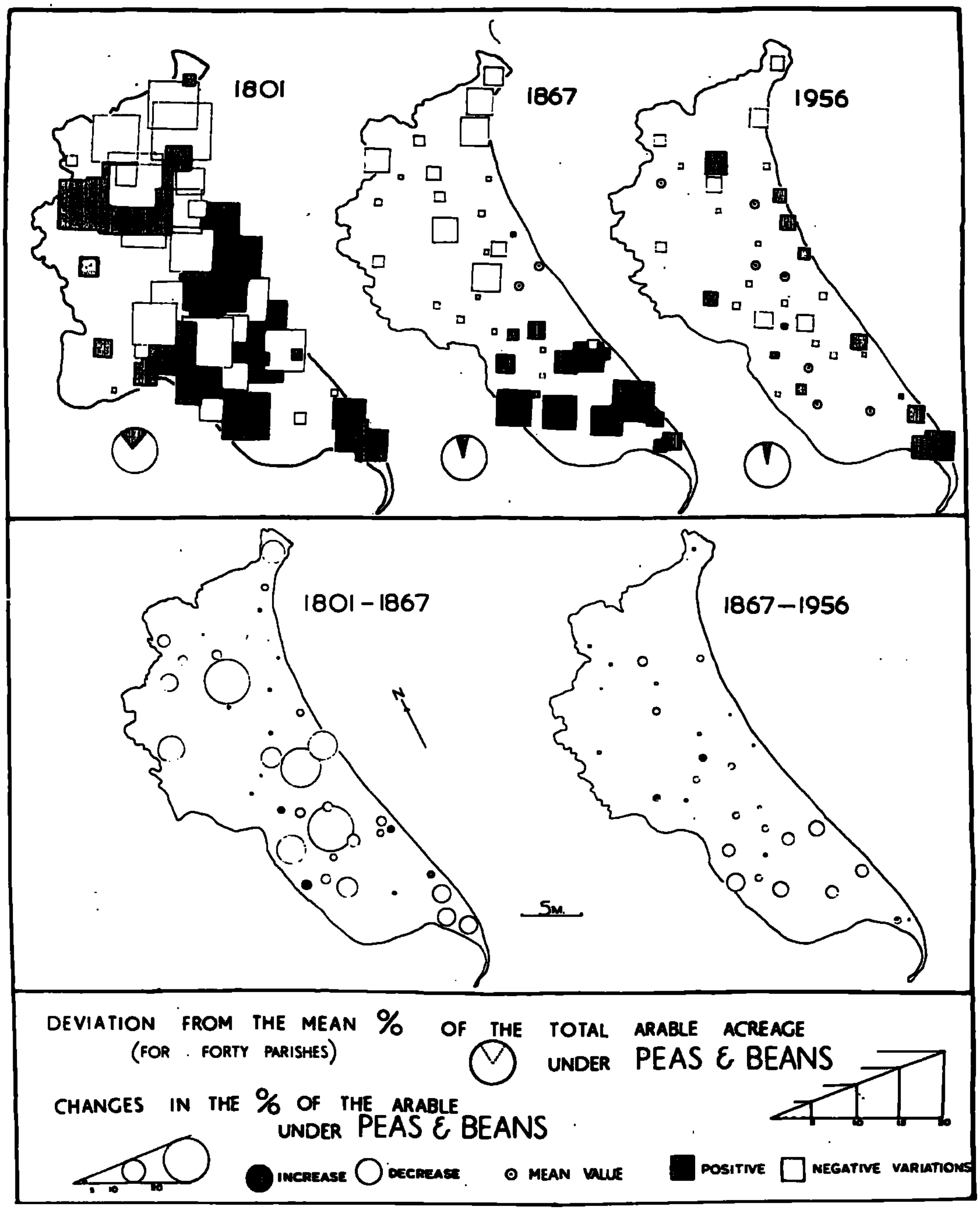

1801
1867
1956
1801 – 1867
1867 – 1956
N
5M.
DEVIATION FROM THE MEAN % OF THE TOTAL ARABLE ACREAGE
(FOR FORTY PARISHES)
UNDER PEAS & BEANS
CHANGES IN THE % OF THE ARABLE
UNDER PEAS & BEANS
INCREASE
DECREASE
MEAN VALUE
POSITIVE
NEGATIVE VARIATIONS

FIG. 42

distribution is in fact similar to that for oats acreage deviation and it is possible to suggest similar reasons for this. Farmers in coastal parishes, open to the full effects of sea winds, are more liable to emphasise cattle farming (rather than cereal growing) than the farmers further inland. Beans and peas like oats, are hardy enough to withstand the more rigorous conditions of the coastal fringe. It is worth noting that several local farmers have admitted, in conversation, that they would grow more peas if suitable canning facilities existed in the area.

Changes in the Percentage of the Arable Acreage Under Peas and Beans 1801 - 67; 1867 - 1956. (fig, 42.(ii)

1801 - 67: This map reflects the wide variation in the scale of reduction in the acreage under peas and beans in the first half of the Nineteenth century. Again, the greatest reduction in acreage was in the parishes with a large acreage of heavy clay 'bottomland' (e.g. North Frodingham - 33, Withernwick - 26, Elstronwick - 33,) and these were the parishes with large acreages of beans and peas in 1801 (Frodingham +21 Withernwick + 18, Elstronwick + 24, Holmpton + 9, Easington + 9, Skeffling + 8.).

1867 - 1956: The greatest reductions in acreage under beans and peas between 1867 and 1956 were in south Holderness (Keyingham - 12%, Paull - 13% Roos - 12%, Patrington - 10%). These parishes are those containing the heaviest clays, where improved drainage conditions would make an impression upon farming practice and, therefore, on the statistics over a longer period than further north. Here, it has been suggested, other factors had by this time become more important than drainage in the determination of stresses.

Parish Deviation from the Mean Percentage of the Arable Acreage Under Turnips & Bulb Roots. (fig.43)

Interpretation of the influence of land drainage upon the areal distribution of acreage under turnips and other bulb roots is complicated by several factors. Firstly, the 1801 Agricultural Returns were made in respect of turnips only, taking no account of other root crops. Secondly, these early returns made no distinction between acres under turnips and those under rape. These are feed crops with entirely different drainage requirements. Comparison between figures for the three years 1801, 1867 and 1956, is therefore, of only marginal value.

The main purpose in re-producing maps from these statistics is to demonstrate the argument that a higher proportion of free draining soils in North Holderness (a pre-requisite for good bulb-root yields) as opposed to the higher proportion of heavier retentive clays of south Holderness, was a distinction which is perceptible in differences of farming choice within the region. A significant measure of this influence is the fact that a higher proportion of bulb roots are used as fodder crops in North Holderness, where peas and beans are used in the South. It would seem ~~that~~ from prevailing wet soil conditions that the parishes showing very much higher than average acreages of 'Turnips or Rape' in 1801, (i.e. Barmston + 20.5, Brandsburton +9, Bilton +14), were given over to rape rather than turnips or swedes. Root crops were hardly grown at all in Holderness in 1801.(18) Their increasing use, especially in North Holderness, led to an overall increase from negligable proportions in 1801 to an average of 11.09% of the arable acreage of all parishes covered by the survey as a whole in 1956. Even on the heavy soils in the south, increases of over 6% were evident in certain parishes, (Hollym + 7.6, Keyingham + 6.3 Withernwick + 12).

---

(18) Turnips alone occupied an average of 20% of the arable acreage on the Wolds. In Holderness, turnips and rape together only occupied an average of 6.6% of the arable acreage in 1801 (fig. 39.)

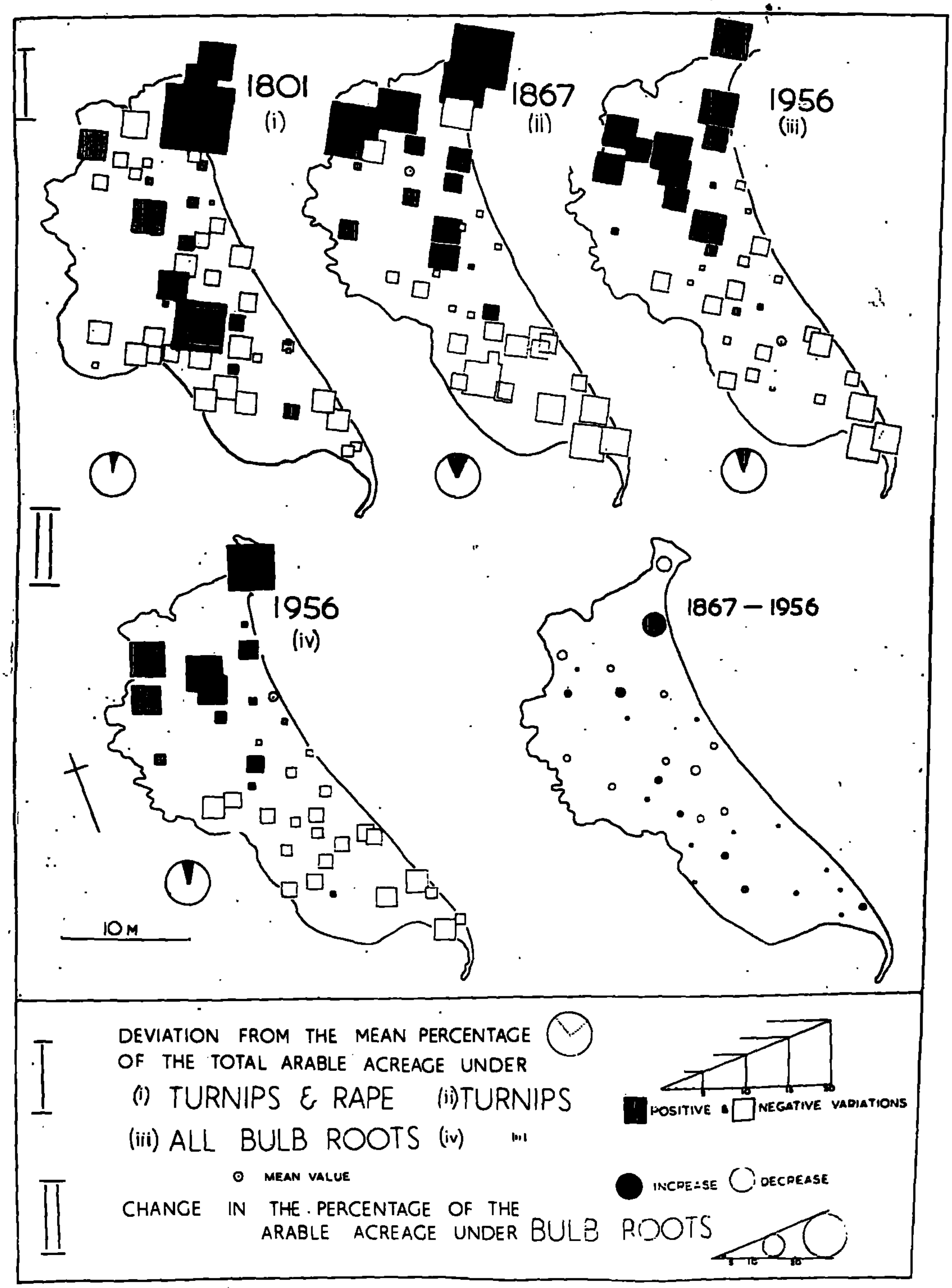

I
1801
(i)
1867
(ii)
1956
(iii)
II
1956
(iv)
1867 — 1956
10 M
I
DEVIATION FROM THE MEAN PERCENTAGE OF THE TOTAL ARABLE ACREAGE UNDER
(i) TURNIPS & RAPE (ii) TURNIPS
(iii) ALL BULB ROOTS (iv)
POSITIVE & NEGATIVE VARIATIONS
MEAN VALUE
II
CHANGE IN THE PERCENTAGE OF THE ARABLE ACREAGE UNDER BULB ROOTS
INCREASE
DECREASE

FIG. 43

Fallow - Parish Deviation from the Mean (fig. 44)

1867: It is unfortunate that in 1801 no returns were made of the acreage under fallow. A conclusive factor in the argument of this chapter is the reduction in the ammount of land under fallow during the period 1867-1956. It has already been suggested (19) that in any year before the Parliamentary inclosures (due to the prevalent 'two-field' system in most Holderness parishes (fig. 17), almost half the arable land area of Holderness was fallow. It has also been suggested that the main reason for this system was low fertility, induced by sub-soil saturation.

In 1867 the parishes with significantly more than average ammounts of fallow land (i.e. Elstronwick +11, Easington +9, Hilston +11, Hollym & Withernsea +23, Holmpton +9, Skeffling +10) lay in an area where positive deviations in the 'wet heavy' land crop acreages were, as it has been indicated, due to poor drainage conditions. (fig. 40-43)

(19) Chap. 3. (ii)

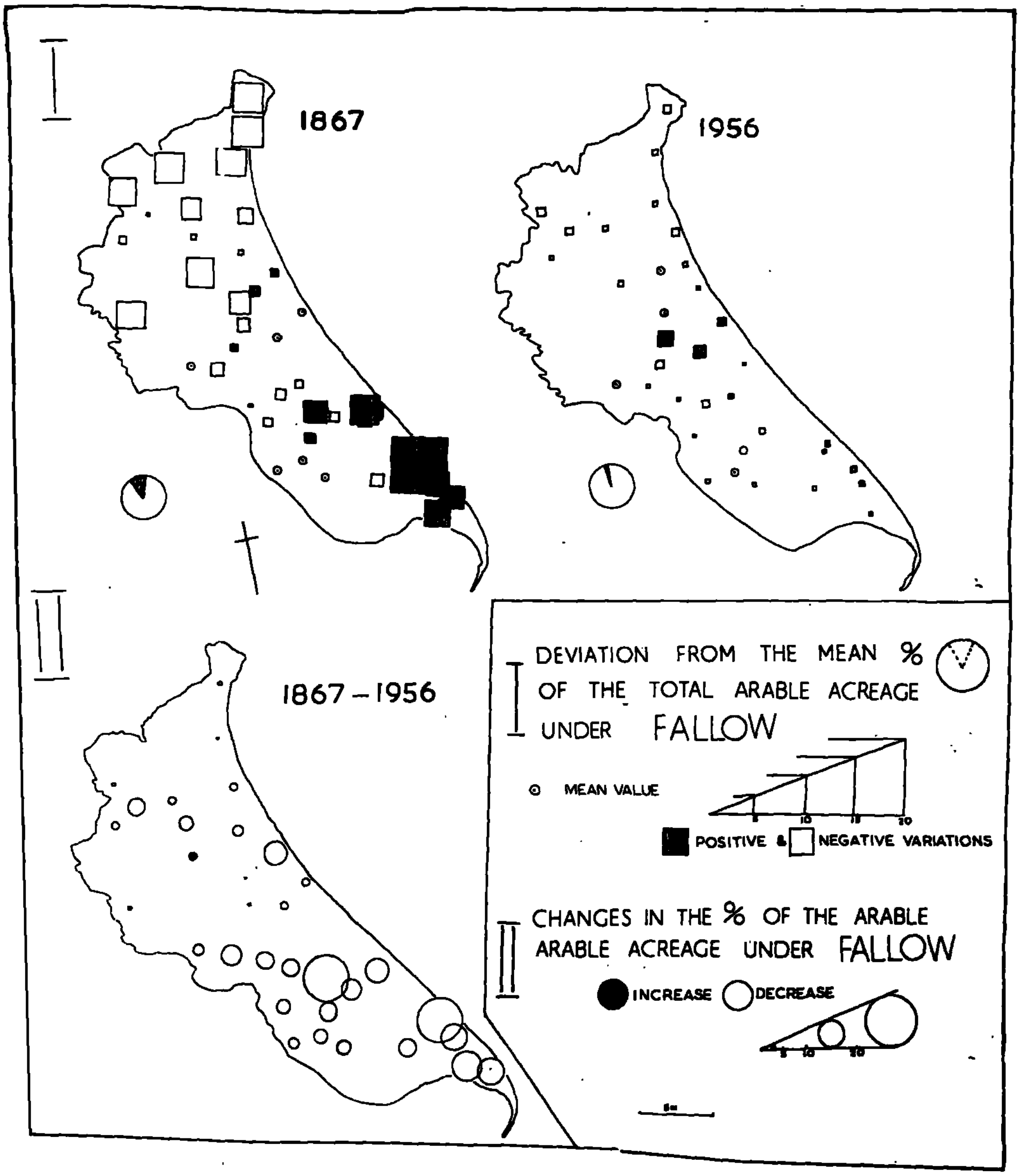

I
1867
1956
II
1867 – 1956
I DEVIATION FROM THE MEAN % OF THE TOTAL ARABLE ACREAGE UNDER FALLOW
MEAN VALUE
POSITIVE & NEGATIVE VARIATIONS
II CHANGES IN THE % OF THE ARABLE ARABLE ACREAGE UNDER FALLOW
INCREASE
DECREASE

FIG. 44

Certainly the broad distinction in drainage properties previously distinguished between North and South Holderness can still be found in the map of these deviations, despite the considerable reduction in fallowing which we can only presume to have taken place between 1801 and 1867.

1956: In 1956 the average proportion of the arable acreage left fallow was only 2.8%. Any positive or negative variation from such a low figure can only be deduced as fortuitous, and the map of this variation is only of value in illustrating this fact by the apparently almost random distribution of variations.

Changes in the Percentage of the Arable Acreage under Fallow 1867 - 1956. (fig 45 (ii)

As might be anticipated the greatest reduction in fallowing between 1807 and 1956 occured on the heavy clays of South Holderness, where the influence of poor drainage remained effective the longest, and where the greatest margin of improvement was possible.

Barley - Parish Deviation from the Mean (fig 45 (i)

1801: In 1801 there was little barley grown in Holderness, (an average of 6% of the total arable acreage, compared with 27.6% on the Wolds). Most pf this was grown on the Wold flanks, where free draining calcareous soils made barley growing more possible. What small variation there was in clayland Holderness was usually between 1% and 4% and is barely significant enough to make any detailed intra-regional comparisons. Generally the wet heavy clays of this period were everywhere unsuitable for barley.

1867: The fact that barley had become a more important crop in the region is a measure of improved drainage conditions and the apparently haphazard distribution of positive and negative variation would seem indeed to suggest a wider opportunity for farming preference by this time. The special case of Burstwick with a positive variation of 30 may be accounted for by the fact that free draining gravels made it possible for this large acreage to be sown, and that lowering of the general water table in South Holderness by drainage work made this possible.

1956: There is even less pattern in the distribution of variations for 1956 than for 1867. Variation would appear to occur quite arbitrarily. With even greater liberty from ecological restrictions than the mid Nineteenth century it is in fact reasonable to expect this to be the case.

Changes in the Percentage of the Arable Acreage Under Barley 1801 - 67. (Fig 42.(ii)

1867 - 1956: It is most convenient in this case to compare the two maps of changes in the percentage of the arable acreage under barley from 1801 to 1867 and 1867 to 1956 rather than to discuss each separately.

The most significant feature of the comparisons is the increase which took place in barley cultivation between 1867 and 1956, It is not only the scale of the increase which is significant, but the fact that it happened with such uniformity throughout the region. Parishes on both the heaviest clays and the lightest gravels show a similar quality of increase (twenty eight of the thirty five parishes in the comparison had increases of between 12% and 25%) Despite the manipulation of the economy through government subsidies the quality of drainage work throughout the region is manifested in the uniformity of this increase.

Summary

Discussion of this analysis of agricultural returns has been brief. It is unfortunate that more time could not be spared dealing with issues raised by the results. It would have been profitable for instance, to examine more closely, differences in crop structure between individual

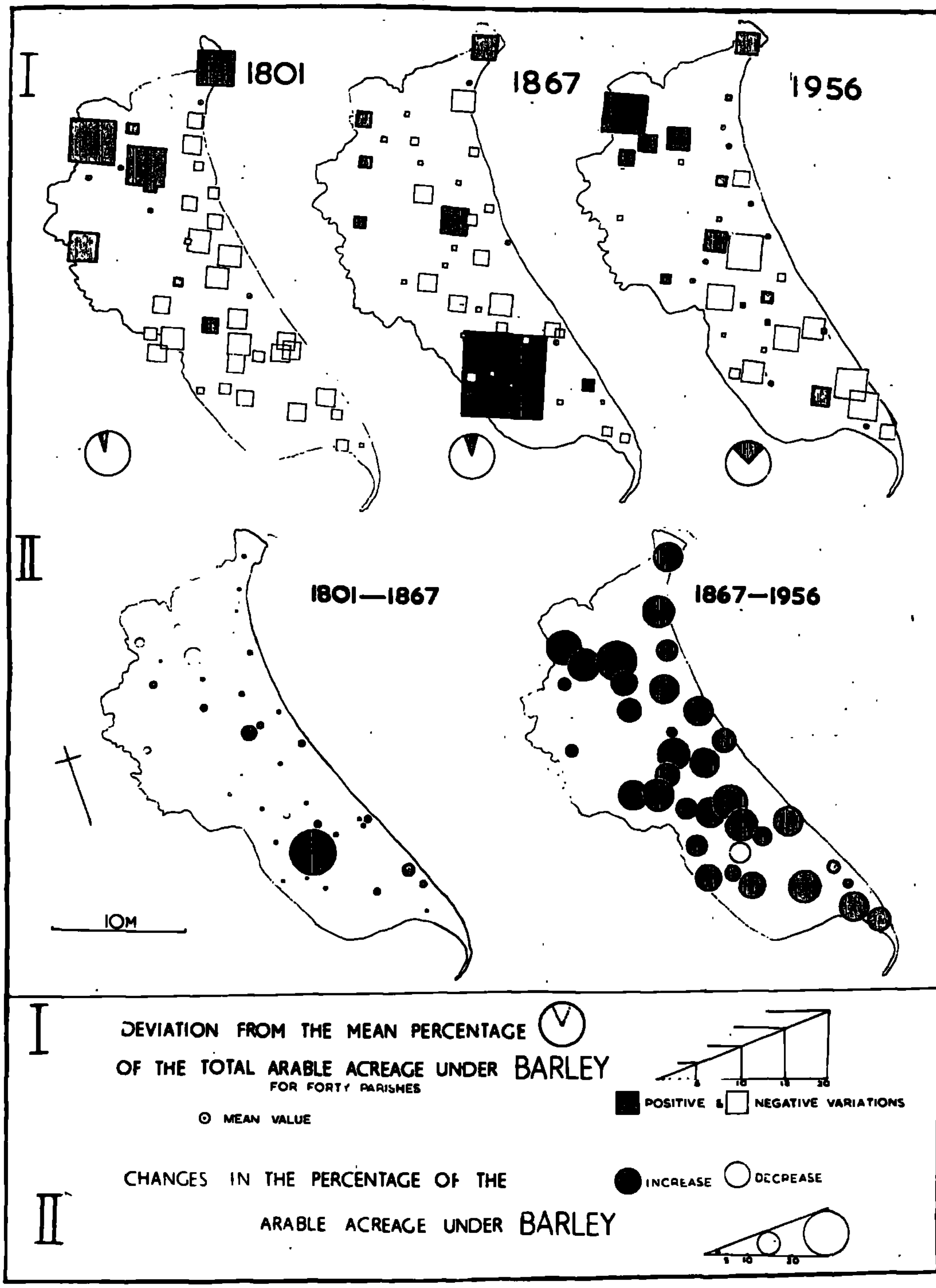

I
1801
1867
1956
II
1801—1867
1867—1956
10M
I
DEVIATION FROM THE MEAN PERCENTAGE (V)
OF THE TOTAL ARABLE ACREAGE UNDER BARLEY
FOR FORTY PARISHES
⊙ MEAN VALUE
POSITIVE & NEGATIVE VARIATIONS
II
CHANGES IN THE PERCENTAGE OF THE
ARABLE ACREAGE UNDER BARLEY
INCREASE
DECREASE

FIG. 45

parishes. It might also have been valuable to attempt to determine the influence of topographical variations by close comparison with maps of these various features. Space and the scope of this work, do not,however, permit this.

Perhaps the most significant features of these results are, nonetheless, readily apparent: namely the reduction in variation between parishes for each crop during the Nineteenth and Twnehtieth centuries as differences of drainage were eliminated; and the decrease in the dominance of 'wet' heavy-land' crops as improved drainage conditions allowed the wider use of those crops more restrictive in their requirements. It would also seem that by 1956 an almost complete emancipation from the controlling factor of land drainage had been achieved. How far it is necessary to modify these inferences is indicated in the following chapter.

CHAPTER 13 LAND DRAINAGE AND AGRICULTURAL PRACTICE 1962.

(i) The Problems of Analysis

Comparison of two Nineteenth century agricultural returns with those of 1956 would seem to suggest that during this period Holderness had gained an almost total liberation from effects of wet and sour soils. For a more complete assessment than those returns allowed it was found necessary to attempt an analysis of the nature, extent and efficiency of land drainage in terms of contemporary farming practice. The material for such an approach was not easy to find. With the exception of the Hull and East Yorkshire River Board, who are chiefly concerned with levels in the main stream there is no, collective standardised source of information on drainage matters Industrial drainage authorities excersise control over various ill-defined catchment areas with equally various degrees of interest and efficiency. Under - drainage was never a matter of public record. No returns were ever collected of underfield drainage and there is no central measure of control over its efficiency.

The only solution seemed to be with a direct approach to farmers by means of a questionnaire. Once more, there were considerable difficulties. The only complete list of farmers and farms in Holderness is in possession of the National

Farmers Union. This, they were unwilling to disclose. The writer was therefore obliged to rely on the list in the classified sections of local telephone directories.

The difficulty of composing a questionnaire which would reveal significant information without antagonising the farmer was not so easy to solve. The resulting form was drawn up after consultation with the local representative of the National Farmers Union who is also an expert in the practical difficulties of local drainage.(1) The questionnaire set out to discover the following facts concerning the drainage of each farm;

(i) The proportion of each farm affected by poor drainage.

(ii) The proportion of the farm under-drained by 'tile' or 'mole' drains.

(iii) The proportion of the farm for which land drainage is a factor in the use made of the land.

(iv) The efficiency of land drainage organisation as a whole.

(v) The extent of the problem of the financial burden of land drainage.

(vi) The effect of special features of land drainage e.g. Springs, coastal erosion, gravels and free draining soils.

(vii) The age of farm buildings. (fig. 47)

The first two points were an attempt to discover precise information; points (iii) (iv)(vi) were largely designed to provide information concerning the value each farmer placed upon drainage as part of farming; point (v) is self explanatory, and point (vii) was an attempt to discover the quality of farming wealth in the area.

---

(1) A.W. Richardson, 492 Holderness Road, Hull.

The forms were sent out to six hundred and twenty farmers, over 80% of the total number in Holderness; each questionaire was marked with the number corresponding with the alphabetical placing of the recipient in the directory. Replies were returned by nearly half these recipients (263), and by checking the numbers of the returned forms against the directory and finding each farm on the 2½" Ordnance Survey Sheet, it was possible in most cases to plot the exact position of the farm on the key map (fig. 46) Where this was not named on the map the farm was presumed to be part of the settlement grouping of the village named in the postal address.

It is not claimed, therefore, that the survey is in any way more than a sample. Nor have the returns an exceptionally high degree of statistical value. The quality of the return naturally varied very considerably. Even the most precise information; that concerning acreages served by each type of under-drain, is, in many cases no more than an estimate. There was, moreover, a wide range in the quality of response; some farmers were non-commital, registering merely positive or negative replies to all questions, others were sufficiently interested to include a covering letter. These letters often

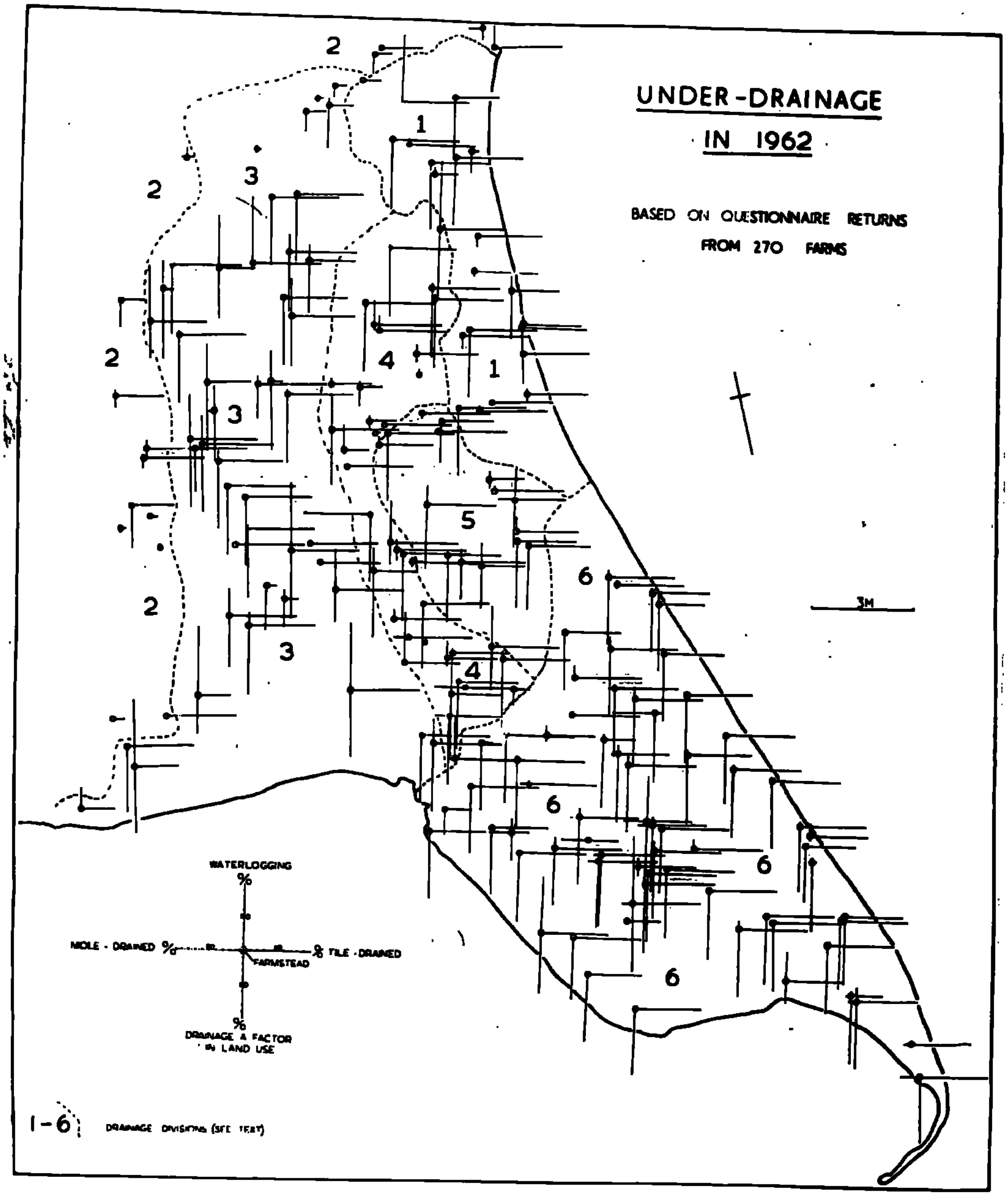

UNDER-DRAINAGE
IN 1962
BASED ON QUESTIONNAIRE RETURNS
FROM 270 FARMS
3M
WATERLOGGING
%
MOLE - DRAINED %
% TILE - DRAINED
FARMSTEAD
%
DRAINAGE A FACTOR
IN LAND USE
1-6
DRAINAGE DIVISIONS (SEE TEXT)
1
2
3
4
5
6

FIG. 46

revealed information of considerable value. The main merit of the survey lies, however, not in its statistical precision but in the general impression of the quality of drainage work which the returns reveal. The utility of the statistics are, then, correlative and corroborative rather than of value for minute comparison.

For convenience the returns were divided by limits approximately determined by catchment areas.

(i) The Northern or Barmston area
(ii) The Wold Flanks
(iii) The Hull Valley
(iv) The Eastern Flanks of the Hull Valley
(v) The Interior 'Basin' of Clayland Holderness
(vi) South Holderness. (fig 46)

The total acreage covered by the questionaire returns was 83,896 acres, approximately a third of the total acreage in the region, thus;

Drainage Area	Acreage covered by Returns.	Av,Farm, Acreage	No of Farms.
The Barmston Area	3,975	221	18
The Wold Flank Area	8,281	224	37
The Hull Valley Aera	12,298	228	54
The East Flanks of the Hull Valley	8,470	188	45
The Intererior 'Basin'	2709	195	14
South Holderness	18,163	252	72

The various proportions involved are also interesting.

Drainage Areas	Tile Drained	Mole Drained	Waterlogged af ter rain	Drainage as a factor in farming))
% of The acreage returned in the census				
Northern Watershed	83	0	11.1	46.7
Wold Flanks	31.5	.06	9.2	22.5
Hull Valley	80.8	2.6	27.9	85.7
Hull Valley Flanks	80.6	1.6	10.5	50.3
The Clayland Basin	80.4	3.0	3.0	50.6
South Holderness	79.6	7.0	9.6	58.3

Obvious, and distinctive differences between each area are immediately apparent from the analysis.

Generally it seems that with the exception of the Wold flanks,- where a number of the farms had land on free-draining chalky soils,- most of Holderness is drained by tile systems, (ranging from 79.6% of the land area of farms from which returns were received in the south to 83% in the North.) It is also clear that very little of the land relies upon 'mole' drainage, although it is possible that in many areas, particularly in the south, old mole drains operate in conjunction with the newer tile-systems. Here proportions range from 7% of the land area in South Holderness where the heaviest clays would be most suitable for this system, to none at all in the Northern area, where the greater amounts of sand in the soil would quickly clog the primitive trenches.

Waterlogging, as one would expect is much more of a problem in the Hull Valley (27.9% of the land area) than elsewhere in Holderness, although the general figure of about 10% of the land area is significantly high.

The proportion of lands for which drainage was accounted a definite factor in determination of land - use

QUESTIONNAIRE ON LAND DRAINAGE.

What is the total acreage of your farm? ....165.................

Approximately how many acres are water-logged ..NIL............

or seriously affected .....NIL........ after persistent

heavy rain? Without under-drainage the whole would be seriously affected

Approximately how many acres are under-drained? ....165...........

" " " " " served by mole drains? 55 (Mole over tile mains)

" " " " " served by tile drains? 110.............

For how many acres is drainage a factor in determining the use made

of your land? ....The whole

Do you find the maintenance of field drains a source of hardship? YES / NO.

In which ways? ...The maintenance of field dykes is costly in labour + an annual expense. Drainage Rate in this area is 11/- in the £, this farm having an A.V. of £98.15 for Drainage Rate purposes.........

Could you give any examples where ill-kept ditches and dikes have been

a cause of dispute? ...No, except where half-dykes (half owned by each riparian owner) are involved.

....

Are there any special features of drainage on your farm?

eg. acreage affected by :- Nearby gravel pits ...No.........

Springs ...."......................

Coastline ...."...................

Others ...."......................

....

What is the approximate age of your farm buildings ....Part post 1956 " approx 1900

FIG 47

is more an index of farming attitudes and knowledge of the benefits of drainage than an objective record of cause and effect. In the Hull Valley most farmers rated the area influenced at 100%. This was an anticipated reaction. (Appendix III) Elsewhere the appreciation of the effects of land drainage are not so well developed. It is, surprisingly low.

(ii) Areal Differences

(a) Northern Watershed or Barmston Catchment Area:

~~Areas~~ In this area, 3,975 acres were covered by the returns, approximately one fifth of the total of the area (= 33 sq.m.) Of the 3,975 acres, 3305 were tile drained (83%) 443 acres were seriously affected after heavy rain (11%) and of the eighteen farms in the census only five said that no land was seriously affected by heavy rain. In this context it is perhaps significant that only seven farmers acknowledge the importance of drainage to all their land, and six only recognise it as important for between 1% and 30% of their farm acreage.

Despite the high proportion of tile drainage land it appears that the efficiency of drainage is lower than might be expected. The main reasons for this would seem to be threefold.

Firstly, the quality of soil in North Holderness is lower than that of the south, and yields are generally lower per acre in this area. Farmers are, therefore, probably less wealthy than those of South Holderness where not only yields but farms are larger.(2) Secondly the cost of maintaining drains, especially where sands are an important constituent of the soil structure is high, despite government assistance.

The cost of maintaining the drainage system will be a considerable burden, particularly to these northern farmers. Almost half the returns stated costs as a source of hardship (seven out of eighteen) a much higher proportion than elsewhere in the region. It is likely therefore, that many of the tile systems operate below the level of maximum efficiency in this area. Thirdly, it seems that there is a corresponding lack of efficiency in the system of public drainage in North Holderness. Barmston Drain is tidal and outflow is prevented at high tides, when water level in the drain reaches the level of outfall of subsidary drains. When high tides co-incide with heavy rainfall, extensive flooding of the bottom lands is usual (fig. 27b).

---

(2) Often 50%. Between £50 and £60 per acre is the figure quoted by several farmers in Holderness.

(11) The Wold Flanks of the Hull Valley:

The area covered by the survey comprises 8,281 acres approximately a third of the total for the area (44 sq, m.) 2609 acres are tile drained, (31.5%) and 5 acres mole drained (.06%) 768 acres are waterlogged (9.2%) after heavy rain.

These figures however, do give a somewhat over - generalised impression of drainage in this area. Closer examination of the returns (Appendix VIII) reveals the wide differences in the quality of drainage between each farm which is masked by these statistical reductions. This area was in fact the most difficult to delimit. Farms patently well above the floor of the valley often hold a varying quantity of land on the valley floor. This variety is only indirectly reflected in the returns. They are, therefore, the least satisfactory from the point of view of statistical analysis.

Perhaps the most valuable contribution which they make lies in the obvious demonstration of the speed with which the transition is made between poorly drained lands, and those fortunately placed above free draining chalks, in itself a tangible demonstration of the effect of water table and spring line. A set of statistics of this sort clearly does not permit of generalisation in a more complete way, any attempt to do this could only result in misrepresentation.

(III) The Hull Valley:

In the Hull Valley the returns account for 12,298 acres, one fifth, of the total acreage of the area (104 sq,m). Of this 9,942 acres were tile drained (80.8%) and 325 acres were mole drained (2.6%). As it might be anticipated, a much larger proportion of the land was subject to water - logging after heavy rain i.e. 3,441 acres (27.9%). It may be presumed that all lands not served by tile drains, except the small areas of clay moraine, are marshy and used only as rough pasture for there is no free draining land in the area. The low proportion of mole drainage is due to the fact that the fine grained silty warp of the valley soon re-fills the more primitive trenches of the system and it is ,therefore, virtually useless. Improvement was much dependent on the invention of tile drainage than elsewhere in the garden Only three farms used mole drainage at all (Appendix [illegible]11)

Returns were made for fifty four farms. Of these nine noted that between 50% and 100% of their lands were water-logged after heavy rain or high tides, and ten returned figures between 20% and 50%. Only six farms did not suffer at all from this problem.

The general level of awareness of drainage as a vital factor in farming was much higher than elsewhere in the region. Sixteen farmers indicated that for all their land drainage was an important consideration in determining its use and ten noted that it was a factor for between 60% and 100% of their lands..

Land drainage is the most serious of all problems for farmers in the Hull Valley, and it is natural to expect that the large majority would make some comment upon these difficulties. The multiciplicity of these problems was, however, quite surprising. Of the purely physical difficulties of moving water from land which in many cases lie below, or little above sea and main river level, there are many other similar problems; the tidal nature of the River Hull, old tile drain systems laid too near the surface for modern plough shares; the large number of springs, particularly on the Wolds side of the Valley; and the constant need for cleaning tile drains into which silts have filtered. Farmers have many complaints concerning the costs of drainage, (eighteen out of the fifty four) and this must be the greatest drawback to efficient farming in this area.

(11) Clayland Flanks of the Hull Valley:

The western flanks of the western moraine of the main clayland area of east Holderness drain directly into the Hull Valley.(2) They are drained by ' upland ' drains whose efficiency depends to some extent upon the state of drainage in the bottom lands of the valley, and they are an index of the efficiency of the drainage system in the valley.

The area for which returns were made comprises 8,470 acres, just over half of the total area of the unit (24 sq.m). 6,833 acres (80.6%) were tile drained and 141 acres (1.6%) were mole drained.

Recognition of the importance of land drainage in farming was surprisingly low. Exactly a third of all the farmers from whom returns were received made no answer to this question or stated that it was no factor at all. Only fourteen noted that it was a factor for all land on their farm. Perhaps these replies can be equated with those regarding the amount of waterlogging. Only nine farms were not affected by waterlogging at all, and of those which were affected an average proportion of the farm of 17% was waterlogged after heavy rain. Four farmers note that more than 60% of

(2) They do not drain first into the interior basin and Lambwath Stream.

their land was afflicted in this way.

The drains occupied as high a proportion as other areas, with twenty four farmers stating that they drained all their farm, and only four for which the drains served less than 70% of the acreage.

(V) The Interior Basin:

This was a small unit, like the Northern area, and few generalisations are valuable. The area covered by the returns was 2,709 acres, one fifth of the total, (21 sq, m.). 2273 acres were tile drained, (80.4%) 82 acres were mole drained (3.0%) and 323 acres were waterlogged after heavy rain, (1.2%).

(VI) South Holderness:

Lands draining into the siltland streams of South Holderness occupy the largest of the drainage areas in the region (105 sq,m,) and just over a quarter (18,163 acres) of this area is covered by the survey. Of this, 14466 acres (79.6%) was tile drained, and 1,283 acres (7.0%) was mole drained. The higher proportion of heavy clays make this higher proportion of mole drains possible. Only 9.6% of the area (1.753 acres) was subject to waterlogging.

These figures suggest, anomolously, that the problems of drainage in this area are less acute than might have been expected. It would be facile to suggest that once efficient tile drains had been laid, the better declivities in the area outweighed any disadvantage that derived from the heavy imporiosity of the clays. Nonetheless reference to the analysis of agricultural returns in the Nineteenth and Twentieth centuries reveals that it was in fact in this area that the most dramatic farming improvements took place.(3)

Perhaps the awareness of the advantages of land drainage is much greater here than elsewhere in Holderness. Of the seventy two farmers who returned the forms, forty four recognised that land drainage affected land use on all their land, and a further seven on between 80% and 99% of it. Only eleven farmers recorded no reply to this question or said that drainage did not affect their choice of crops or stock at all. Some of these were, in fact, positive replies, for their farms are on free draining sandy soils (i.e. Nr Burstwick).

The problems of field drainage do not however, appear to loom any less large in the minds of South Holderness farmers than they do elsewhere in the region. Farmers in the lower levels complain of tidal overflow, and those on the

(3) Chaper 12.

heaviest clays of the difficult subsoil and the effect upon ~~upon~~ them of heavy tractors in causing soil 'panning': high drainage rates, ridged fields (fig. 37), previous poor tile laying at too shallow levels, and of course the high cost of drainage work; were other common complaints.

It is reasonable to suggest, in fact, that the difficulties of drainage are only less severe, here, than those in the Hull Valley, and certainly no better than all other areas of Holderness except, perhaps, the Wold flanks. If this is the case, then the slightly better drainage of South Holderness could be a reflection of better farming practice.

CHAPTER 14. INFLUENCE OF LAND DRAINAGE ON SETTLEMENT & COMMUNICATIONS 1770 - 1829.

There would seem to be little opportunity of measuring the influence of land drainage on settlement and commmnications. The pattern of nucleated settlement, it has already been indicated,(1) was established during the period before the Norman Conquest and its essential outline has altered little since that time. The growth of land drainage in Holderness co-incided historically with the period of considerable social change, and any attempt to distinguish the influences of land drainage amongst the whole complex of social improvement would seem to be destined to failure or misconception. The same arguments apply to the growth of communications - which would appear to have been dependent almost solely upon factors unrelated to land drainage (i.e. the inventions of Mac Adam and the growth of urban demand for better arterial ways). Certainly, later in the Nineteenth century land drainage was of small concern to these improvers, - railways cut across the area with no regard to such minor impediments as land drains.(2)

Two early maps demonstrate, however, that there may be some correlation between drainage improvement and changes

---

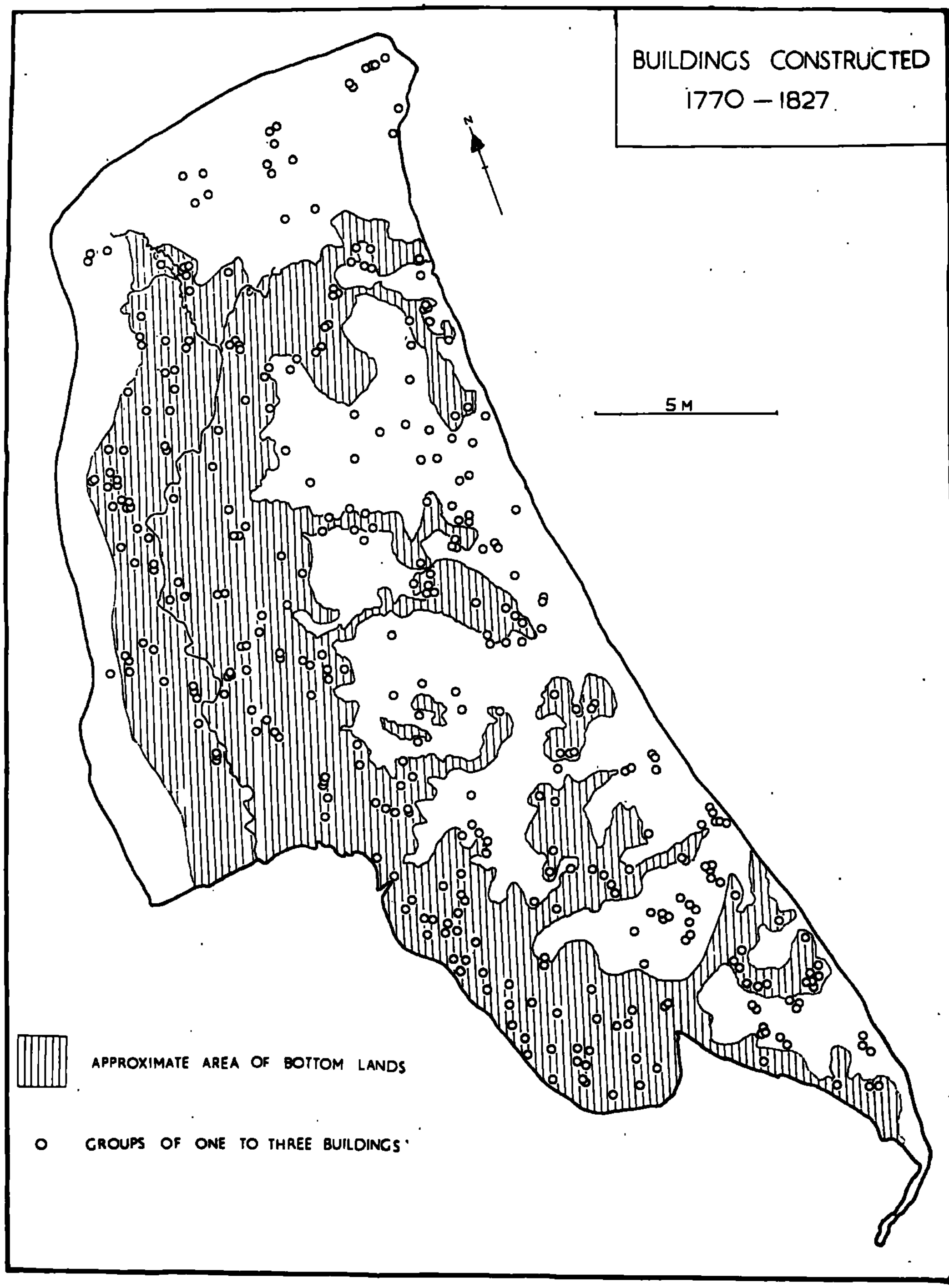
(1) Chap. 4.

(2) The "Hull Advertiser" June 2nd 1853 notes the sinking of piles in an infilling of marsh near Hornsea for the construction of the rail link between that town and Hull.

in the pattern of settlement and communications, particularly in the early Nineteenth century. It is fortunate to the purposes of this work that two early maps of reliable accuracy were drawn - both at a scale of 1" to the mile - which showed individual houses, settlements and roads. The earliest was made by Jeffery in 1770 and the later one by Bryant between 1827 and 1829.[3] By tracing one map against the other it was possible to mark, fairly accurately, the major changes in the distribution pattern of roads and houses. From this work two maps have been devised. The first one (fig. 48) shows the number of buildings (in a group of upto three) which appeared between 1770 and 1829. The second map shows the increase in permanent roads between these two dates (fig. 49) The period between 1770 and 1829 spans the time of the development of a system of public drainage and it is before other changes had obscured the influence of this work. There had been only a gradual improvement in ditching, and ~~that~~ this was also a period of decreasing rural population.[4] the distributions which emerge are, therefore, most interesting. The considerable increase in buildings built in the Hull Valley and the Southern siltlands was immediately apparent. The close relationship between the pattern of 'new' building

---

(3) Hull Ref, Library - Jeffrey Map; Leeds Ref. Lib.-Bryant Map.
(4) S.Best. op.cit. Chap. 5.



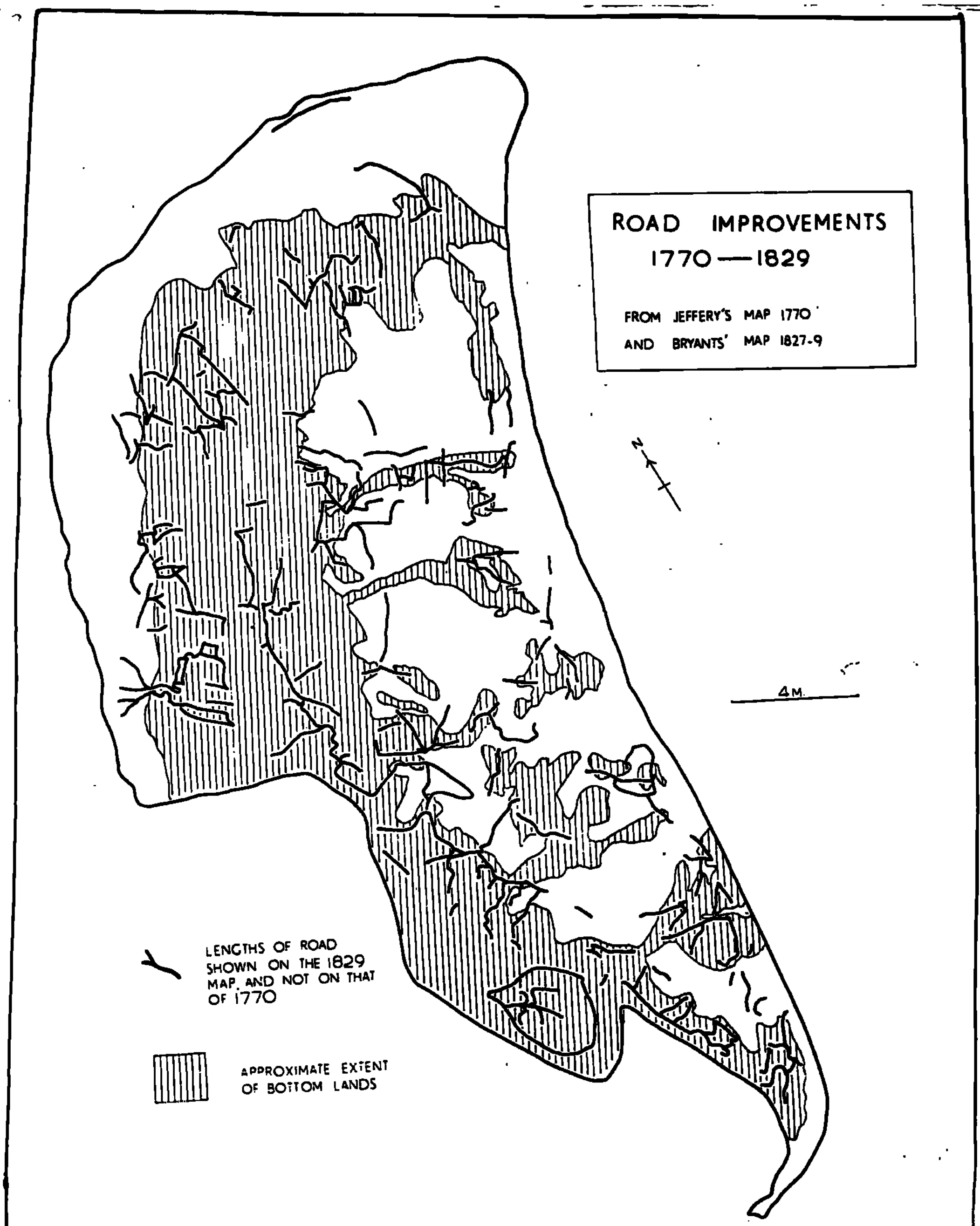
BUILDINGS CONSTRUCTED
1770 – 1827
N
5 M
APPROXIMATE AREA OF BOTTOM LANDS
GROUPS OF ONE TO THREE BUILDINGS

FIG. 48

and the improvements effected by better arterial drainage is made still more obvious when a comparison is made between areas of carr and alluvial ill-drained bottomlands and this spread in building. The strong influence in improvement is seen in this relationship - with much of the new development taking place on lands which, fifty years earlier, would have precluded settlement for reasons of either perennial or seasonal inundation. The growth of settlement in the Hull Valley and the siltlands of the Humber is brought into much clearer relief. It is also possible to suggest from the map that the northern bottomlands of the Barmston overflow were slower in benefitting from drainage.

The pattern of road improvement shows a similar relationship with the area of drainage improvement, again particularly in the Hull Valley and the Humber siltlands, (fig. 48). The probable lack of road improvement in North Holderness is further indication of the relatively slow rate of change in North Holderness which is noticeable from the agricultural data.(5) Although it is important not to press too far this relationship between arterial drainage improvement, the draining of carrs, and development in roads and settlement; the significance of such work is obviously measurable.

(5) Chapter 12.



ROAD IMPROVEMENTS
1770 — 1829
FROM JEFFERY'S MAP 1770
AND BRYANTS' MAP 1827-9
N
4 M.
LENGTHS OF ROAD SHOWN ON THE 1829 MAP AND NOT ON THAT OF 1770
APPROXIMATE EXTENT OF BOTTOM LANDS

FIG. 49

S E C T I O N 111

SPECIAL FACTORS INFLUENCING LAND DRAINAGE AND THE REGIONAL EVOLUTION OF HOLDERNESS.

Introduction;

The argument of this dissertation has so far been concerned with demonstrating that the evolution of drainage in Holderness during the Eighteenth and Nineteenth centuries followed a long period when the structure of the economy, conditioned by the aqueous environment, precluded land drainage as either a practical or even a desirable possibility. It has been suggested that the mediaeval rural economy of the region was neatly and profitably balanced by the utilisation of marsh and lake; that such waterways which existed were for purposes of property division and navigation, and that most of the drainage was largely inadvertent. The implication has been that conscious land drainage took place only when the mediaeval peasant economy evolved into a capitalist farming system and that the main pattern of the contemporary regional mosaic reflects wery considerably the importance of these ages. These elements, however, are not the only factors at work in the evolution and transformation of the Holderness landscape. In order to give point to the main thesis of this work it is necessary to spend a little time in reducing its facility. Casual relationships are rarely simple. Several other important elements are involved in the development of land drainage in Holderness and they deserve at least a brief analysis.

Several of these factors are specifically associated with the physique of the region and the physical changes which affected the unit:-

(1) The influence of climatic fluctuation during the historical period on the development of the region.

(2) The effect of cyclic morphologic changes upon the development of the region, especially concerning the growth of Spurn Point and the siltlands.

(3) The difficulties imposed by the terrain upon efficient administration of drainage.

(4) The effect of poor drainage upon health.

(5) The arguments involving the taxable area for drainage.

(6) Socio-historical evaluations which have left their mark on the contemporary pattern of drainage, and the morphology of the region.

It is not possible to make chapter divisions entirely on the basis of these points, for some relationships contain elements of all these factors. It is hoped, however, that this summary will make the reasons for division into chapters self-explanatory.

CHAPTER 15. SPECIAL FEATURES OF CLIMATE + TOPOGRAPHY.

(I) Climatic Variation

Three major climatic factors would appear to have conditioned the regional evolution of Holderness during the present millenium; (i) a change in sea level, (ii) a cyclic fluctuation in the amount of annual rainfall; (iii) periodic phases of more dramatic climatic extremes, especially of floods and storms.

Several writers have made attempts to determine the extent of climatic fluctuation during the last two thousand years.[(1)] Godwin and Swinnerton have shown that there has been a gradual rise in the sea level of the east coast during the last millenium. The amount of such increase may have been as much as 200 feet, a figure of some significance to the development of settlement in the region.[(2)] The most valuable contribution in this field so far, however, has been made by Brooks.

---

(1) Noteably C.E.P.Brooks "Climate Through the Ages". J.Schove,
J.Schove "Solar Variation and Related Geographical Phenomena" Weather No.7 1961.
Symons & Hennig "Cycles in British Climate" Q.J.R. Met. Soc; 111 p. 189. 1895.
Godwin, "Post Glacial Changes in Land and Sea Level" P.T.R.S; (P 11.Vol. 230
Swinnerton, "Post Glacial Deposits of the Lincs Coast" p.360 Q.J.G.S. 1931 Vol. LXXXV11.

(2) Chap. 4.

By checking historical records of dramatic events in British and European weather, against fluctuations in peat bogs, lake and river beds; by measuring the variety in width of tree rings and using records of climate, during the last 150 years, Brooks has been able to overcome some of the difficulties of inadequate corroborative evidence, which had marred the work of earlier climatologists. Brooks found that there were 1.8 more droughts recorded than wet years during the period A.D. 900- 1650. By multiplying the number of wet years recorded in any century by this figure to restore the balance, he was able to devise the following index of raininess:

$$R = \frac{100 + 2\ (1.8\,w - d)}{\sqrt{n}}$$

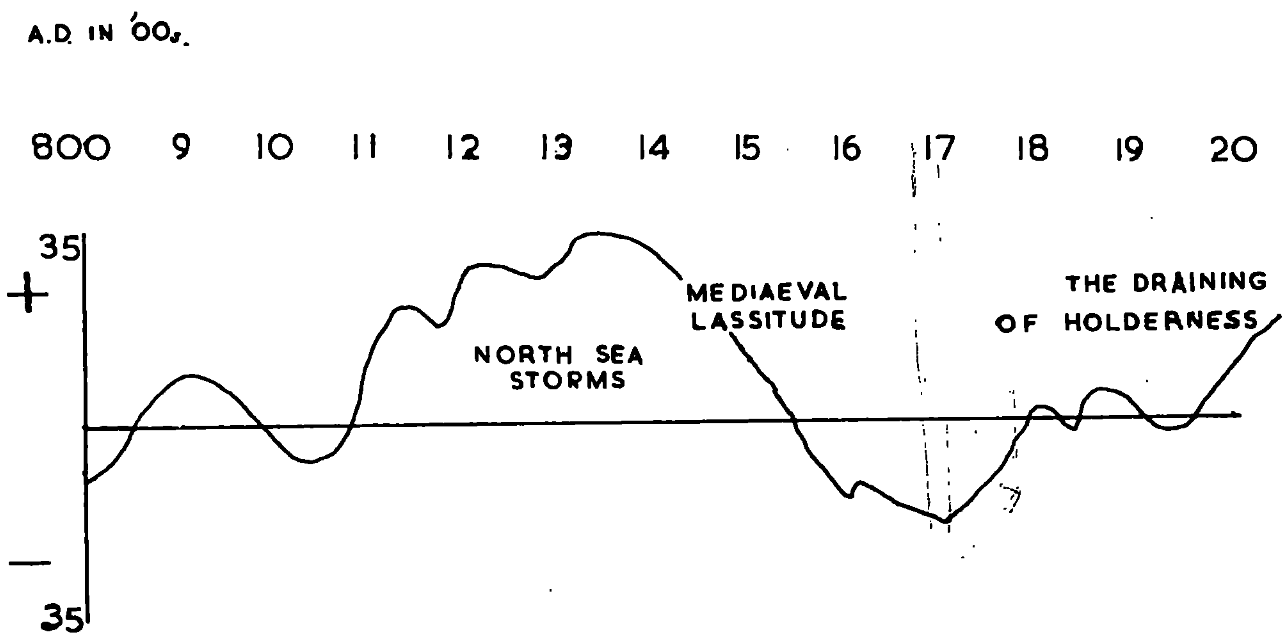
Where w = wet years
d = dry years
n = total number of records for the century
R = Index of raininess.

If a graph is constructed of these figures, a striking cycle of climate is revealed. If Brooks assumptions are correct there would appear to have been five major fluctuations in climate during the last 1,500 years. Three peak periods extend from 850 to 1000 A.D. from 1100 to 1500 and from 1700 until the present century. These phases of increased rainfall are separated by two ' troughs ' or periods during which drought was more common than prolonged heavy rain. These extended from 980A.D to 1800, and from 1550 until 1700AD(fig 50). These graphs of possible rainfall variation bear considerable relationship to variations in the intensity of drainage activity in Holderness. There is some evidence to suggest that periods of greatest drainage activity were associated with periods of flood. All records of the number of meetings to deal with drainage problems held by the Court of Sewers for the East Riding are preserved in minutes from the period 1647 until the fragmentation of authority at the end of the Eighteenth century.(3) It could be argued that in such a period, when drainage administration was, at best, lackadaisical, the number of meetings to deal with drainage problems fairly reflected the need for improvement. There is no indication that meetings were held at constitutionally appointed times during the year. There are no annually re-occuring dates for meetings. The only pattern apparent in the records is the marked preference for meeting in summer, probably when highways

---

(3) E.R. P.R. Office CSR/1 - 30).

INDEX OF 'RAININESS' (AFTER BROOKS)



FOR INDEX FORMULA SEE TEXT

FIG. 50

were in a better condition.[4]

A careful abstract of the number of meetings in each year between 1647 and 1789 was made by the writer (Appendix 1) A graph constructed on the basis of these figures (fig 51) shows a marked increase in drainage activity after 1680 coming to a peak during the first forty years of the Eighteenth century. It is perhaps interesting to compare this growth with the one compiled from Brooks statistics of historical raininess (fig 50). There would appear to be a more than co-incidental relationship between increase in activity marked in the Court of Sewers minutes and the gradual increase in 'raininess' during the early years of the Eighteenth century. This increase in rainfall, after a period of 'drought' in the preceding two centuries may have been a contributary factor in the increasing interest in drainage matters during the latter part of the Eighteenth century. Glasspole [5] has suggested that the figures of average rainfall between 1740 and 1850 were

(4) CSR/4/188 (1723) " The exceeding dry summer has afforded us better opportunity than heretofore of finding out defects in several sewers in Holderness "

(5) Glasspole " Changes in the Ammount of Rainfall 1740 - 1915" Met. Mag 1928.

NUMBER OF MEETINGS OF THE COURT OF SEWERS 1682-1786

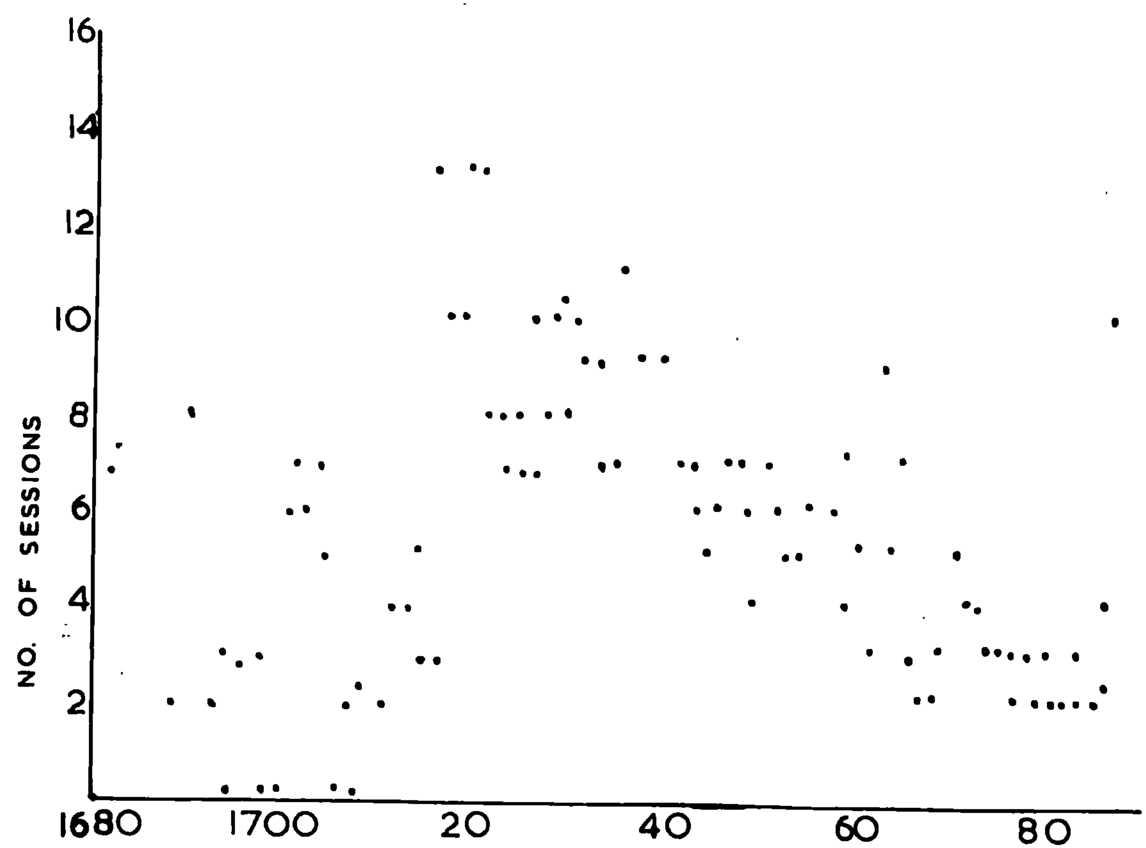


FIG. 51

only 86.9% of those for the period between 1881 and 1915. He suggests that this period of low rainfall was followed (in the years between 1760 - 70) by a period of rainfall averages of which were 101% of those in 1881 - 1915. These calculations agree with those made by Brooks. Another relationship can be suggested; just as the increase in rainfall may have added impetuous to the movement of public drainage arteries during this period a similar increase in the number of wet years between 1840 and 1850 may have encouraged the inception of under-drainage technique during the Eighteenth century. (fig 52). This process was doubtless assisted by the period of dry summers between 1850 and 1870.

Nineteenth

Brooks calculations infer that there was a long period of adverse climate turbulence between 1100 and the end of the Sixteenth century. During this period of increased raininess it is reasonable to suppose that the influence of the water surplus upon the shaping of a mediaeval rural economy in this area was more marked than if a period of ' dryness ' had replaced it. Lakes, marshes and seasonably inundated Carr land would still have played a vital part in the pattern, but there is reason to believe that it would not have been so significant. The continual drying out of valued marshes, and

PERCENTAGE VARIATION IN RAINFALL

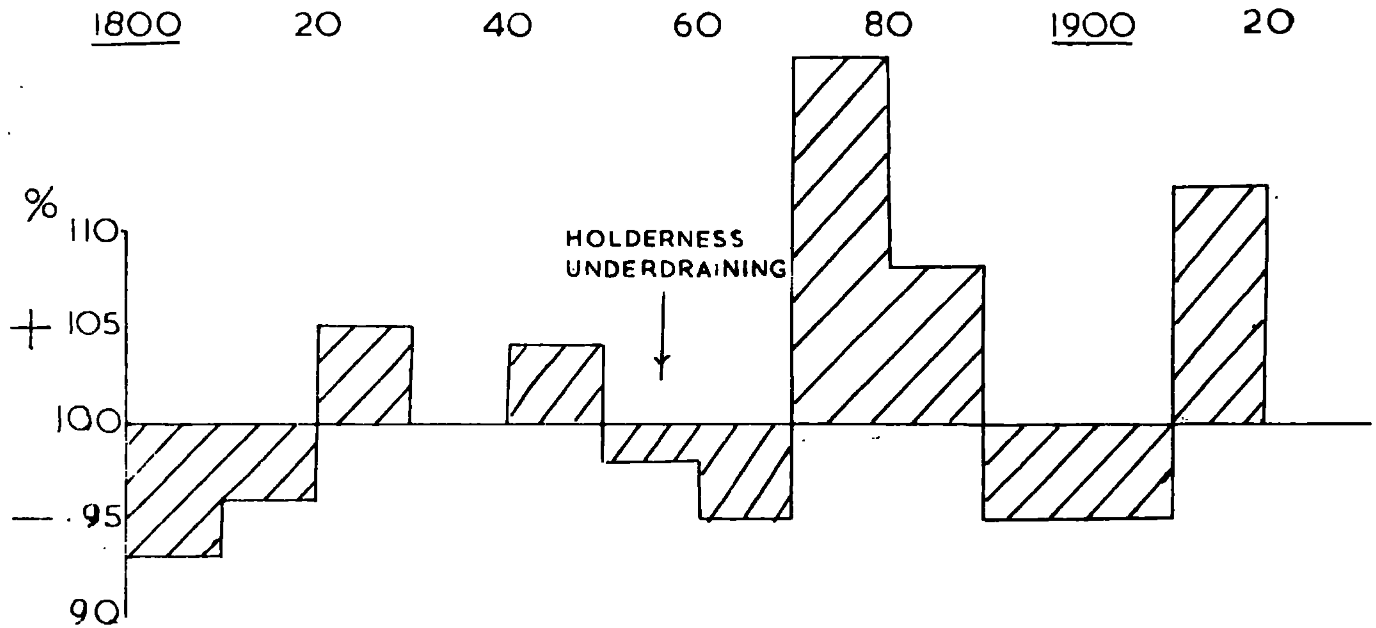


FIG. 52

the lowering of water levels in navigation channels would have caused a considerable re-arrangement of economic emphasis in the region. It is nonetheless, a curious co-incidence that 'sympathetic' fluctuations in climate have probably added impetus to a developing pattern of reactions in this way. There is little doubt of the impact of dramatic fluctuations in weather upon the region. A number of historic records survive of the effects of such disasters.

The most important series of floods in the history of the region, which took place with greater frequencies as time continued, began to effect the siltlands of the Humber littoral in 1295 and ended in 1400. They were sufficiently strong to cause the complete submergence and the eventual relinquishing of the lands which early reclaimers had won from the estuary. Fortunately the monks of Meaux owned considerable estates in this area and a complete record of the stages of inundation has survived.(6)

A full record of this disaster has been made by Boyle(7) following the history of Meaux, in his attempt to prove that these townships existed. All physical trace of them had been effectively removed by 1401. The Hedon Inquisition of 1401, of 'lands lost to the overflowing of

---

(6) Chap. 16.
(7) J.Boyle "Lost Towns of the Humber " 1889.

the Sea, of the Humber and of the other streams of Holderness ' ([illegible]) shows that a total of 1,069 acres had been lost by this time.(8)

The significance of these extensive floods is that they took place in the only area of Holderness which had shown any real interest in drainage and reclamation for land improvement. The effect and memory of these floods was a probable deterrent to reclaiming activity for 250 years.

Sometimes disasters were a spur to minor improvement even during the mediaeval period. It would seem, however, that there needed to be a major catastrophe before work was undertaken. In the time of Edward 111 the road between Anlaby and Hull was flooded so frequently that the King ordered a new ditch 24 feet broad to be made.(9) This road was in fact the main artery of the developing city of Hull; the fact that it was allowed to remain flooded for so long is a measure of the importance attached to drainage work.

There is reason to believe that many of the arterial drain improvements of the period between 1760 - 1770 took place as direct result of economics re-inforced by flood inundations. It has already been suggested that rainfall was higher during this decade. Many of the reports on the need

---

(8) C.M.M. Vol (iii) p.283 - 86.
(9) Camden "Brittannia" p. 320

for drainage, cite the incidence of floods as a reason for action.[10] There is no intention of suggesting that the factor of response to climate changes was crucial in the emmergence of the pattern of regional relationships, for sufficient evidence has already been evinced to show that this was only one element at work in the process. Nonetheless, it seems reasonable to suppose that the nature and growth of the land drainage pattern of Holderness was influenced by these factors.

(ii) Health and Drainage Activity

Flower suggests that there was an increase in drainage interest immediately after the Black Death, because the visitation had been associated with stagnant waters in the ditches[11] and notes that lack of labour and use would cause further stagnation. Richardson does not, however, support this view, he draws attention to the fact that a growing number of Commissions for Sewers were established in England and Wales between 1320 and 1366. (Both preceding and following the years of the plague)

1327 -1336	73	
1337 - 46	57	
1347 - 56	78	
1357 - 66	79	(12)

---

(10) Reports of Chapman & Jessop on Holderness B. & Key in Dr Hull H.C.R.L.
(11) C.T.Flower op.cit. Vol.1. p. XXV111
(12) A.H.Richardson - Eng. Hist. Rev, XXX1V.

and notes that there is no contemporary evidence for such a theory.

It is logical, however, to account for the sudden curious spurt of activity in the mid-fourteenth century followed by such a long period of apathy, in such terms. There would certainly be a strong case for suggesting this as a reason for the very complete survey of Holderness made in 1366,(13) when a similar thorough examination does not appear to have been made for 300 years after this time.

It is certain that the presence of large areas of motionless water led to the spread of malaria and other contagions and the general debilitation of the rural population of Holderness. Dugdale wrote of the association between poor drainage and bad health in the region in the mid-Seventeenth century.

> " What expectation of health can there be to the bodies of men where there is no element of good ? The air being for the most part, gross, and full of rotten harres; the watre putrid and muddie; yea full of loathsome vermin, the earth spongy and boggy." (14)

Leatham, writing in 1794 paid special attention to the problem

---

(13) Chap. 2. + Appendix I
(14) Dugdale op.cit. p. Xl.

> "The water in dry seasons is stagnant and brackish..... and before the present drains were made a very large proportion of the people were afflicted with the ague and were otherwise unhealthy." (15)

The parish registers of the Eighteenth century bear testimony to the effects of malaria and other marsh fevers in taking its toll of the population and there are many records of 'death by ague' and fever.(16)

It is likely that this factor was present in the arguments of these urging the necessity of land drainage improvements. The Winestead Drainage Board Minutes for 1862 reveals an interesting example of the influence of unhealthy conditions in speeding drainage improvements. The minutes record that a complaint had been received of stagnant overflowing ditches and poisoning drinking water. The complainants note that 'several young beasts had been almost killed through drinking water from the 'drains' and that the stationmaster of Winestead stated that 'the smell was so great to produce nausea all day, and for railway passengers to close carriage windows'.(17)

---

(15) Leatham op. cit. p. 17.
(16) Patrington & Leven Parish registers revealed twenty such deaths out of a total morality of 85 between 1730 & 1760.
(17) Winestead D.B. Minutes 1862, Crust Todd & Mills (Beverley)

The minutes also record that the Board discouraged the practice of emptying sewage into ditches. This is the only mention of this practice in early manuscripts, but it must be imagined that before the days of piped sewage the parish drain was often misused in this way, with deducable results.

It is reasonable to suppose from this evidence, that considerations of health were at least a factor in the increase in drainage activity during the agricultural revolution.

(iii) <u>The Diversity of the Terrain and Difficulties of Drainage Organisation.</u>

Drainage authorities inherited a system of drainage which was inevitably made complex by the terrain. It is clear however, that its involutions were by no means entirely due to natural causes. It has already been suggested that the pattern of Holderness drainage is to a considerable extent the result of a super-imposition of contemporary needs upon a system of channels constructed without drainage as a primary aim. The bizarre state in which modern drainage authorities find themselves is best illustrated by reference to a petition to the Court of Sewers in 1825.

The township of Flinton complained that a certain dike (Helldike) which drained a tract of land on the north side of the town, was so designed that the obvious intention of the planner was to carry water from this place to a sewer in the Keyingham Drainage System which lay at a higher level than this drain. Although Flinton lay within the bounds of the Keyingham Drainage System;

> " The physical probability of carrying water from Helldike to any of the sewers of this system do not exist " (18)

This reference in fact epitomises the two main difficulties inherited from the antique system of public drainage; (i) the disputes arising from the difficulty of determining the area liable to benefit - and therefore taxation from drainage improvement; and (ii) the fragmentation of drainage authority which has for so long impeded overall improvement.

(i) Fragmentation of Authority;

At first the moribund Commission of Sewers was responsible for drains in all areas of low land. Gradually each area of low grounds developed its own autonomous authority in the series of acts referred to in a previous chapter.[19]

---

(18) C.S.R. DDCC/40/17.
(19) Chapter 7.

Finally, only the areas furthest from out-fall and most difficult to drain were left under the jurisdiction of the Commission.

The distribution of area of low ground judged to be improved by the arterial drains laid down by the several drainage authorities (fig 33) shows the extent of the fragmentation of drainage authority. This map of drainage board areas reveals the nature of the evolution of this system of administration.

A preliminary examination of the areas administered by each board would appear to suggest that the system grew up with little reference to any scale of values. Closer examination reveals, however, that each drainage board area developed in subtle response to the complexities of relief.

There exists no official over-all map of drainage catchment areas in Holderness. The jealous autonomy of each authority has precluded any form of general regional planning. Even the East Yorkshire River Board, which now has general oversight of drainage matters in Holderness, has concerned itself largely with matters closely related to the River Hull

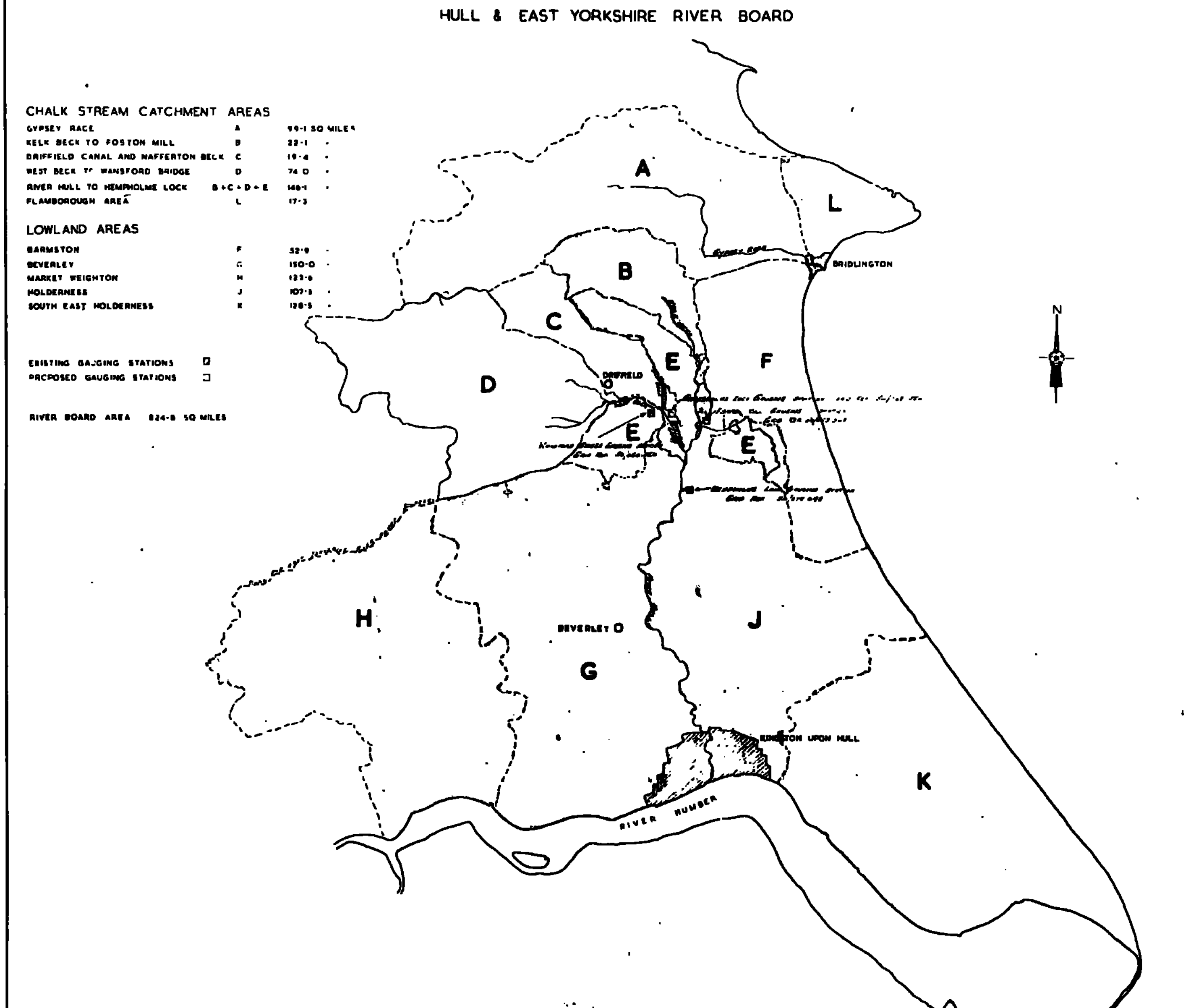
---

(3?)

and has been un-willing to trespass on the authority of each board. The only plan which exists of catchment areas is devised to show the positional importance of the four river Hull gauging stations at Hempholme, Foston Mill, and Snakeholme and Wansford Bridge (fig 53) No attempt to define more than approximate limits of drainage areas had been made.

By tracing all open ditches and drains shown on the $2\frac{1}{2}$" Ordnance Survey Sheets and comparing these streams with flow line arrows shown on the 6" Ordnance Survey Sheets, it has been possible to devise a more accurate delimitation of catchment areas (fig 9).

This map is interesting for several reasons. It shows that only a surprisingly small amount of the drainage water of Holderness now finds its way into the River Hull, and that consequently a considerable burden is placed on the south draining systems of Keyingham, Patrington, Thorngumbold, and Winestead, It shows that despite the silting difficulties of the Humber outfalls, this south-draining has proved more effective than draining water westwards to the river basin, along more natural flow lines. A comparison with the map of relief shows also that many of the limiting lines of these catchment areas are artificial, demonstrating that only the



SCALE 1/2 INCH TO 1MILE	DRAINAGE AREAS	G. ELLISON F.R.I.C.S. ENGINEER & CLERK 31·8·59	DRAWING No 586/3

FIG. 53

low drainage potential of the central clay areas could allow such manipulation. It shows that divisions between catchment areas do not always follow watersheds. It shows that only a limited amount of Holderness water drains directly into the sea, through the Barmston channel. The subsiduary 'sea-capture' systems which are the result of coastal erosion suggests the difficulties of re-arrangment which are likely to multiply as the reduction of the coastal watershed continues (figs; 1,9)

More important to the present argument, however, is the general similarity between catchment areas and division of drainage authorities. It demonstrates beyond doubt that the fragmentation of authority was an almost inevitable result of natural diversity. It is, in fact, difficult to imagine how a more practical centralised system could have developed. Fragmentation is more a product of the environment than a feature. of human parochial perversity.

(ii) The Taxable Area Dispute;

The argument concerning the extent of an area liable to improvement by drainage and therefore open to taxation or other maintenance responsibilities has been raised wherever drainage is an important element in the landscape.

The elementary structure of mediaeval drainage was such, that often only those persons with 'land adjoining' the drain were responsible for its maintenance. There are many references in earlier drainage reports that this was the usual practice in Holderness.[20] Where these lands were common, i.e., before inclosure, the village was made collectively responsible for the maintenance of 'common sewers'.

The difficulties which a vague organisation of this kind promulgated were numerous. The division of responsibility very often led to poor maintenance and an inefficient sytem. In the 1367 report to the Commission of Sewers, the jury notes that along Summergangsdike, between Meaux and the River Humber, a length of 47 chains was apportioned between four people.

" The Abbot of Thornton	-	23 cords
The priar of Bridlington	-	22 cords
John Scalbre	-	10 cords
Simon Bradley	-	1½ cords" (21)

This is noted as an exceptional instance and the state of maintenance along this stretch of sewer can be imagined. The results of common responsibility could scarcely have been much better.

The records of the Commission of Sewers for the East parts of the Riding are interspersed by many references to difficulties arising from poor maintenance.

---

(20) C.S.R. 2/1 - 26 and others Bev; P.R.O.
(21) op.cit. ~~ibid~~. p.117.

Indeed most of the dealings of the Commission are with disputes arising from this problem; in 1342 it was found that Keyingham fleet could not be made fit unless;

> " they repair that wych ought to be repaird near the Humber" (22)

From later examples, which multiply with the increasing number of records which survive since 1660, the following can be quoted in 1716;

> " The inhabitants of Gransmoor complain that their ground was flooded because of neglect of the inhabitants of Barmston. The Commission decided that the flooding was caused by the side of the bank dividing Barmston and Gransmoor not being sufficiently dressed. (23)

It may be argued that ill conceived organisation was the main cause of these difficulties. There is cosiderable body of evidence that would support this view.(24) But some of the difficulties would seem to have been an inevitable consequence of the nature of the terrain. Other reasons for poorly planned drainage were economic. The evaluation of the waterways for boundary divides, and for navigation (25) was a natural consequence of the structure of the mediaeval economy of the region. A boundary ditch, it could be argued, was sufficient to itself and did not need cleaning; whereas a waterway was demonstrably used by everyone, and was at least set free of

---

(22) op. cit. p.
(23) C.S.R./19/9 Apr; 3rd 1716.
(24) Chap. 2.
(25) Chap. 4.

weeds by the processes of navigation. It has been suggested elsewhere that few of the channels were purely used for drainage. It was on to this haphazard and extremely inneficient system of inadvertant drainage that the arterial systems of the period of public drainage were imposed.

The difficulties of apportioning taxation for benefits due to land drainage did not occur until the change to capitalist farming and the public arterial drains became a real feature of rural economy. Early leglislation on this matter by the new drainage authorities was still much affected by the system of jurisdiction which it was replacing. It was only gradually, as the system of land drainage grew in extent and efficiency, that the inadequate nature of early powers of taxation became apparent. Many of the early anomolies still remain in the present system.

The early drainage acts and awards (for Holderness Drainage, Beverley and Barmston, and Winestead in particular(26)) make it clear that only low grounds, below flood level were liable for taxation. (fig 54) and (Appendix I).

The increase in under-drainage in the mid- Nineteenth century soon made it apparent, however, that this apportionment

---

(26) E.R. P.R.O. DA/1, 4, 5(a) 6 - 12 and AppendixI

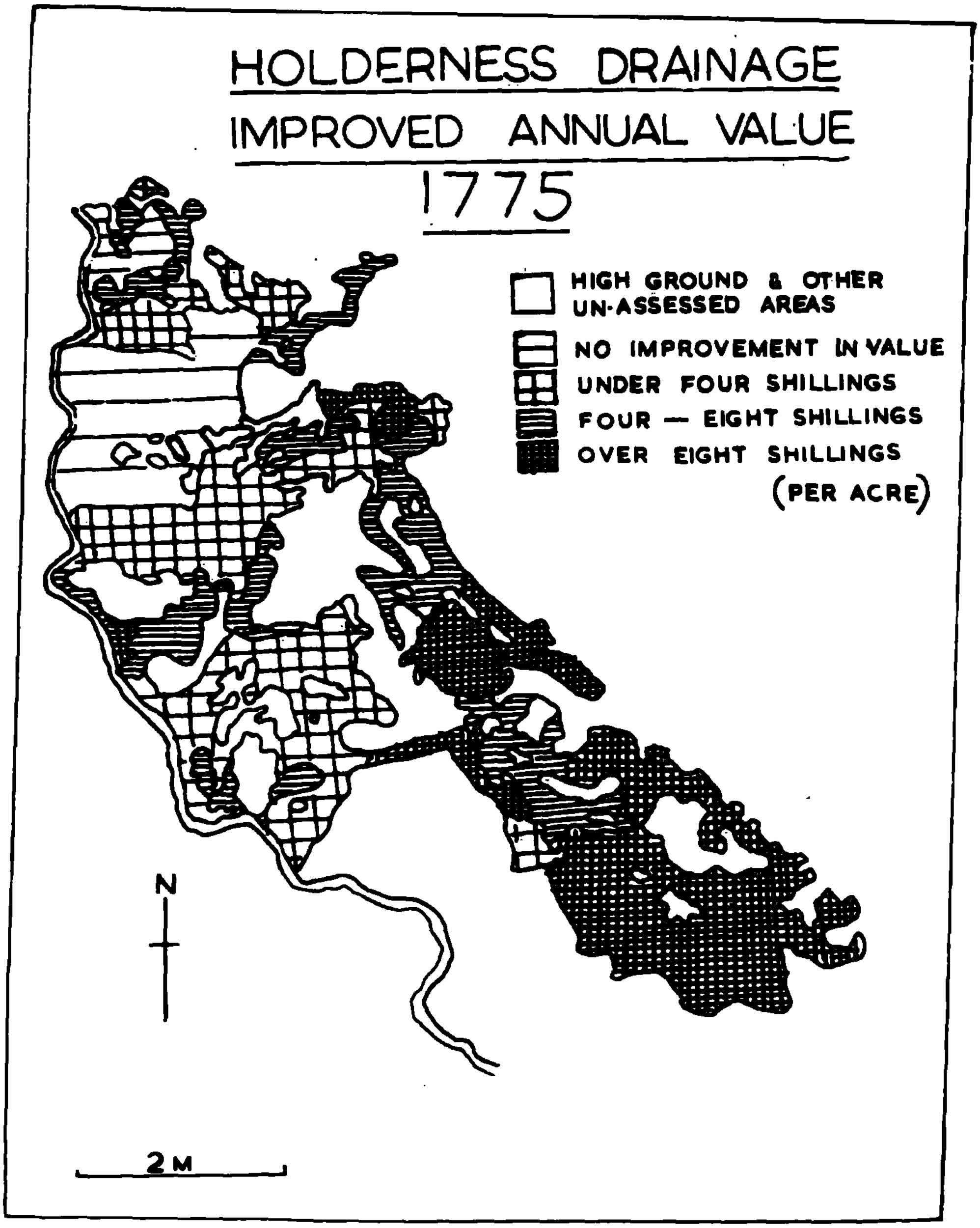

HOLDERNESS DRAINAGE
IMPROVED ANNUAL VALUE
1775
HIGH GROUND & OTHER UN-ASSESSED AREAS
NO IMPROVEMENT IN VALUE
UNDER FOUR SHILLINGS
FOUR — EIGHT SHILLINGS
OVER EIGHT SHILLINGS
(PER ACRE)
N
2 M

FIG. 54

was inadequate, although the 1847 Drainage Act made no provision for extension of tax. The claim of the natural right of upland farmers to drain into lowland areas (because ' the same amount of rainfall on the uplands as on the lowlands!) was first challenged by Clarke in his essay for the Royal Agricultural Society on Trunk Drainage as early as 1855

> " We are beginning to realise that every river with its streamlets, feeders and ditches and even the underdrains which trickle towards the supply must be viewed as a system of drains organised and complete in itself." (27)

The whole of this report is remarkable in that Clarke advocates improvements which are only gradually being recognised as important even today.

The first improvements in the system were not made until ten years after Clarke's report was published. Although the House of Lords recommended an extension of obligation to the whole catchment area in proportion to benefit,(28) the Act of 1867 could only extend leglislation tax responsibility as far as five feet above the height of the highest known flood level. The records of how far this leglislation affected drainage authorities in Holderness are not easily accesible. All minute books are deposited with the soliciters who manage the affairs of each board, and the records are not

(27) J.A.Clarke " Essay on Trunk Drainage J'nl of R.Ag.Soc, 1855 p.18
(28) Report of Select Committee of H.of L. 1877.

made available for inspection. The writer did examine the minutes of the Winestead Drainage Board (1819) for this period and found that as a result of the Act of 1867 the taxable area was increased from 1,500 acres to 3,134 acres (although the total catchment area is over 8,000 acres) and that although the five feet limit may have been exceeded, the extent of this excess was probably very small. Certainly there was sufficient increase to allow three rates of tax to be applied at 2/6d, 3/9d and 5/- per acre, according to height above sea level.(29) This extension was recognised as attributable to "all lands benefitting."

In 1877 the House of Lords Committee on Land Drainage(30) suggested that "Rates be distributed over the whole watershed with the uplander taxed less than the lowlander". Little was made of this radical suggestion, however, In 1918 the Ministery of Agriculture taking 'the best known advice' extended the area liable for taxation as far as eight feet above the highest flood level.(31) This extreme conservatism was eventually recognised in 1926 when the Commission on

---

(29) Winestead D.B. Min; Crust, Todd & Mills (Beverley)
(30) H.L. Select Committee (Hans, 1877)
(31) op.cit. p. 18.

PARISHES PAYING NO DRAINAGE TAX

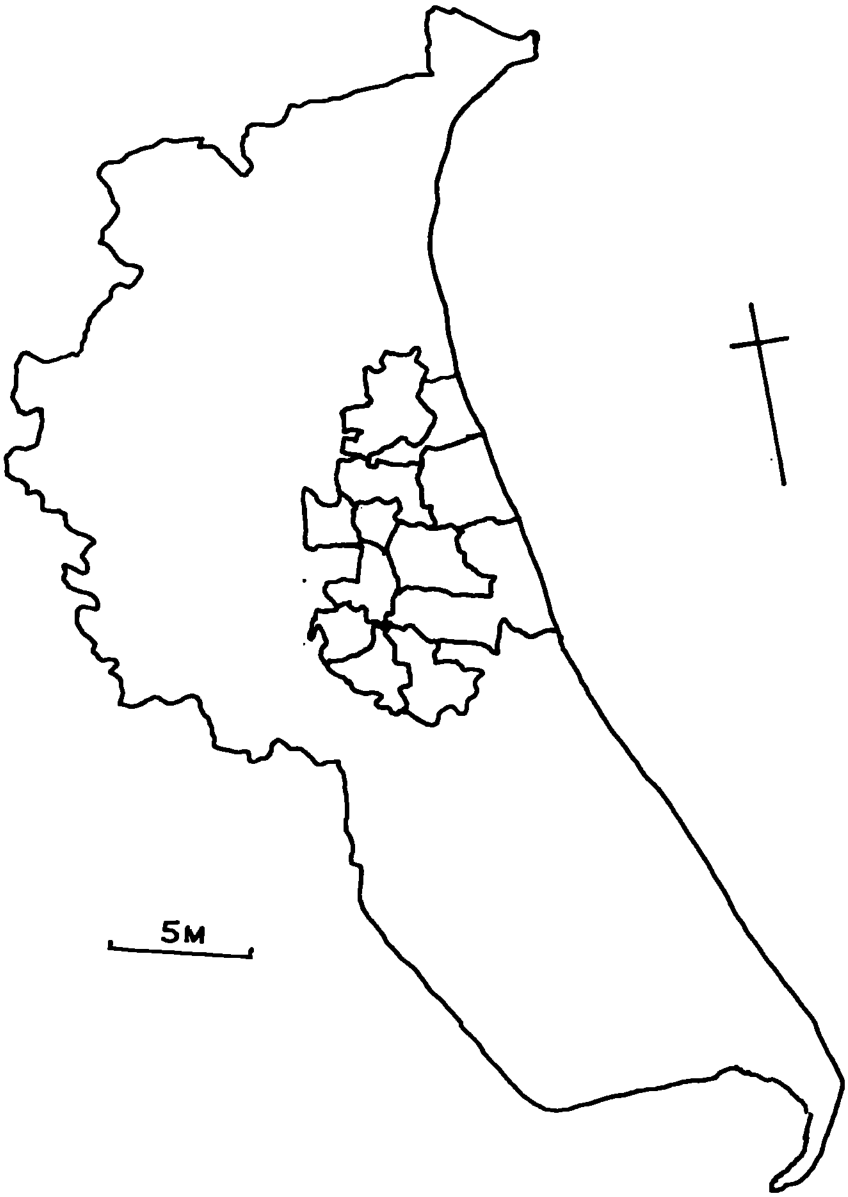


FIG. 55

Land Drainage, echoing Clarke's words seventy years earlier, recognised that;

> " rivers under modern conditions of roofing, paving, road making, sanitation, and under-drainage are called upon to discharge functions for which they were not designed by nature." (32)

The Commission suggested that obligation be extended to " the whole catchment area" (33) In the case of Holderness, leglislation was one thing, and practical application another. There was a complex and often arbitrary arrangement of catchment areas where for large areas (even over 25' O.D.) water could be persuaded to flow in several potential directions, and could easily be diverted without much re-arrangement of water - courses. (figs 35). No one appears to know the exact limits of the catchment area for each authority. As far as the writer can discover no plan has ever been made to delimit these areas. By shading the areas noted as liable to taxation it is possible to distinguish a considerable part of east-central Holderness were drainage taxes are paid to no one, although the area obviously benefits by the efficiency of the various Boards. (fig 55)

The questionaire sent out on land drainage, to all

(32) Report of Commission on Land Drainage 1926. p.16.

(33) using H.R.Mills definition of (catchment area' from the article on geography in the 1911 Encyclopedia Brittanica).

Holderness farmers, reveals that difficulties of apportioning both taxation and the responsibilities for ditch maintenance are still a feature of farming life in the region. It is likely that this will always be the case. It is a natural consequence of the nature of the terrain and the devious evolution of the drainage pattern.

CHAPTER 16. SOCIO - ECONOMIC FACTORS AND THE EVOLVING DRAINAGE PATTERN.

Several important causal relationships involving land drainage, and the pattern of human responses in the region, deserve some special attention. They concern not only the ways in which social evaluations have further diversified the already complex development of artificial drainage in Holderness.

The most important of these factors is the significant relationship which appears to have occurred between land drainage and the development of the South Holderness siltlands.

(i) Land Drainage and the Development of the Siltlands of South Holderness.

The modern silt deposits of the south Holderness shore began to accumulate at the end of the Seventeenth century. Deposition has been continuous since that time. The progress of ~~dep-~~

deposition

is readily discernible from various maps and charts of the Humber. Maps by Saxton (1577) Speed (1610) and Jansen (1640) indicate no such development, but Bleau (1685) shows mud banks off the south Holderness shore, and Morden (1700) marks this feature clearly as an island separated from the mainland by a channel two miles wide. A number of historians have traced the progress of accretion and reclaimation from this time, noteably Butterfield, Shelford, and Sheppard.(1) The work of these Eighteenth and Nineteenth century re-claimers gave the country over 8,00 acres of the excellent farm land still known as Sunk Island, although there is now little visible evidence of its gradually diminished insularity. The origin of these silts has long been a matter of speculation and dispute. Controversy has been based on the premise that the majority of this vast bulk of material has derived from one of two sources: the silts brought into the Humber by the Ouse and Trent; and/or the re-deposited clays eroded from the Holderness coast and borne into the Humber by tides. Although both sources had protagonists, the general movement of opinion has been towards regarding the coast of Holderness as the main source of this deposit. It is necessary to trace the main outline of this argument.

---

(1) Shelford "Outfall of the River Humber" Proc; Inst, C.Eng. Vol XXVIII 1869
J.Butterfield " The Naturalist " 1904 p.264.
T. Sheppard "Lost Towns of the Yorks Coast" p.45.

As early as 1853 Oldham asserted that only at the still of flood tide could sufficient bulk of detritus be held in the water to allow such deposition. The source of the material he maintained could not, therefore, be riverine.(2) Parsons extended this argument by showing that Humber detritus found its way as far up stream as the lower reaches of the Ouse and Aire, by distinguishing the difference between sediments deposited by the rivers above and below the tidal limit.(3) There is strong reason for supposing, therefore, that little of the detritus of the Ouse and Trent tributaries reaches the Humber, and could contribute little to the materials of the siltlands. This argument is given further weight by the work done by Platnover on materials taken from the Ouse.(4) Samples taken in periods of normal flow were compared with those taken during Spring floods. Platnover found that the water carried less material during floods than during normal flow. This he no doubt rightly accounts for by suggesting that flood water derives largely from springs

---

(2) J.Oldham - Jn'l of B.A. 1853
(3) H.F. Parsons - " The Alluvial Strata of the Lower Ouse Valley" Proc. Y.G.S. 1877 p.214 - 238.

(4) Quoted in T.Sheppard " L.T. Y.C" p.242.

and normal flow is principally the result of run-off. The amount of detritus carried down into flood time would seem, then, not much greater than that carried under normal conditions. Therefore no significant addition to Humber detritus is made at the times when one would expect it most likely to take place.

The suggestion that materials comprising the Humber siltlands came principally from the Holderness coast was denounced categorically by Wheeler(5) who tried to show that most of the longshore drift currents eventually turn away from the Humber mouth, and that the solution of eroded clays was carried out and disseminated in the sea. Historical measurements of erosion on the Holderness coast showed, however, that an average of 7 feet are removed from the coast each year, a total of 969,000 cubic yards of material.(6) Questioned by the Commission on Coastal Erosion which sat in 1906, and faced with these measurements, Wheeler admitted that 'it was possible' that some of this large bulk of material found its way into the Humber and was

---

(5) W.H.Wheeler " The Sea Coast" (1902) p. 140.

(6) J.R.Boyle " Erosion of the Holderness Coast" Trans. H.G.Soc; 1895 Vol.(iii) p.16.
I.Cole "Erosion of the Yorks; Coast". Naturalist 1893. p.112 - 44

deposited on Sunk Island.[7]

Later writers, notably Steers, have subsribed to the view that much of the material is estuarine rather than riverine in origin.[8]

There is strong evidence, however, that this phase of deposition between approximately 1650 and the present day is not the only one with which we must contend. There would seem to have been a similar period of deposition between the time of Saxon settlement of the area in the Sixth century lasting to the end of the Fourteenth century, when the silts were reclaimed by the Humber tides.

The alignment of Saxon settlements in south Holderness (i.e. Keyningham. Ottringham, Patrington, Welwick, Skeffling and Kilnsea) on the ends of morainic spurs, suggest that this was the shore line at that time; This is a view to which Shepperd would also subscribe.[9]

Evidence from the Domesday Survey, from the Melsa Chronicle, and early Court Rolls[10] show that by the Twelfth century the shoreline was considerably further south than it

(7) Royal Commission of Coastal Erosion (1907) - Vol. 1. pt.2. p.153.
(8) T. Shepperd " Origin of the Humber Muds" Hull Field & Naturalists Club, 1898.

(9) P.F.Kendall & H.E.Wroot, " Geology of Yorkshire" (1924) Ch.XXV11.
(10) Steers "Coastline of England and Wales. p.415.

was in Saxon times. The actual extent of this accretion must remain conjectural, but there is little doubt that it was considerable. It was of sufficient size to support townships, Tharlesthorpe, East Somerte, Frismarske, Penisthorpe, Orwithfleete, Ravenser and Sunthorpe (fig 18) although it must be admitted that several of these were possibly no more than small granges, extensions of the villages further north. Their Danish place names[11] suggest that they were additions made after the initial Saxon settlement and some of these (certainly Tharlesthorpe) had an independent manorial identity. In order to prove the existence of these settlements Boyle[12] collected all relevant information and also attempted to place these settlements on a map (fig 18). For those noted as being within the parish of the earlier village, silting is at least restricted to a small area; some can be fixed even more accurately following early descriptions[13] (e.g. Ravenser and Ravenser Odd;) All that can be claimed with certainty however, is that the area of early mediaeval siltland

---

(11) Torp + A Common Danish Suffix - see E.P.Soc, publics.
(12) J.R.Boyle " Lost Towns of the Humber" (1898)
(13) Boyle op.cit. p. 65.

does not accord completely with the area and shape of moddern accretions, but extended further eastwards as a more regular extension of the coastline.

There is also little doubt that the acreage of the early deposits was considerable. Tharlesthorpe, the largest of the settlements, was held by the monks of Meaux and in many of the others they held lands and 'tenements'[14]

In Tharlesthorpe the rich lands yielded considerable returns. Three hundred quarters of grain came from the township to Meaux in 1250[15] and in 1277 the monastery was pasturing 1,274 sheep in the township on " lands so rich that the ewes brought forth two lambs ". The Hedon Inquisition of 1401[16] which was a record of all lands lost by the monastery in Humber inundations of the Fourteenth century, gives an important indication of the area of these silts:

(See over)

(14) C.M.M. (ii) p. 90.
(15) op.cit. (ii) p. 283. - 6.
(16) C.M.M. (iii) p. 286 - 6.

Acres of Land Lost by Meaux Abbey During the Humber ~~Floods in the~~ Fourteenth Century
(from the Hedon Inquisition 1401)

Township	Meadow & Pasture	Value per acre	Arable	Value per acre	Total
Tharlesth'pe	252	3/6d - 4/6d	321	4/6	573
Salthaugh	282	3/6 - 4/6	-	-	282
Ottringham	40	4/-	100	2/-	140
Frismerske	-	-	22	4/-	22
~~or~~ Wythfleet	46	4/-	-	-	46

Total Acreage 1063

It must be remembered however, that this was not the only land lost during these inundations. The Archbishop of York and the Priory of Knaresborough held lands in Tharlesthorpe in the Thirteenth century,(17) and there is no record existing of losses which were probably sustained by other lords who held lands here.(18) The total acreage of early mediaeval siltlands in this area must have been considerably larger than even the figure above would suggest.

---

(17) Candelarium Inquisition Post Mortem (i) p. 117.
(18) The Lords of Albamarle were main landowners in Holderness

The floods which caused this disasterous damage were not an isolated dramatic natural calamity, but a good series of inundations gradually increasing in intensity during the Fourteenth century. It is probable that the Inquisition held at Hedon in 1401 took stock of all previous floods and not only those of 1396 - 99, although these were doubtless the most serious. Inundations of a slightly less serious nature took place between 1249 - 56.[19] If these were of sufficient importance to be worthy of record it is likely that many more took place which did not reach the pages of the Chronicle. The final abandonment of all townships south of the old shoreline was finally effected by 1401, and there is every reason to suppose that the estuary encroached as far, or almost as far as the old Roman coastline. The strongest evidence for this supposition comes from a chart of navigation channels in the Humber made by Burleigh (circa 1580) which plainly indicates that the old line of settlements stood along the shore and acted as small ports for river vessels. (fig 56)

---

(19) C.M.M. (ii) p. 91. (iii) p. 48. (iii) p. 76.

Preliminary examination of the evidence would seem to reveal clear reasons for this dramatic reversal of conditions. The estuarine silts had apparently been deposited in the slow eddies which occurred in the arc made by the growing sand spit of Spurn Point. This spit was not only the main instrument in the formation of the siltlands but also gave them some protection from the full spate of tidal inflow. During the abbacy of Hugh de Leven (1339 - 49) Meaux Abbey acquired the church at Easington. The Chronicle notes that;

> " Shortly after the appropriation aforesaid the town of Ravenser Odd........by inundations of the Humber was completely blotted out and consumed" (20)

It is reasonable to suppose that this township, situated on the Humber side of the spit, was destroyed owing to a breach of this feature of such dimensions that it was not thereafter repaired.[21]

If this was the case then the tidal flow pattern of the river estuary would have been altered and the now

---

(20) C.M.M. (iii) p.16. (trans)
It seems likely that the flood which caused this destruction is the one previously noted as taking place between 1356 - 6.

(21) There is some historical justification for this supposition (see Boyle op.cit.)
This breaching of the spit has taken place in a 250 year cycle the last occasion being 1953.

less devious main channel of the stream brought nearer the northern shore. Erosion would naturally replace deposition on the reclaimed northern shore of the Humber and the most serious land losses would take place during the periods when equinoctial tides were increased by high winds.

This argument is reasonable but somewhat facile. Another factor of considerable importance to this study has emerged, and it is possible to suggest a further explanation for this interesting cycle of erosion and deposition.

> The Inquisition of 1401 continually refers to " Lands and possessions lost by the inundations and overflowings of the sea, the Humber, and other Streams of Holderness." (22)

This last phrase is significant. It seems that tidal flood was not the only cause of erosion. The only 'streams' of Holderness' which affected this area were the drainage and navigational streams of the south. It is at first difficult to imagine that these short and narrow channels would have warranted inclusion as a contributory source to such catastrophic disasters. Careful examination of all the evidence available reveals that these water courses would seem not only to have played a considerable part in the erosion of silts but also in their accretion.

---

(22) C.M.M. (iii) p. 283. - 6.

FIGURE 56

The argument for this contention is based upon the premise that the removal of the wood cover in mediaeval Holderness was of sufficient dimension to allow quite considerable land erosion; and that the soils removed from the uplands of South Holderness were carried down to the estuary in sufficient quantity to contribute significantly to the siltlands of this area. Several arguments can be evinced to substantiate this view.

Before the period of Saxon settlement, the whole of the boulder clay area, not under marsh lake, was probably covered by a dense development of deciduous woodland.[23] The Saxons brought with them both the techniques of assarting, and agriculture and the heavy mould - board plough. The fairly close settlement pattern indicated by the Domesday survey suggests a relatively intensive system of land use, but the available area of ploughland in Holderness was limited by inundations - particularly in South Holderness, where the density of population and settlement was highest.[24] (fig 19). Arable land, especially on the saturated heavy clays of South Holderness, was of poor quality, and a proportionately larger area per capita would be needed than in more friable areas on the Wolds, and in North Holderness.

(23) Chap. 1 (ii)
(24) Chap. 4.(ii)

It has been shown previously moreover, that a considerable area of the region was covered by marsh and lake. This area was of great value, but its preservation placed an ever greater burden on the drier areas to provide arable land. With a reed supply of fuel from the carrs there was no incentive to retain any of the natural woodland cover of the hummocks. In fact there is a broad body of evidence to suggest that by the early mediaeval period the removal of Holderness woodlands was virtually complete.

The Domesday assessors noted only four small areas of Woodland in Holderness at Burstwick, Sutton, Bewholme, Ellerby and Cowden, and the general shortage of wood for fuel is reflected in several mediaeval records. In 1362 the Prior of Watton charged William of Sandale with cutting down 200 saplings worth £20.(25) Similar charges are recorded against William of Waghen in 1370, and Henry of Ulrhome in 1371.

The serious shortage of timber not only placed an extra burden upon turbiary,(26) which became the main source of fuel for the poorer manorial tenants, but also made it necessary for those owning woodland to defend them from depredation.

---

(25) De Banco 19 Henry Vl. (3) E.R.R.S. 1. p. 30.
(26) Chap. 4. (ii)

Several early records show that this practice was general in the region.(27) In 1437 the prioress of Swine charged four men with;

> "Breaking her close, and cutting down trees worth £10" (28)

An early Beverley Minster fabric roll makes it clear that woodland was scarce enough to need careful preservation by surrounding with a fence containing two padlocked doors.(29) The Melsa Chronicle makes several references to woods surrounded by defensive moats, and refers to the fact that these often needed to be widened:

> " Remisit etram nobus omnem actronem queralae de terra capta ad elargationem fossati nostri circa boscum nostrum de Rowth" (30)

Burleigh in his Chart of the Humber (1580) made a point of drawing quite clearly the double line of fencing which surrounded the wood at Burton Constable (fig 56). Speed's map (1610) also shows pallisading around the woods at Ledonfield, Constable and Burstwick, and Patrington parish bye-laws note that it was necessary to stipulate that.

> " It is our custom that any man may fell wood only in his own ground" (31)

---

(27) Y.A.S.R.S. XXIV p.53.
(28) op.cit. p. 40.
(29) Bev. Min; Fabric Roll, Hy 6.
(30) C.M.M. - Vol (ii) p.37. See also Vol.(ii) p.48.
(31) Poulson op.cit. Vol. 11. p. 437.

By the Eighteenth century, few of the parishes in Holderness contained any woodlands.

With the complete removal of the wood cover, and the ploughing of all available land, with a system of cultivation which implies large areas of bare fallowing on the wet clays, a considerable area of 'upland' Holderness was open to soil erosion. The ridge and furrow method of land division, with furrows deepened to carry off water from the fields(33) would encourage surface drainage and soil movement in an area where percolation was much restricted by the texture of the soil. (fig 37.)

The burden placed upon the few drainage cuts, (fig 10) and navigational channels must have been considerable. With an increased volume of water the speed of erosion and the load must have increased and re-depositions of silts carried by these streams would take place along their lower courses, near the tidal creeks, where encroaching tidal water caused flooding and prevented outfall into the Humber.

The evidence of several archaeological excavations lend stature to the argument for erosion of the upland hummocks and the re-deposition of clay particles on the lower levels of the region.

---

(33) Chap. 9. (i)

In 1836 workmen clearing a drain in Roos 'bottoms' discovered a group of figurines which probably date from the time of the Danish invasions. These figures were found on blue clay <u>six feet below the surface</u>. Surface material consisted of re-deposited clay and alluvium.(34)

The Barmston and Ulrome lake dwellings in the bottom-lands of those parishes were also discovered under an over-burden of similar depth and consistency.(35)(Fig 23). Bore - holes reveal that alluvial deposits can often be discovered in this area under a thick deposit of heavy brown silt.(36) Tree stumps are sometimes discovered, in ploughing the perimeter of the Hull Valley, under two or three feet of such material.(37)

---

(34) Poulson Vol. 11. p. 99 - 100.
(35) J.Sheppard 1.B.G. Vol, 23 (1958) p. 80.
(37) Two other features are worthy of mention (1) the siltlands township of Frismerske (Fresh marsh) suggests that fresh water marshes were present in an area where salt marshes have been expected (11) The considerable dissection of relief in South Holderness (fig 1) suggests greater erosion in this area. This is made more likely by the fact that clays are generally heavier here.

It is also probable that the period of highest mediaeval rainfall coincided with that of greatest erosion and deposition in Holderness. (fig 50)

On the basis of the above evidence it is possible to suggest that the mediaeval accretions of South Holderness had their origins not only in materials eroded by the North Sea from the coast of the region but also in materials washed down streams from the hummocks of interior Holderness. The first process was encouraged by longshore drift, tidal inflow, and the 'eddy elbow' of Spurn Point; the second by flood-swollen streams in a period of heavy rainfall, and denudation of wodland after intensive use of limited arable land by Saxon settlers.

It also seems clear that the loss of these siltlands in the Fourteenth century was due to the resumption of the Saxon coastline by the river Humber after the redirection of its current by a breach in the 'Humber dam'.

If this assesment is correct how is it possible to account for the re-development of the South Holderness silts between the Seventeenth and Twentieth centuries ?.

The period of re-establishment extended from the mid Seventeenth century until the present day. It is chiefly associated with the contemporary growth of Spurn point.(38)

(38) Ward "English Coastal Evolution " p. 78.
20 yds/annum 1676 - 1766, and 3 to 4 yards/annum 1873 6 1902-
$1\frac{1}{2}$ miles since 1676.

It seems likely that boulder clay silt continued to be transported down the channels and cuts to the estuary during the whole of this period.

The processes of erosion are likely to have been increased by improvements in open drainage during the Eighteenth and early Nineteenth century(39) and the growth of a system of under - drainage in the middle of the last century. Deposition on the lower levels was encouraged by the placing of 'clows' or sluices at the mouths of tidal creeks, which not only prevented the inflow of tidal water but allowed the land water to stand idle, depositing more of its heavy load than otherwise would have been the case. That these cloughs collected behind them a considerable quantity of land borne silt there is documentary evidence. William Brown's Report on Keyingham Drainage to the Commission of Sewers in 1728 accompanied by adequate diagrams (fig 57) showed that silt had collected behind the clough gates to a depth of 3 feet, causing the level of the drain to be raised to 3' 6" above the level of water in Keyingham Fleet at high tide. This was often the cause of

(39) Chap. 7. (iii)

KEYINGHAM CLOUGH IN 1728

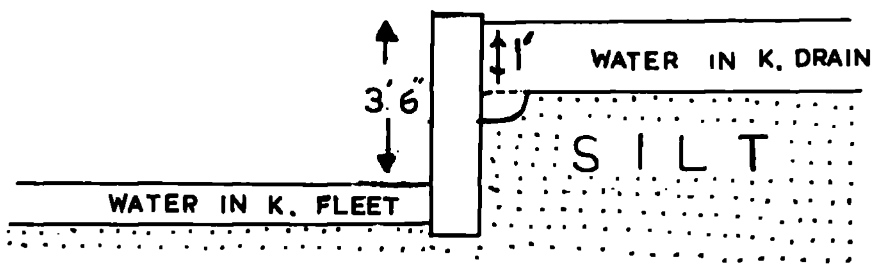


FIG. 57

widespread flooding in the lower levels of the drainage systems[40] and land stream silt was often distributed over a wide area on each side of the main drain.

Examination in the field reveals that the blacker estuarine silts of Sunk Island are often covered by a layer of between 6" and 12" of browner re-deposited clay silt from the hummocks. Closer analysis of soils than the preliminary sampling[41] employed by the writer would be necessary to establish beyond doubt the origin of these silts.

(40) Chap. 7. (iii)
(41) 30 samples were taken from points distributed evenly, over the Island - time and expense has not permitted more than a brief visual examination of these samples.

(ii) Early Economic Evaluations:

(a) Lakes for fishing (b) Ditches for boundaries (c) Mills and stream diversions (d) Early inclosure of bottom Lands.

It has been suggested that the structure of the mediaeval rural economy, with its basis firmly fixed in self sufficiency amply suited Holderness; that the diversity of natural resources evident in the region encouraged the development of a relatively high population density. A series of important chain reactions to this evaluation of Holderness resources can be traced in the patterns of the evolving landscape. All have retarded progress and prevented the efficiency of land drainage.

(a) Lakes for fishing :

The previous part of this chapter has suggested that the Saxon mediaeval population pressure caused a virtually complete denudation of the clay hummocks in order to extend to its limits the area available for ploughing, and that swifter surface drainage on the heavy clays, aided by the fewer available drainage channels, carried large quantities of silt down to be deposited in the tidal inflow area of south Holderness.

It might be argued that such a wholesale removal of detritus would have been prevented by the large number of lakes and marsh. It is indeed reasonable to suppose that the major reason for the disappearance of these numerous lakes by the Sixteenth century was by such silting.[42] The reason why it is possible to suggest that such large quantities of silts found their way south, is because the lakes were kept free of weed for fishing[43] and that water movement was sufficient to allow a high proportion of downwash material to pass through the lake.

Although there was a decline in the importance of fishing caused by both the Reformation and the increase in sea fishing as a training for the navy, the development of weed, and silting of mere beds was only slow. The retention of larger marshes and lakes until the Eighteenth century was largely due to their use by the gentry for sport. Strickland writing in 1812, found that the numbers of gentry living in Holderness had declined from 28 families in 1700 to 8 families in 1812, noting that =

> " formerly a low rich soil..... was thought desirable for residence, the fuller marshes lakes and fens, the better as affording.....additional amusement." (44)

Some of the mediaeval evaluations of marsh and carr land, despite increasing silting of these bottomlands, continued.

---

(42) Terrier of Ed.111. P.R.O. SC/12/17/4 lists, 37 acres of meadow with mere names.

(43) J.Sheppard " Mediaeval Meres of Holderness" J.B.G. 1958.Vol.23. Their area was also extended by turf cutting (see Chap. 3.(ii)

(44) Strickland op.cit. p.38.

(b) Ditches for Boundaries:

The modern drainage network owes much to the previous evaluation of the lands of Holderness. Many of the smaller ditches lead in directions which confound even the most elementary principles of land drainage. It would seem only reasonable to suppose that the flow lines of many of them are the result of an incorporation within the drainage system of many older cuts which were never intended to serve this purpose. It is obviously much more temptingly less expensive to adopt an original system of waterways to a new need than to cut a new series of channels altogether.

Many of the older cuts were devised as navigational channels, cutting across the slope, and aiming obviously to preserve water within the cut rather than to remove it. Reference has already been made to the nature and extent of this practice.(45) It seems, however, that many of the other channels noted in early records were intended as boundaries between parishes and properties rather than for drainage. The water cut was a reasonable substitute for the hedge which needed more maintenance, and which in any case would not grow in ill drained soils.(46) It is not only marked by a division, but with suitable grading of

(45) Chap. 4. (iii)
(46) Nicholson " Land Drainage " p. 45.

the sides - preventing cattle from wandering in neighbouring properties and being impounded.

A number of historical references substantiate this interpretation of the drainage map. The Patrington Charter of 1033 notes that the limits of the township were devised on this basis;

> " First it (the boundary) commences at the pit and so along the dike to the stone and so along the ditch to the hollow " (47)

A survey of the manor in 1637 shows that these limits were still used at that time;

> " The Lordship begyneth atte the south end of the even dike, goeth down even dike north,,,. and turneth southe as the sewer ledeth to Winestead clow ". (48)

Blashill notes that a ditch was used as the boundary between Sutton and Wawne.(49) (fig 58 a) This was later widened to make Forthdike, a monastic navigation cut(50) later translated to service as a drainage channel - an excellent example of triplicate function. Many parishes use

---

(47) Harris - "Open Fields of E.Yorkshire" E.Y.L.H.S.(1959) p. 20.
(48) "Early Yorkshire Charters" Y.A.S.R.S. Vol; Xl. p.51.
(49) "Survey of the Manor of Patrington 1st March. 1637.E.R.P.R.O.
(50) T.Blashill " History of Sutton. " p. 25.

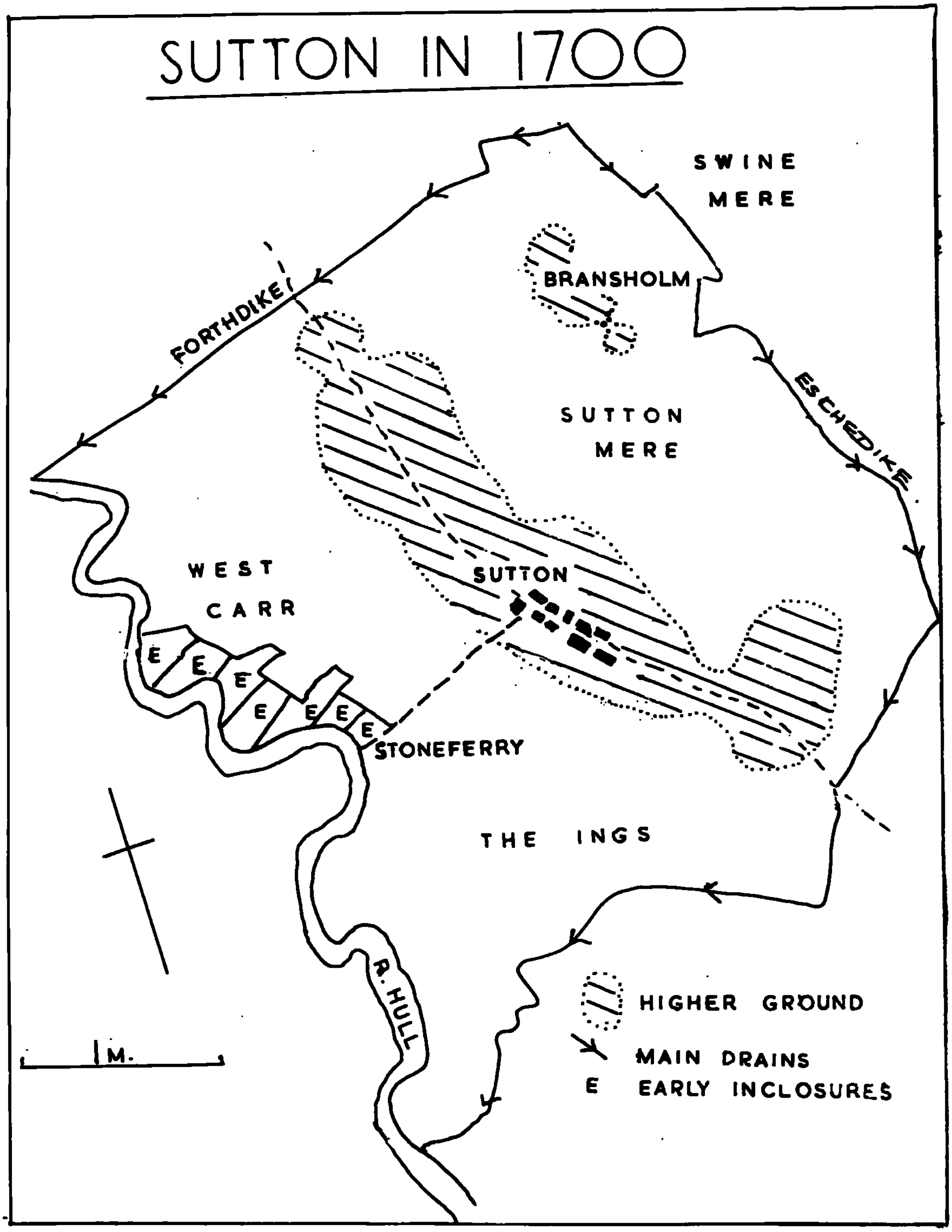

SUTTON IN 1700
SWINE
MERE
BRANSHOLM
FORTHDIKE
SUTTON
MERE
ESCHEDIKE
WEST
CARR
SUTTON
E
STONEFERRY
THE INGS
R. HULL
HIGHER GROUND
MAIN DRAINS
E EARLY INCLOSURES
1M.

FIG. 58A

ditches and channels for one or more boundary lines today and the " water townships " of the Hull Valley, Tickton, Routh, Sutton and Wawne are separated on four sides by such channels (e.g. fig; 58).

It is possible that many of the early exaggerated ridge and furrow systems of the lower plough lands were originally intended as boundary divisions - the water in the hollow acting as a deterrent to trespass on neighbouring sections (fig, 37).

In 1794 Leatham mentions the use of "fence - dikes" as a means of dividing the newly enclosed lands of the period, and notes the practice of ensuring such a method by

" Stopping the accidental flow of water in the ditch " (51)

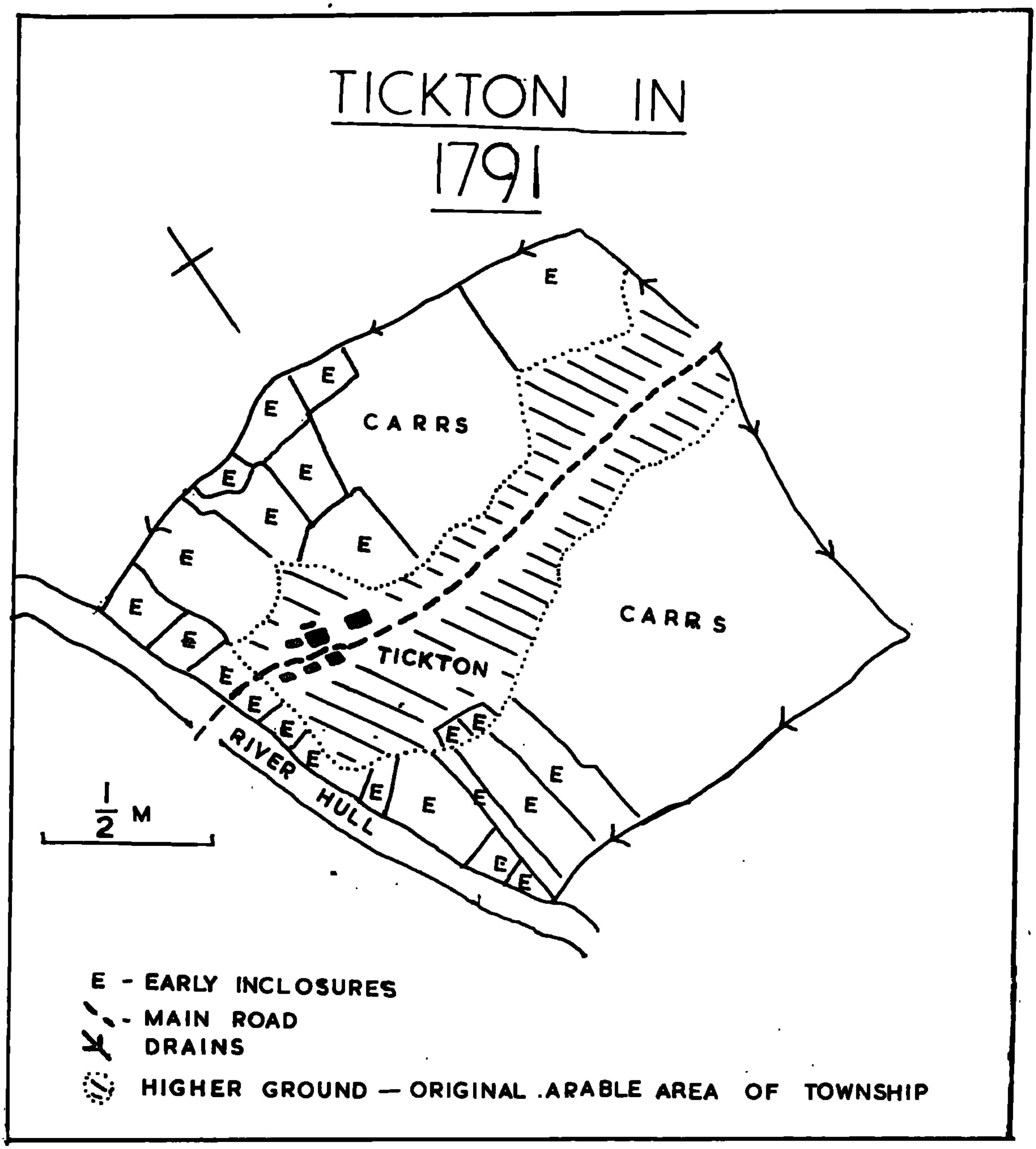
Even as late as 1835 Howard notes;

> " In lower grounds the subdivision of fields is formed by ditches or drains from 8' - 12' in width a very considerable loss of ground, but not to be regretted on account of the drainage afforded." (52)

If these ditches and sewers, cut for the purpose of navigation and dividing property, are eliminated from the pattern of early drainage, very few would remain as those designed to carry away water from the land. Few of the early records mention

---

(51) J.Leatham " General View of Agricultura in the East Riding" p.22.
(52) C.Howard. op.cit. p. 134.



TICKTON IN 1791
CARRS
CARRS
TICKTON
RIVER HULL
1/2 M
E - EARLY INCLOSURES
MAIN ROAD
DRAINS
HIGHER GROUND — ORIGINAL ARABLE AREA OF TOWNSHIP

FIG. 58B

such a use for the channels. Carrying the water away was a very secondary function, for which no real provision was made. With no system of under-drainage to increase the speed of flow-off, the winter rains would seldom be persistent enough to cause flooding from the cuts. Only when they were excessively obstructed " by willows growing beyond measure" or sedge and reeds, was something done to ensure that " the course of water should not unreasonably be stopped".(53) ~~and~~ The operative word in this period was "unreasonably"; limited efficiency was not only allowed, it was necessary.

(c) <u>Mills and Stream diversion;</u>

Mills were often a cause of stream diversion, ~~and~~ the deliberate manipulation of natural flow lines; - Sheppard makes out a strong case for believing that Kelk Beck, a northern tributary of the River Hull, was diverted by the Danes in order to power a mill at Foston.(54) Poulson (copying from Dugdale(55) who took his information from Court Rolls) quoted in full the Inquisition of Dikes and Sewers of 1367. The clerks of the Commission note that:

---

(53) Report of Jurie to C. Sewers 1367. op. cit. P.R.O. Bev;
(54) J. Sheppard op. cit. p. 180
(55) Dugdale op. cit. p.220.

> " Eskedike extended to the bank of the Hull, where stands a water mill with three clows. Through the middle clow the miller letteth in the water of the Hull in plenty, by which course the waters of Monkdike are greatly hindered, to the general loss of the village" (56)

There are few records of the number of mills in Holderness. Most of those for which records remain, are for mills in the Hull valley, and it is reasonable to suppose that wind rather than water was the motive power in any area where water flow-off was irregular.

The Domesday Survey notes only four mills in the Holderness clay lands, compared with eighteen in the Hull Valley (57) where the more regular water supply of the chalk springs could be utilised. The only mention of a mill within the main clayland area, in the Melsa Chronicle is a brief reference to a decaying mill at Dringho in North Holderness.(58) Early mediaeval inquisitions refer to several other mills within the claylands (at Withernsea, Ravenser, Keyingham, Burstwick, Hedon, and Easington)(59) but they almost invariably fail to clearly

---

(56) Poulson op. cit. Vol I p.118.
(57) V.C.H. Vol. II p. 117.
(58) C.M.M. Vol. II p. 49 (1235).
(59) Y.A.S.R.S. Vol. XII p. 79,100.

distinguish whether or not they were water mills. It is probable that the last four places mentioned above had water flowing on the ebb - tide. A similar water mill at Barmston is referred to in 1576.(60) It is also likely that these mills would impede outflow at these points and encourage silting.

The number of water mills in the Hull Valley in the Eighteenth century was the cause of some difficulty in organising land drainage. Leatham mentions that drainage was often impeded by mills,(61) and an anonymous series of observations on Hull drainage in 1736 draws attention to this problem and obligingly lists the mills in question:(62)

Townships with Mills	No. of Mills.
Foston	1
Wansford	1
Driffield	2
Skerne	1
Beswick	2
Scorborough	1
Beverley	2
Cottingham	2

(60) Constable Collection E.R.P.R.O. DD/CC/73.

(61) J.Leatham op.cit. p.20.

(62) "Observations on the draining of certain low grounds on the East side of the River Hull." H.C.R.L. 6181

(d) Early Inclosure of Bottomlands:

A feature of early land use which was to be of some importance in the evolution of the drainage pattern was the practice of inclosing areas of the bottomlands which had reverted from marsh to pasture land by the processes of inadvertant drainage. Although as Beresford points out[(63)] lowland areas were, in general, immune from widespread inclosure until the Eighteenth century,— certain small bottomland units were divided in this way. This was particularly the case in the lower silt-lands of the Hull Valley, which was one of the areas where salt water marshes were converted into pasture at an early date. The Melsa Chronicle refers to several such improvements;

> " The improved marsh as Wawne was divided amongst free tenants each tenant marking out in the said marsh, according to the quantity of his tenements" (64)

Several other references to "Daila" are continued in the Chronicle [(65)] but the most conclusive evidence of these early inclosures is found in the records of the Inclosure Commissioners lodged in the Registry of Deeds at Beverley.

---

(63) Beresford " The Lost Villages of England" p. 127.
(64) C.M.M. Vol. 1. p.38.
(65) Daila = "Deal" or " lot "

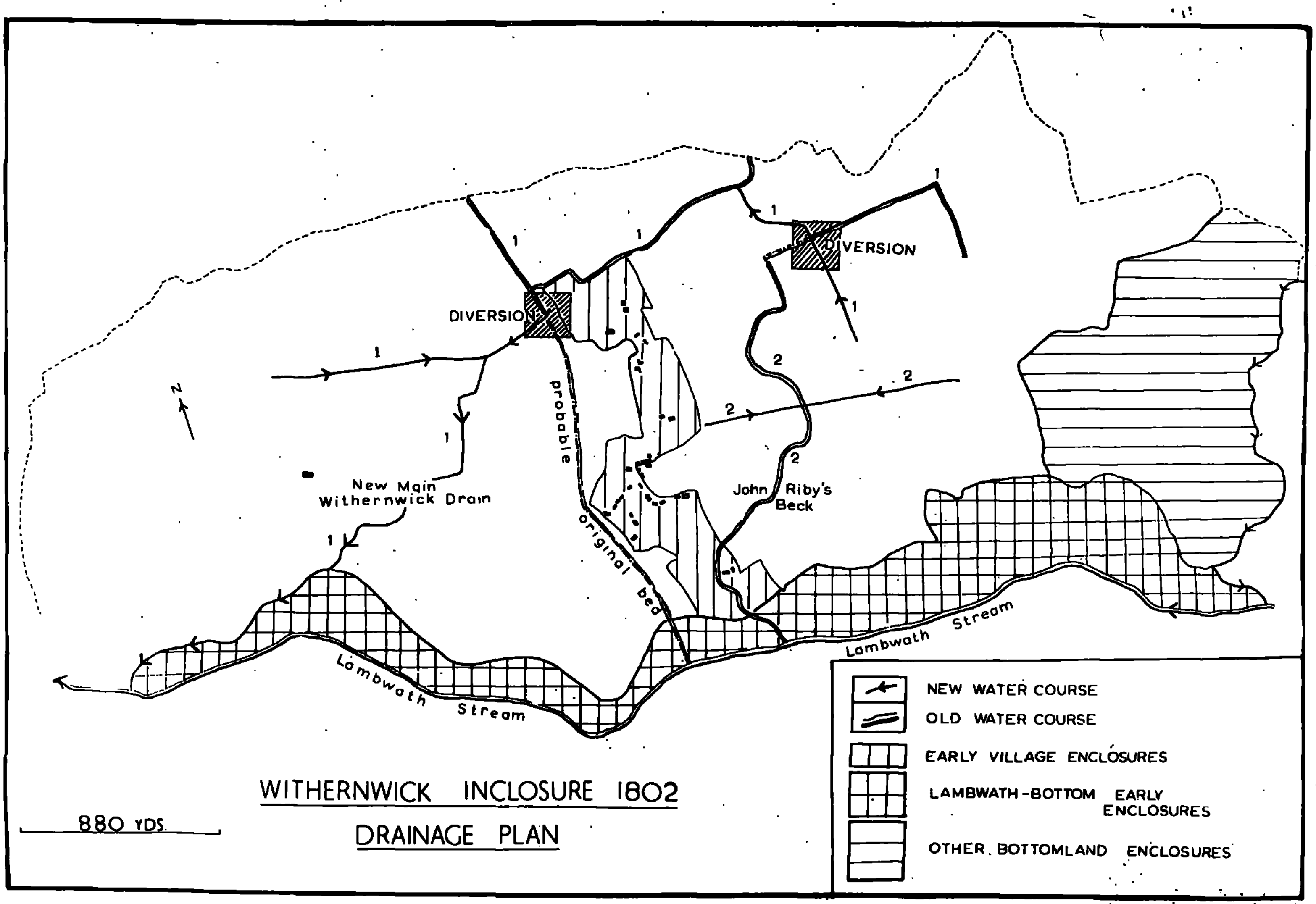

WITHERNWICK INCLOSURE 1802
DRAINAGE PLAN
880 YDS.
N
DIVERSION
DIVERSION
New Main
Withernwick Drain
probable original bed
John Riby's
Beck
Lambwath Stream
Lambwath Stream
1
2
NEW WATER COURSE
OLD WATER COURSE
EARLY VILLAGE ENCLOSURES
LAMBWATH-BOTTOM EARLY ENCLOSURES
OTHER BOTTOMLAND ENCLOSURES

FIG. 59

For many of the Eighteenth and Nineteenth century awards plans survive. On these plans it would seem to have been a general practice to mark in the areas of "ancient inclosures" and to shade them green. Most of these early inclosures are in areas of low ground which had previously been carr or marshland (fig 58, 59). The difficulties involved in avoiding these private lands when the Inclosure Commissioners attempted to organise new drainage channels were often considerable. They are best illustrated by references to the Award for Withernwick in Lambwath (Mid - Holderness). Considerable trouble, and three pages of the award(66) were devoted to ensuring that these old 'bottom-land' enclosures were not affected by new upland drains designed to take waters from the later inclosures. (fig 59). The new owners were instructed to maintain their drains carefully, and the owners of the ancient inclosures were allowed to inspect these at any time. Sluice gates were erected at the junction with Lambwath stream, and to prevent any risk of inundation, the bed of that channel was deepened. Although this example is an exceptional one, similar violations of the laws of 'natural' drainage were a feature of most awards, and seriously affect the efficiency of modern subsequent channels.

---

(66) R.D.B. - Withernwick Inclosure.

(iii) The Growth of Hull and other Ports and their Effect on Land Drainage.

In the Hull Valley the main task of developing an adequate drainage system was seriously hampered by the growth of Hull and the restrictions which the port placed upon suitable outfall for the new channels. The difficulties and controversies involved in this problem have been described earlier,(67) and the resultant compromises and half solutions are an obvious feature of the contemporary pattern of Hull valley drainage. (fig 35)

It was not only the city of Hull which caused difficulties in the planning of adequate drainage, many of the problems associated with the silting of outfalls in south Holderness during the Nineteenth century were complicated by the requirements of the small ports of this area, of which Hedon was the most important. In several cases drainage channels were diverted, or witheld in order to assist with the excavation, or preserve the fast silting 'havens' of these ports.

In 1862 Winestead Drainage Board negotiated with

---

(67) R.D.B. - C.Q. p.309 - 312.

Patrington to move their main outfall so as to dam back Winestead and Welwick water to allow the sluicing of Patrington Haven[68] This scheme was eventually abandoned because of the danger of removing by such drastic methods the newly reclaimed land at Sunk Island. It is indicative however, of the general influence of trading powers in these townships.

Water from as far east as Roos was diverted to scour Hedon Haven until 1723.[69]

---

(68) Winestead Drainage Board Minutes - (Crust, Todd & Mills, Beverley.)

(69) C.S.R. 4/144.

CHAPTER 17. LAND DRAINAGE AND THE REGIONAL SETTING. 1962.

The main aim of this dissertation has been to trace the influence of surface and sub-surface water upon the development of patterns in the human geography of Holderness. The attempt has been made to prove that this element is vital to the regional identity of this peninsula.

It has been suggested that this influence has taken place in two historical phases. The first period was one of adaptation to the environment. Here, the distribution of surface water was the chief controlling factor, and it was due to this that the mediaeval economy of Holderness was shown to consist of a subtle balance of natural resources. It reflected itself in the patterns of land-use, settlement, communications, and drainage. The second period was one of transformation - a process which was, apparently, almost total. This took place first by the removal of surface water by under-drainage. The patterns which emerged from this transformation were discernible in all aspects of the human geography of the region.

The second secton of this work was concerned with analysing these changes. In the case of agriculture and land drainage, the attempt was made to delimit more accurately,

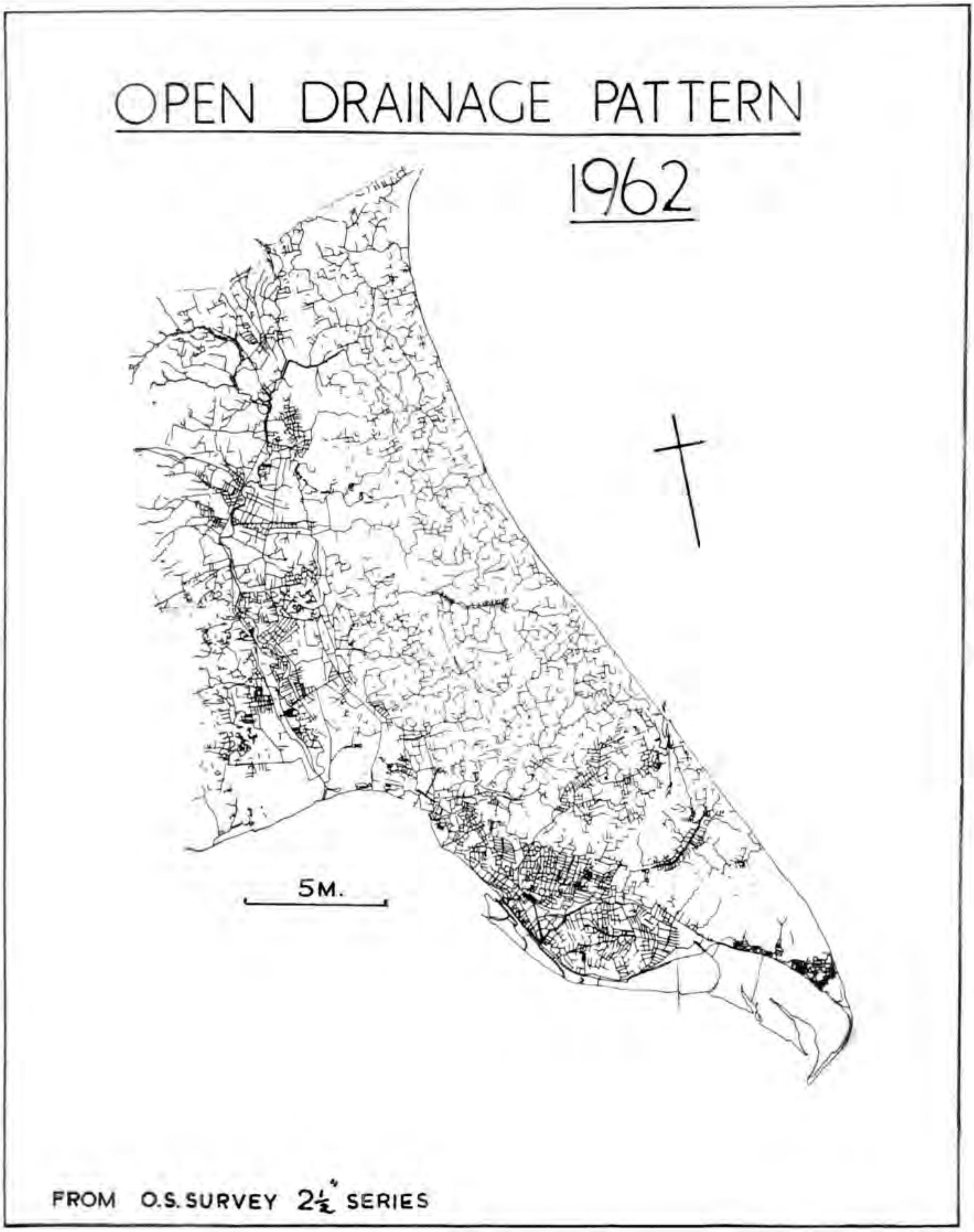


FIG. 60

the degree of emancipation from old controlling factors.

It was thought fitting that the last chapter of this work should provide a foil to this argument by assessing briefly the extent to which modern patterns of open drainage, settlement, and communications reveal the patterns of geographical inertia. How far is it possible to discern the influence of early evaluations in a landscape almost free from old controlling factors?.

The argument of this chapter depends on traces from the $2\frac{1}{2}$ inch Ordnance Survey sheet, which formed the basis of preliminary investigation for this dissertation.

(1) <u>The Holderness Open Drainage Pattern 1962</u>

A trace of all open drains shown on the $2\frac{1}{2}$ inch Ordnance Survey sheets of Holderness reveals the considerable complexity of the pattern (fig. 60) The areas of greatest drainage difficulty where the problems are still severe,(1) are the Hull Valley, and in the "bottomland" areas of South Holderness. In both areas the drainage pattern reveals not only the difficulties of draining away bottomland water, but also the problem of carrying Upland 'hummock' water through the same area.

---

(1) See Chap. 13.

AIKE BECK, BARMSTON DRAIN & THE RIVER HULL

FIG 61

In the Hull Valley the three main drainage channels are the river Hull itself, Beverley and Barmston Drain and Holderness Drain. Naturally, all these flow in predominantly north - south direction. The river Hull, by "law and custom" takes waters from the southern chalk dip-slope streams, relieving the pressure on overburdened artificial drains. This often causes elaborate junctions of three drainage streams on three levels, as in the case of Aike Beck, Barmston Drain and the River Hull (fig 61.) Similar cases are numerous in both areas.

These difficulties are to some extent natural, and will probably always be a feature of drainage organisation in these areas. The system still bears the marks, however, of previous evaluations and needs. It is, for example, clearly impractical to have ~~all~~ the waters from the west of the Hull Valley all converging at Cottingham Clough. This was due entirely to the urban growth of Hull, and the development of important road and rail links with the West Riding.

In South Holderness the system still owes much to deviations of natural flow lines, to clear silting harbours.

Elsewhere in the region the complications of pattern, though naturally less intensive and important, show clearly

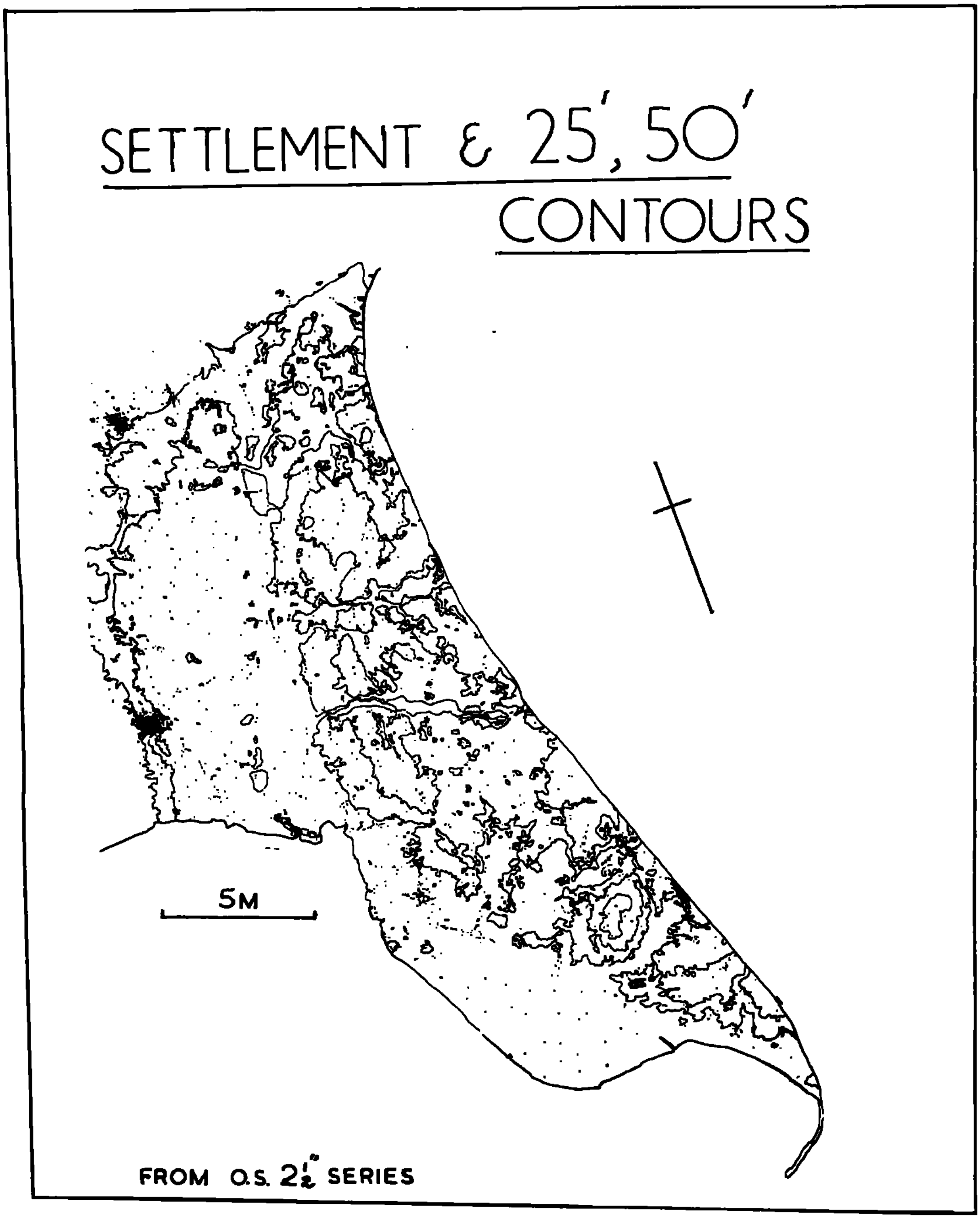


FIG 62

the influence of early inclosure deviations, boundary-marking ditches, navigation channels, and mill stream diversions. An examination of the Ordnance Survey Six Inch series, which marks flow-line arrows for all ditches, makes this quite apparent.(2)

Despite a growing measure of centralised authority, and more competent administration, the pattern is too well established to allow any wholesale reformation - even if this were shown to be practical and necessary.

(ii) Settlement and Land Drainage 1962.

Reference has been made earlier to the spread of the building in Holderness bottomlands between 1770 and 1829.(3) A trace of buildings and contour lines from the 2½ inch Survey sheets (fig 62) shows that the influence of higher land upon building and the growth of settlements - is no longer a feature of the contemporary pattern, only the nucleated settlements appear as vestigial remains of earlier controls. (figs 26, 28) Other factors; - the urban growth of Hull, the fertility of the soil, and proximity to main roads, have been superimposed to cause a distribution

---

(2) The boundary lines for most of the older parishes are frequently ditches.

(3) Chap. 14.

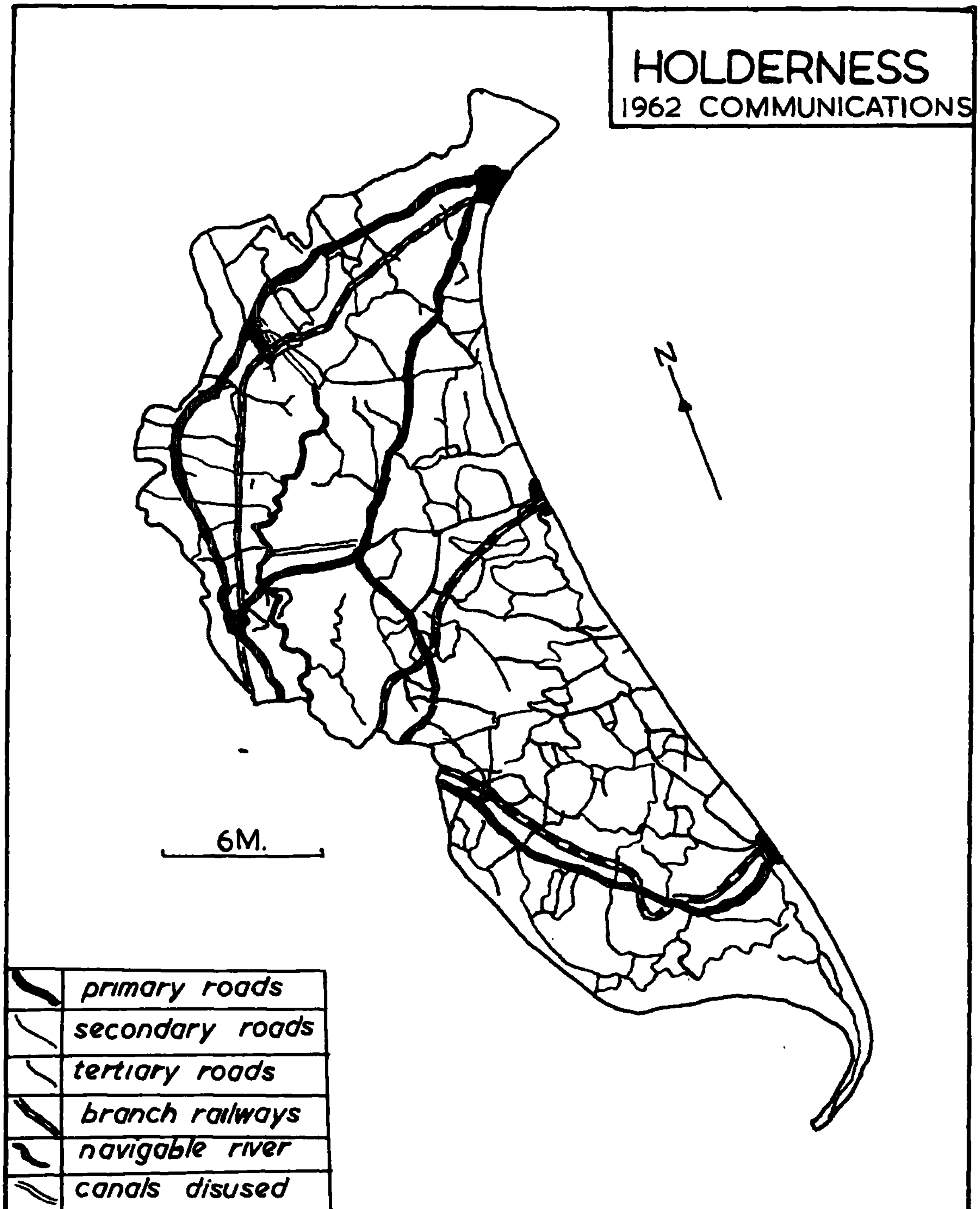

HOLDERNESS
1962 COMMUNICATIONS
N
6M.
primary roads
secondary roads
tertiary roads
branch railways
navigable river
canals disused

FIG 63

of buildings which blur the earlier patterns.

(iii) Communications in 1962.

The system of communications in Holderness shows little evidence of earlier controlling factors. (fig 63)

The system of railways evolved after the main work of land drainage had been completed, and is related directly to the growth of Hull and the coastal resorts of Holderness. The involved road network owes more to the inclosure commissioners than to natural factors. There were, however, few roads before the Inclosure Movement and it is worth noting that the straight roads which should have developed before this time were prevented from doing so by poor drainage. The only obvious relationship between poorly drained areas and communications is the avoidance of the Hull Valley flood plain. This is most apparent in the system of major roads, where a virtually total avoidance of the bottomland areas is clearly seen. The main road across the Hull Valley, from Beverley to Hornsea follows the line of the old Beverley Leven causeway (fig 30).

Conclusion.

It is hoped that this short chapter gives some further indication of the way in which the contemporary landscape still shows the scars of its evolution. In Holderness, the control of the landscape is almost complete, and little remains to indicate the dramatic nature of its transformation. It is hoped that this dissertation has given clear proof that surplus water has played the dominant part in directing this evolution.

REFERENCE BIBLIOGRAPHY.

Authors and works in order of first reference. For fuller details see footnotes.

Introduction.

Crow	" Landscape and Society "
K.H.Huggins	" Landscape and Landschaft "
Kurt Burger	" Der Landschaft Begriff "
R.Hartshorne	"The Nature of Geography "
G.H.Kimble	" Inadequacy of the Regional Concept "
G.W.Robinson	" The Geographical Regions Its Form and Function"
S.W.Woolridge and G.W.East,	" The Spirit and Purpose of Geography"
P.E.James	" Towards a Further Understanding of the Regional Concept"
R.S.Platt	" A Review of Regional Geography "
Hartshorne	" Perspective on the Nature of Geography "

Chapter 1.

Valentin	" Young Morainic Topography of Holderness "
Kendall	" Glacial History of Holderness "
T.Sheppard	" The Making of East Yorkshire "
Palmer	" Holderness in the Making "
J.Sheppard	" Drainage of the Yorks Marshland "
J.Sheppard	" Mediaeval Meres of Holderness "
T,Sheppard	" Lost Towns of the Yorkshire Coast "
Wright	" The Quaternary Ice Age "
Camden	" Brittannica "
T.Blashill	" History of Sutton/Hull "
Sheahan and Whelan	" History and Topography of the City and County of York "

Chapter 2.

Lythe	" Drainage and Reclamation in Holderness "
Dugdale	" History of Embankyng and Drayning "
Poulson	"History of the Seignory of Holderness "
A.E.Bond	" Chronica Monasterii de Melsa " in the series "Return Brittanicum Medii Aevi Scriptors" Vols. I. II. III.
C.T.Flower	" Public Works Mediaeval Law "

J.Sheppard " Drainage of the Hull Valley "
J. Grundy " Report to C. of S.R."
W.Brown " Report to Commissioners on the Silting of Keyingham Haven"

Chapter 3.

Maxwell "Yorks Section " Domesday Geog. of N.England "
A.E.Earle " Essays on History of Meaux Abbey "

Chapter 7.

J.A.Clarke " Prize Essay on Trunk Draining "

Chapter 8.

O.Wolkinson " Agriculture Revolution in the East Riding "

Chapter 9.

I.Nicholson " Land Drainage "
Barley " Yorkshire - By - Laws "
Blith. " English Improver "
Vancouver's " Survey of Essex "
Ernle " English Farming Past and Present "
I.Leatham " Agriculture in East Riding of Yorkshire "
S.Best " Prize Report of Farming in East Riding "
Wright " Improvements in the Farming of Yorkshire "

Chapter 10.

J.Mc Bean " The Soil "
J.A.Watson and J.Moore " Agriculture "

Chapter 11.

A.Young " Tour of North England " Vol. II
Strickland " A general view Agriculture in the East Riding of Yorkshire "

Chapter 12. -

Chapter 13 -

Chapter 14 -

Chapter 15.

C.E.P.Brooks " Climate Through The Ages "
J.Schove " Solar Variation and Related Geographical Phenomena "

Symons and Hennig "Cycles in British Climate
Godwin " Post Glacial Changes in Land and Sea Level "
Swinnerton " " " Deposits of the Lincolnshire Coast"
Glasspole " Changes in the Amount of Rainfall 1740 - 1915 "
J.Boyle " Lost Towns of the Humber "
A.H.Richardson " English History Review XXXIV
J.A.Clarke " Essay on Trunk Drainage "

Chapter 16.

Shelford " Outfall of the River Humber "
J.Butterfield " The Naturalist "1904
T.Sheppard " Lost Towns of the Yorkshire Coast "
J.Oldham " Journal of the British Association 1853 "
H.F.Parsons " The Alluvial Strata of the Lower Ouse Valley"
W.H.Wheeler " The Sea Coast "
J.R.Boyle " Erosion of the Holderness Coast "
I.Cole " Erosion of the Yorkshire Coast "
T.Sheppard " Origin of the Humber Muds "

GENERAL BIBLIOGRAPHY.

Sources not referred to in footnotes.

"Assarting and the growth of Open Fields "

W.Brown "The 1297 Lay Subsidy " Y.A.S R.S. XVI (1894)

Cobbett " Rural Rides " Vol.2 (1830)

H.C.Dalton " Lake Humber as interpreted by the Glaciation of England and Wales" N.W.Naturalist 1941

H.E. and M. Goodwin " British Meglemose Harpoon Sites " Antiquity (1933

Lythe " Organisation of Drainage and Embankment in Mediaeval Holderness Y.A.J.(1939

H.Macmahon " Beginnings of the East Yorkshire Railways" E.Y.Local History Soc.(1935)

T.Spink " Lake Dwellings in Lake Pickering" Y.G. & Poly Soc. Vol XIII (1895)

" British Museum - Lansdowne 894.

" British Rainfall - 1870 - 1923.

Ferrer and Clay " Early Yorkshire Charters "(1920)

"Beverley Corporation Minute Books Y.A.S.R.S Vol LI and CXXII

"Ditches Dykes and Deep Drainage " - Young Farmers Club Booklet.

Prothero " English Farming Past and Present."

L.U.S.Report " Farming in the East Riding"

Churley " 1801 Crop Returns " Yorkshire Bulletin of Economic and Social Research Vol. 5

Andrews " Some Statistical Maps of Defoes England " Geog. Studies No.3.

" Field Names" Amateur Historian Vol. 2. No.12.

Mc.Gregor Finance of Land Drainage " Bedford College Thesis.

" A Holderness Charter of William Count of Aumerle " Y.A.J CLIV.

Fuller "Development of Drainage, Settlement, and Agriculture in South East Lincs" E.Midl.Geog No 7

Allan Straw " The Ancholme Levels - A History of Drainage and Effects on Land Utilis " E.Mid. Geog.No3.

H.Darby " Mediiaeval Fenland " (1940)

" " The Domesday Geography of East England " (1957).

A.Raistrick " Bronze Age Settlement in Northern England " Arch; Aeliana 4th ser. Vol.III

T.A.M.Bishop " Norman Settlement of Yorkshire " (1924)
J.Bygott "East England " (1923)
Holinshed " Chronicles of England, Scotland, and Ireland" (1577)
Semple " Influences of the Geographical Environment"
W.McLean Honan " The Marshlands Between Hythe and Pett " Sussex Arch. (1938)
" Inning and Winning of the Eomney Marshes " Agric. Vol. LXI
R.Knox " East Yorkshire " (1855)
H.Allen " History of the County of York" (1832)
Best " Farming Book - A Rural Economy of Yorkshire" Surtees Soc, (1857)
A.Harris " Open Fields of East Yorkshire " E.Y.L.H.S Series 9.
Barley " Byelaws of the East Riding Y.A.S. XXXV (1943)
M.Drayton " Poly Albion " (1613)
Fordham " Roads Books and Itineries of Great Britain 1570 - 1850.
Miller "Winestead and its Lords " (Booklet)
G.T.Asquith " The Burton Pidsea Story " (1953)
Maddison. " Hornsea A Corner of East Yorkshire " (London Univ, Thesis)
J.Miles and J.Richardson " A History of Withernsea (1881)

William Jessop - Report on the Drainage of the Low Grounds on the Wolds or West side of the River Hull, Frodingham Carrs, Lisset and Elsewhere in Holderness. Hull. 1796.

William Jessop, John Rennie the Elder, and W.Chapman; Report to the Commissioners of Sewers for Beverley and Barmston Drainage. Hull. 1804.

Catalogues of Collections ;
(a) Walter Perkins Agricultural Library, Southampton University 1961 (b) Royal Agricultural Society's Library 1918; (c) Rothamsted Experimental Station, 1926, 1940, 1949. (d) Patent Office Library; Subject List of Works on Agriculture etc; 1905.

Royal Commission on Coast Erosion;
Third and Final Report, 1911 pp. 46, 47, 109 - 109.
Chairman of the Commissioners; Viscount Wimborne
Coast Protection in Holderness; East Riding
Commission of Sewers.

Commissioners for Wood, Forests and Land Revenues
Sunk Island in 15th Report, 1838, 28th Report,
1851; and 29th Report, 1852.

S.G.E.Lythe Court of Sewers for the East Parts of the East
Riding; Organisation of Drainage in Mediaeval
Holderness. Yorks Archaeol. Journal. Vol 34. 1938- 39.

Beverley and Barmston Drainage Act. 1798.
Act for Draining ....Low Grounds....Beverley....
all in the East Riding of Yorkshire.(38 Geo. III
cap. 63)

John Chamberlayne Account of the Sunk Island some years since
recovered from the sea. Phil. Trans, Royal Society
London 1719. Vol. 30.

A P P E N D I X

I

a) i. Mediaeval Meres in Holderness
ii. Place and feature names on the $2\frac{1}{2}''$ O.S. Map suggesting ill-drained land (for 9 sample parishes)

b) i. Townships Mentioned in the Commission of Sewers Inquisition of 1342.
ii. Ditch Size Stipulations from; Commission of Sewers 1367, 1709 - 1836.

c) The Proportion of Plough Teams to Ploughlands in Domesday Holderness.

d) The Lands of Meaux Abbey

e) The Lay Subsidy Returns for 1297.

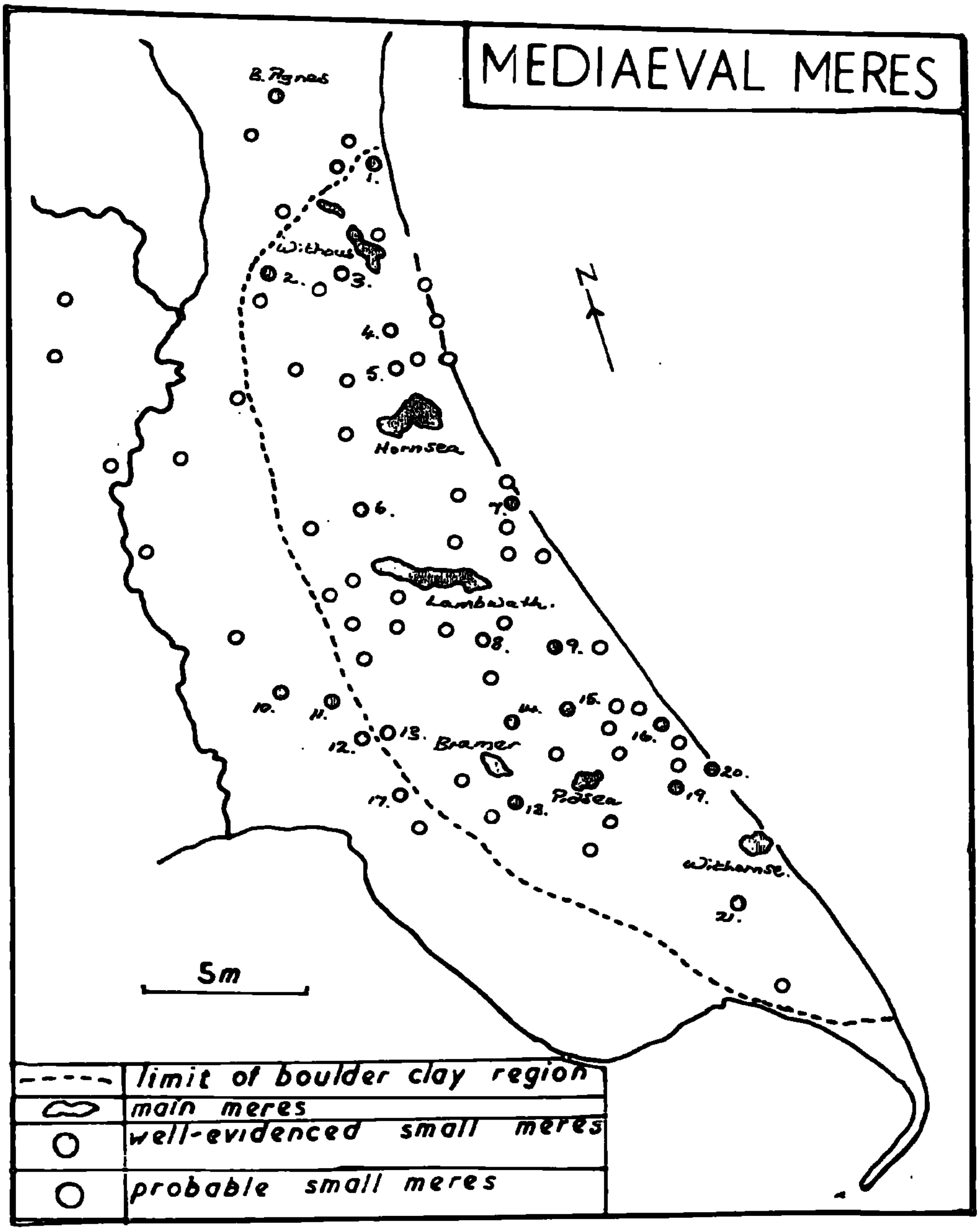
f) Cultural Origin of Village Place Names.

g) Commission of Sewers - Number of Sessions - 1682 - 1790.

h) Record of Inclosure Awards, Bye Law Books and Maps - (40 Holderness Parishes)

i) i. Holderness Drainage Taxation 1761 - 3.
ii. Winestead Drainage - Taxation Assessment 1811.

j) The Costs of Tile Underdraining Heavy Clay Lowland 1850.



KEY OVERLEAF.

a) i. MEDIAEVAL MERES IN HOLDERNESS.

1. Barmston
2. Braemere
3. Dunnington Mere
4. Averill Mere
5. Howsike.
6. Hatfield - West Marr & Red Marr.
7. Eelmere
8. Turmere
9 Bailmere
10 Swinemere
11 Willow Rowe Mere
12 Bilton Mere
13 Wyton Mere
14 Mainbermar
15 Bowmarr
16 Gilderson Marr
17 Reedmarr
18 Ridgemont Marr
19 Ingkpol
20 Sandle Marr
21 Bowmere.

a) (ii) Place and feature names derived from the ill drained nature of the land.

1 Ulrome:	Croftings
	Carrs
2. Skipsea;	North carrs
	Skipsea
	The feetings
	Brough carr
	Brough carr hill
	Four holes
3. Beeford;	Red carr
	East and West red carr
	Hoe carr
	Braemarr
	Sedge mire
4. Foston;	Brigham ings
	Fish holm
	Brigham carr
	Ban carr
	Turf carr
	Carr hill
	Carr house
5. Frodingham;	Turf carr
	Jarret ings
	North Frodingham ings
	Carr house
6. Bewholme;	The carrs
	Crake dikes
	The mask
7. Atwick;	Atwick mask
8. Hornsea	Mere
	Redecarr
	Foss deene
9. Seaton	Catfoss
	Braemers
	Money marrs
	Croftings
	Wasdike

b) (i.) Townships mentioned in 1342.

Patrington

Frismerske
Tharlesthorpe
Ottringham
Winestead
Frodingham
Rimswell
Owthorne
Withernsea
Redmeyer (Redmere)
Holymm
Rise
Holmpton
Thorpe (Patrington Thorpe)
Wellweaye
Pennisthorpe
and "North of Lambwath Bridge"
(an indeterminte area)

b) (ii) DITCH SIZE STIPULATIONS FROM THE COMMISSION OF SEWERS RECORDS FOR 1367.

(The first recorded work of the Commission)
from C.S.R./1/1 E.R.P.R.O.

Unsatisfactory Ditches	Recommended Size (in feet) Breadth	Depth
Routh - Tickton - Eske	8	4
Menpit	8	4
Eske (Oxmerdike)	8	4
Leven - Eske	12	8
Barmston & Outram	8	4
Wincton & Barmston (Graines)	20	8
Leven & Haholme to Fereumgende	12	5
Fereumgende - Hull	12	5
Brandesburton - Haholme	18	4
Frodingham		
Whitecross- Leven Bridge & Routh		
Beeford (Helland)		
Lessit & Auram	12	8
Lisset & Dringhoe	10	5
Dringhow & Auram	8	4
Attick & Bewholme		
Cleton - E.& W.Hatfield	4	3
Rise - W.Hatfield - Sigglesthorne	6	4
N.Colden - Hornsea Mere(Mappleton)		
Hornsea Burton - Suthorpe	6	4
Easington -(Waterdike)Frithomflete	10	4

cont;)

Unsatisfactoryy Ditches	Recommended Size (in feet)	
	Breadth	Depth
Frithomflete -(Kilnsea)	12	4
Witholme - Couland	8	4
Hollym-Smalkedike & Outpitts,. Sewer		
Winestead		
Ottringham - Summergangs deke- Meaux		
Thorngumbold & Humber		
Newton.		
Waskholme - Newton (Palland Herne)too		
Ottringham - Southland Herne Carnfleet	5	5
Winestead fleet(Burtall - Humberside foss)	5	
Tunstall - Hilston-Oustwick-Burton Pidsea Danthorpe	8	3
Grimston - Monkdike	5	4
Fixling - Danthorpe	7	4
Danthorpe (Burton Foss)		
Burton Foss- Elstronwick	9	$3\frac{1}{2}$
Elstronwick - Bandwath	9	$3\frac{1}{2}$
Garton - Grimston		
Newton - Aldbonough		
Flytling - Flinton	5	2
Aldborough-Flytonfoss + 2 sewers		

cont:

Unsatisfactory Ditches	Recommended Size (in feet) Breadth	Depth
Ederwike - Aldborough		
2 to Humbleton from Flynton	9	4
Humbleton to Danthorpe		
Flytling - Humbleton Morskdike		
Sandwath - Rugemunde Marr	16	6
Rudgemund - Bondsburstwick	18	6
Headon Fleet-Parraknoke-Bondburstwick		
Ryhill - Burstwick Manor		
Ryhill - Thorngumbold-Stockholme land (nr Hedon Fleet)	20	10
Hedon Fleet	30	12
Waxholme- Rimswell	4	3
Keyingham Fleet Tundtsall-Humber	6	3
Halear - Halsham- Burton Carr-Burton Pidsea		
Burstwick Carr(St Sepulchre Headon)		
Keyingham Fleet(Tundtall Humber)		
Flinton - Moortofts - Humbleton	6	3
Lelley (Twierdike)		
Sproatley(Milncroft dike & Nuthill)		
Fossbridge Wath - Preston		
Preston-Wineton Marr-Wineton Bridge -Bilton Marr- Mardike	10	3
Swinmarr - Humber(Ganstead)		
Bilton Merske - Bilton Bridge & Sutton		

cont;

Unsatisfactory Ditches	Recommended Size (in Feet)	
	Breadth	Depth
Bilton Brdige - Preston-Marfleet & Preston Merske	12	5
Thirtleby - Sproatley		
Preston (Haymerske) Netemerske)		
Thirtleby & Winteton (Nr Preston)		
Monkdike	15	5
Fairholme-Newland-Mordike(Wawne & Swine) Sutton & Bunsholme		
Flinton Carrs - Burton Park	8	4
Burton - Newton Lambwath	8	4
Burton Pidsea- Keyingham Fleet		
England Sand - Potter Fleet Bridge		
England to Sandwath	10	4
England to Hollym Carr		
Hollym - Frodingham		
Ellshome - Kirkholme		
Carlehome - Winstead Brdige	18	8
Burton Bridge - Westwood (Riston Sewer)		

b) (ii) DITCH SIZES FROM THE

BOOK OF PAINES OF THE COMMISSION OF SEWERS

1709 - 1836. from

C.S.R./38/2½ E.R.P.R.O.

N.B. This book may not have been entered properly between 1820 - 1830.

Barmston - Earl's Dike - 8' x 4'				
Silkvin Nook to Fisher Bridge	8'	x	5'	at bottom
Alisholme Book sewer	8'	x	5'	"
Bewholme - Water Lane-Stean Gutter	4'6" x		3' deep	
Hornsea Marr to Arram Dyke				
Arram Mask Nook	5'	x	3'	
Atwick Lane Bridge - Mask Dyke	6'	x	4'	"
Mask Nook- Skipsea Causeway	8'	x	5'	"
Brough Leach Garth-Boardenn Bridge	3'	x	2'	"
Brough "Causeway" to Holmes Nook	15'	x	10'	"
Skipsea Sowmarr - Balemarr	5'	x	3'	"
Holmes Nook -Frodingham Bridge	25'	x	15'	"
Donnington - Dringho- Cow Grainge	8'	x	6'	"
Beeford - Grange-Hungerhillwath- Eastwbridge - Roughamnooke	7'	x	5'	"
Frodingham - Arcas Carr to Bitmarr Nook	4'	x	2'	"
" Fleetland - Inghams Nook - Bitmarry Nook	5'	x	3'	"
" West Bridge - Bitwarry	8'	x	5'	"
Lisset - Gransmoor Intack - Old How	12'	x	9'	"
Frodingham - Emmortland - River Hull	30'			
River - Emmotland - Weel	60'			
Micklow Dike	8'	x	4'	"
Hempholme - River Bank	10	x	5'	"
Kirk Carr Dike				
Frodingham New Ings - Ox Pasture - Emmotland Gate	,8'	x	4'	"
Bank End - Bow Bridge	8'	x	4'	"
Bottom Dike	5'	x	3'	"
Dion Sewer - Holmes Bridges	9'			
Goodhill Clow				
New Ing Dike	8'	x	5'	

cont:

Hempholme Bridge - Micklow Gate 12' x 9' at bottom
Hull Water - Park Noak 9' x 5' "
Brandesburton - Hallerholme - Park & Whiteholme
to Fryer Tongue 15' x 12' "
Brudel Lane - Monkdike 9' x 5' "
Withernwick Nook Sewer - East Ouston 12' x 9' "
Tickton Dales - Bridge 14' x 10' "
Weel Clow 16' x 12' "
Seaton, Sigglesthorne, Catfoss, Catwick,
Brandsburton, Hayholme and Leven 8' x 6' "
to Rosper lane Gate 10' x 8' "
to Monkdike Hatfield Town End Main Dike -
Foss Dike be made 6' & 3' "
Hatfield, Sigglesthorne, Catwick Leven,
Catcher Close-Birmsmoor-New Close- Rise Lees 8' x 4' "
Monkdike 11' x 9' "
Hornsea - Marr dike - Seaside 10 x 8' "
Newbegin Lane - Hallgarth Sugmire 7' x 5'
Rolston - Hornsea mere 7' x 5' "
Lambwath Stream 12' x 5' "
Cowden Hill -Whartell Gate - Lambwath
Stream (Bewick) 6' x 4' deep
Haisholme Sewer 7' x 4' to bottom
Hull Bank - Frodingham, Highbridge
Mappleton to Rolston 5' x 3' "
Dringhoe - Aher Dike 4 x 4' "
Fowsendale Gutter 4' x 4' "
Rolston Seats, Nr Goxhill - NE Weatherhill 4' x 4' "
Hornsea Burton Drain 6' x 4' "
Gransmoor & Lisset - Barmston 8' x 6' "
x 3' deep
and to Barf Beck 8' x 4' 6" at bot;
N.Frodingham Hill Carr Clow, Church Gutter 8' x 6' "
5' deep.

Nunkeeling Lane Sewer- Brandsburton -
Catfoss closes across Catwick Brandesburton
Rd 3' x 4'
(Stipulating names of tenants 3 x 2'
for the first time) 7' x 4'

cont;

Starr Carr Lane Sewer	6' x 4' at bottom
Skipsea Bail Ditch	2' x $2\frac{1}{2}$'' "
Donnington Spring Close Gate Sewer - Band Bridge in Beeford - Nunkeeling	5'
Bewholme Candler Garth Sewer	5' x 3' deep & 2' at bottom
Ulrome Sewer- Arnold Ditch (Barmston)	4' x 3'
Mappleton Brookhill Sewer	7' x 4'
Hatfield Ellshaws Sewer (Gt;Driffield) Mappleton, Withernwick East	7' x 4' " x 4'deep
Goxhill Sewer - Rolston Westfield	8' x 4' " x 4'deep
Beeford - Hungerhill nook - West Carr Bridge - Ingholmes	12 x 7' " x 6' "
Dringhoe Bonwick Dunnington Bowbotts - Skipsea Carr	5' x 2' "
Gt Cowden - N.S Carrs	4' x 2' "
Skipsea-Skirlington - Atwick North	12' x 6' "
Mask - Skirlington, Skipsea Causeway	12' x 6' "
Cowden - Mappleton the sea	$2\frac{1}{2}$' x $2\frac{1}{2}$' "
Fleet Lane End Beeford - Bramer Brdge	4'
the Drain, Beverley & Barmston	5' x 2'
Rolston(Angeaves - S of Rolston Rd)	
B'burton - SW corner of B.B.moor a sufficient width and depth.....	
B'burton SE corner of moor -S.W.corner od moor as above	
Arham Gate - Crossing road from Hornsea -Bewholme	5' x 3' "

c) THE PROPORTION OF PLOUGH TEAMS TO PLOUGH LANDS IN DOMESDAY HOLDERNESS. (V.C.H. Vol; (ii) p.195)

Township	Plough teams	Plough lands i.e.(Carucates)
Burton Manor	14	25 waste
Bridlington	2	4
Little Kelk	2	1
Lowthorpe	1	1½
Patrington, Winestead, Halsham, Welwick, Tharlesthorpe	35	35
Swine	8	10
Aike	½	6 Bovates
Lockington	2/5	2½/9½
Molescroft	2	3
Gt Kelk (Gembing Region)	7	13
Lowthorpe, Ruston Parva, Haisthorpe	7	12½
Wawne	1	2½
Weel	1	2
Tickton	½	12 Bovates
Eske	1	2
Welwick & Weeton	6	2¼
Ottringham		6
Bilton	2	3
Burton Constable	5	5

cont;

Township	Plough teams	Plough lands i.e.(Carucates)
West Newton	2	3
Danthorpe	1	1
Withernwick	1	1
Routh	2	$\frac{3}{4}$
Sutton	1	$\frac{1}{2}$
Southcoates	waste	
Cowden	3	9
Rise	waste	
Sigglesthorne	5	8
Catwick	1	1
Brandesburton	1	1
Leven	4	6
Kirkella	2	4
Watton	7	13
Beswick	2	3
Leconfield	1 3	$\frac{1}{2}$ 3
Hutton Cranswick	4	8
Fraisthorpe	$\frac{1}{2}$	1
Thearne	2	3
Hessle	$\frac{1}{2}$	$\frac{1}{2}$
Foston	3	5
Nafferton	15	23
Burstwick	6	4

cont;

Township	Plough teams	Plough lands i.e.(Carucates)
Paull Skekling Newton Nuttles	6	4
Skekling, Paulholme Camerton Lelley Thorngum; Sproatley Preston	20	20
Kilnsea	12	13½
Tunstall Roos Owstwick, Elstronwick Ringborough, Humbleton Flinton, Winestead	32	29
Hilston & Owstwick	7 waste	7
Withornsea	16	18½
B.Pidsea, Danthorpe, fitling Sproatley, Grimston, Waxholme Tunstall, Owthorne, Hollym, Redmere.	25	32
Mappleton	13	13
Rowlston, Goxhill, Colden, Withornwick	15	16
Thirtleby, Wyton, Marfleet Consiton, Rotth, Hatfield Goxhill	22	26
Hornsea	27	27
Hornsea, Bursan, Southorpe Riston, W.Skirlaugh, Skirlington	12	11½
Bleeton	28	28
Dringho Upton	5½	5½
Easington	15	15

cont;

Township	Plough teams	Plough lands i.e.(Carucates)
Garton Ringborough	8	8
Dimlington	5	5
Aldborough	10	9
Newton Skirlaugh Tatele	3	$2\frac{1}{4}$
Wawne		
Melsa		
Benninghome		
Rowton		
Skirlaugh		
Dowthorne		
Marton	40	41
Fosham		
Bewick		
E.Newton		
Ringborough		
Waxholme		
Totle		
Ottringham		
Keyingham	8	8
Ottringham	4	4
Halsham	1	$\frac{1}{4}$
Owthorne	5	5
Rimswell	5	5
Waxholme	2	2
Redmire	$4\frac{1}{2}$	$6\frac{1}{2}$
Rise	6	$5\frac{1}{2}$
Wassand	2	2
Little Hatfield	3	3
Withernwick	1	1
Langthorpe	1	1
Gt.Hatfield	2	2

cont;

Township	Plough teams	Plough lands i.e.(Carucates)
Ellerby	4	4
Ouborough (Allenburg)	2	2
Ganstead	4	4
Sutton	3	3
Bilton	1	1
Preston	10	10
Southcotes & Drypool	2	$\frac{3}{4}$ 13 Bovates
Carlton	2	2
Marton(Swine)	1	1
Sproatley	4	$4\frac{7}{8}$
Roos	4	$3\frac{1}{4}$
Withsthorpe	1	2
Cottingham	8	16
Holmpton	8	8
Out Newton	5	5
Riston	2	2
Easington	3	3
Lissett	3	3
Beeford	12	$12\frac{1}{2}$
Dunnington Winkton Nunkeeling	13	13
N.Frodingham	12	12
Barmston	8	8

cont.;

Township	Plough teams	Plough lands i.e.(Carucates)
Ulrome	2	2 ½
N.Keeling	4	4
Bewholme	5	5
Arram	1	1
Brandesburton	12½	12½
Seaton	6	6½
Catfoss	6	6
Catwick	6	5
Long Riston	4	4

d) T.HE. LANDS OF MEAUX ABBEY (from the Egerton Manuscript M.S. 1141 and Phillips Manuscript M.S.6478-Lib.B.M)

(1) Routh,. Hotana et Eggetona woods
(2) Salthagh
(3) Free Passage through Paull
(4) Tenement in Hedon
(5) Passage in R.Hull
(6) Land in Sutton and Ganstead
(7) Heyholme grange
(8) Molendine N.of Hull and in Cottingham
(9) Granges @ * Blaunchemarle and Eketona aliis tenementis in Watria, Daltona Harlesthorpia.
(10) Grange in Belagh * ; Warroma
(11) Whitby Strand, (terris datis).
(12) Eskedyke
(13) Dodyngtona (tenem) Mora (gran)
(14) Beforth, (terris et tenem)
(15) Brantingham et Burgo " ")
(16) Nessyngwike (")
(17) Myton and Wyke (ten;et terr)
(18) Tharlesthorpe (gr.) Owthorne (gr)
(19) Thorpeia
(20) Arnallia,grange Erghoma et Dringhouse(terr et ten;)
(21) Alvele (Pastura)
(22) Passagio - Hesella
(23) Eboraco, Beverlaco; Molescroft (ten;et terr)
(24) Wandesforth, Oktana, Elvinygtona, Wiggethorpia.
(25) Stokholmo; Keyingham, Orwythfleete (terris)
(26) Rystona (terris)
(27) Westheitfeld, Estheilfeld Setona
(28) Gousle, Erghoma (Seton) Hertburne Wathsand (ter)
(29) Boltona (et) North Daltona) (ter)
(30) Skyrena,(ter) Etona (ten)
(31) Knottyngde Woggethorpia
(32) Benynghlmo. Ryhyllekerre
(33) Grymstona, Hildolnestona, Owtwyk, Prestona,Halsam, Frysmerske, Owthorne, Dymlingtona
(34) Rowth (terr; gran;)
(35) Coldona,

cont;

(36) Walkingtona
(37) Frysmerske
(38) Walthsam, Newtona
(39) Mydeltona Boveltona * Gravallia, Lyntona (reditte)
(40) Staxton, Colloma * Newbigyng
(41) Redmarra; Withornwyk, Bewyk
(42) Hornse Burtona,
(43) Braythyte, Mideltona
(44) Hogate
(45) Ottringham
(46) Tunstall
(47) Holmtona
(48) Ald Revenserre, et Odd
(49) Ryse
(50) Birdsall
(51) Wharroma
(52) Wood at Bymanskwyh
(53) Beeford
(54) Kylloma
(55) Cravenna
(56) Inklmore
(57) Wyke, Owthorne, Tunstall, Roos
(58) Grymesby
(59) Clee(thorpes) Waltham Brygesle.
(60) Croo (Grange)
(61) Raventhorpia, Lockyngtona, Nessyngwyk, Molendinis(Byrdsallia)

e) 1297 LAY SUBSIDY RETURNS (from Y.A.S.R.S. Vol,)

FOR CERTAIN PARISHES IN HOLDERNESS (The tax was for raising war money - consisting of of the total value of parish goods.)

Waghen	-	14men	taxed	=	22s	1d.
E.& W.Halsham		14 "	"	=	24s	6d
Holmpton	-	7 "	"	=	13s	5d
Eske	-	3 "	"	=	8s	4d
Skeffling	-	3 "	"	=	3s	7d
Roos	-	5 "	"	=	9s	1d
Arnold	-	4 "	"	=	4s	6d
Swine	-	8 "	"	=	10s	3d
Rimswell	-	6 "	"	=	9s	10d
Burton Pidsea		11 "	"	=	18s	4d
Preston	-	19 "	"	=	39s	6d
Tunstall	-	7 "	"	=	12s	1d
Hedon	-	45 "	"	=£4	1s	4d
Humbleton	-	4 "	"	=	10s	6d
North Froding'm		15 "	"	=	21s	8d
Ottringham	-	15 "	"	=	44s	5d
Keyingham	-	10 "	"	=	13s	10d
Thorn'g'bold	-	4 "	"	=	6s	1d
Elstronwick	-	8 "	"	=	13s	6d
Rise	-	3 "	"	=	4s	3d
Garton	-	8 "	"	=	11s	9d
Winestead	-	8 "	"	=	13s	6d
Sproatley	-	5 "	"	=	7s	8d
Brandesburton	-	6 "	"	=	8s	11d
Atwick	-	10 "	"	=	19s	4d
Catwick	-	4 "	"	=	6s	7d
Coniston	-	3 "	"	=	3s	11d
Lisset & Beeford		19 "	"	=	28s	11d
Patrington	-	38 "	"	=	77s	4d
Ellerby	-	3 "	"	=	3s	1d
Seaton	-	2 "	"	=	2s	2d
Long Riston	-	2 "	"	=	2s	9d
Kelk	-	2 "	"	=	2s	4d
Burstwick	-	4 "	"	=	8s	3d
Foston	-	5 "	"	=	7s	11d
Woodmansey	-	4 "	"	=	7s	5d
Thearne	-	10 "	"	=	20s	4d
Sigglesthorne	-	8 "	"	=	16s	10d.

f) THE CULTURAL ORIGIN OF VILLAGE PLACE NAMES

(from E.P.N. Soc; Yorkshire Vols.)

Place Name.	Cultural Origin.
Carnaby	D.
Burton Agnes	A.S.
Haisthorpe	A.S. Late
Harpham	A.S. "
Lowthorpe	D.
Nafferton	A.S. "
Barmston	D.
Fraisthorpe	D
Gransmoor	D
Kelk	A.S.
Lisset	Celtic
Gembling	A.S.
Ulrome	D
Wansford	D
Skerne	D
Foston	D
Skipsea	D
Beeford	D
Brigham	A.S.Late
North Frodingham	A.S.
Hutton Cranswick	D
Watton	A.S.Late
Bewholme	D
Atwick	A.S.
Beswick	Celtic + A.S
Brandesburton	A.S.Late
Sigglesthorne	D.
Leven	A.S.
Catwick	A.S.
Scorborough	D
Rolston	D.
Leconfield	A.S. Late
Mappleton	A.S.Late
Tickton	"
Routh	D
Weel	A.S.
Long Riston	D
Winestead	A.S.
Ottringham	A.S.
Welwick	A.S.
Easington	A.S.

Place Name	Cultural Origin.
Rise	D
Hatfield	D
Cowden	D
Arnold	D
Withernwick	A.S.
Aldborough	A.S.Late
Woodmansey	?
Marton	A.S.late
South Skirlaugh	A.S.
West Newton	A.S. "
Ellerby	D
Wawne	A.S.
Thearne	A.S
Dunswell	A.S.
Swine	A.S
Coniston	A.S
Flinton	A.S
Barton	D
Sproatley	A.S.
Humbleton	D
Ganstead	A.S
Bilton	D
Skidby	D
Owstwick	A.S
Elstronwick	A.S
Preston	A.S.Late
Burton Pidsea	A.S "
Tunstall	A.S. "
Skeffling	A.S
Roos	Celtic
Burstwick	A.S.
Halsham	A.S.
Hollym	D
Holmpton	A.S.Lte
Patrington	A.S. "
Thorngumbald	D ?
Paull	Celtic
Keyingham	A.S.

A.S. = Early Saxon. A.S.Late = Anglo Saxon Late. D = Danish.

(g) COMMISSION OF SEWERS NUMBER OF SESSIONS 1682 - 1790

(from C.S.R. - E.R.P.R.O.)

(Usually conducted between April and October.)

Year	No. of sessions	Year	No. of sessions
1682	7	1725	7
1688	2	1726	10
1690	8	1727	8
1691	5	1728	10
1692	2	1729	8
1693	3	1730	10
1694	0	1731	9
1695	2	1732	9
1696	3	1733	7
1697	0	1734	7
1698	0	1735	11
1699	5	1736	9
1700	6	1737	9
1701	7	1738	4
1702	6	1739	8
1703	7	1740	14
1704	4	1741	7
1705	0	1742	7
1706	2	1743	6
1707	0	1744	5
1708	6	1745	6
1709	9	1746	7
1710	2	1747	7
1711	4	1748	6
1712	4	1749	4
1713	5	1750	7
1714	3	1751	6
1715	3	1752	5
1716	13	1753	5
1717	10	1754	6
1718	10	1755	6
1719	13	1756	6
1720	13	1757	7
1721	8	1758	4
1722	8	1759	5
1723	7	1760	5
1724	8	1761	3

(g) cont;

Year	No. of sessions.
1762	9
1763	5
1764	7
1765	3
1766	2
1767	2
1768	3
1769	3
1770	5
1771	4
1772	4
1773	3
1774	3
1775	3
1776	2
1777	3
1778	2
1779	3
1780	2
1781	2
1782	3
1783	4
1784	5
1785	8
1786	5
1787	10
1788	20
1789	6.

(h.)

RECORDS OF BYELAWS INCLOSURE AWARDS AND MAPS.

(from E.R.P.R.O. and R.D.B.)

Parish	Bye Law Book	Inclosure Awards	Inclosure Maps
Carnaby	+	-	-
Burton Agnes	Book of Paines 1632	(2) 1718, 59	-
Barmston	-	1758, 819	-
Kelk	-	1849, R.D.B.	-
Harpham	-	1776, R.D.B.	Plan C.S.R.
Nafferton & Wandsford		1773, R.D.B.	-
Driffield	-	1741, "	R.D.B.
Skipsea	-	1766, E.R.P.R.O.	E.R.P.R.O.
Skerne	-	-	-
Beeford	-	1768, R.D.B.	C.R.
North Frodingham	Book of Custumas	1808, R.D.B	R.D.B.
Foston	-	1780, R.D.B.	C.R.
Hutton Cranswick	-	1771, "	"
Lockington	-	1772, "	"
Watton	-	-	-
Beswick	-	-	-
Atwick	-	1772, "	in parish church
Bewholme	-	1741, "	-
Dunnington	-	Act 1770, "	-
Brandsburton	-	1847, "	E.R.P.R.O.
Leven	-	1796, "	E.R.P.R.O.
Leconfield	-	-	-
Hornsea	-	1809, "	R.D.B.
Seaton	-	-	-
Sigglesthorne	-	1791, "	-
Catwick	-	1731, "	C.S.R./E.R.P.R.O.
Long Riston	-	1778, "	-
Routh	-	-	-
Wawne	-	-	-
Tickton	-	1792, "	C.R.

cont.

Parish	Bye Law Book	Inclosure Awards	Inclosure Maps
Molescroft	-	- R.D.B.	R.D.B.
Beverley	1697 Paines	1786, R.D.B.	E.R.P.R.O
Woodmansey	-	- R.D.B.	E.R.P.R.O.
Swine	-	1781, -	-
Withernwick	Catwick Parish Ch.	1802, R.D.B.	R.D.B.
N. & S. Skirl'gh	-	-	-
Ellerby	-	-	-
Rise	-	-	-
Gt. Hatfield	-	-	-
Mappleton	-	E.R.P.R.O.	Plan E.R.P.R.O.
Burton Constable	-	-	-
Aldbrough	-	1764, E.R.P.R.O.	Plan E.R.P.R.O.
Elstronwick	-	1814,	R.D.B.
Sproatley	-	1763, E.R.P.R.O.	Plan E.R.P.R.O.
Bilton	-	-	-
Preston	-	1777 E.R.P.R.O.	E.R.P.R.O.
Hedon	-	-	-
East Garton	-	-	-
Humbleton	-	E.R.P.R.O.	Plan E.R.P.R.O.
Roos	-	1787, R.D.B.	-
Burton Pidsea	-	R.D.B.	Parish Plan?
Burstwick	-	E.R.P.R.O.	-
Thorngumbald	-	1757, E.R.P.R.O.	Paull Vicarage
Paull	-	1822,	R.D.B.
Keyingham	-	1805, "	Plan E.R.P.R.O.
Halsham	-	-	-
Hollym & Withernsea	-	1797, "	-
Ottringham	-	1768,	Vicarage
Patrington	-	" R.D.B.	R.D.B.
Welwick	-	1771, E.R.P.R.O	E.R.P.R.O.
Skeffling	-	1767, "	"
Holmpton	-	1807, E.R.P.R.O.	Easington Vicarage
Easington	-	1774, "	Plan E.R.P.R.O.
Owthorne & Withernsea	-	1815, "	Plan R.D.B.

(i)

(i) <u>HOLDERNESS DRAINAGE TAXATION (Manuscript)</u>

Copy of Agreement and Taxation for Drainage of

Law Grounds and Carrs in Undermentioned Townships

by Acts of Parliament obtained in 1761 and 1763.

<u>(Wilson Barkworth Collection from 631-6 E.R.P.R.O.)</u>

	Acres	£ Impr Ann; value per acre		£ Total Impr; value	£ Cost / Acre	£ Total Tax.
Sutton	1122	10	20	829	5.17.3	6582
Gansted	232	7	12	108	3.14.9	867.5
Swine	665	2	16	330	3.19.8	2654
Benningholme	234	.1	15	182.10	3.10.1	823
B'holme Grange	214	1/6	9	60	2.4.11	402
Fairholme	93	3	7	19	1.13.10	158
N. Skir laugh Rowton Arnold	496	1/6	12	232	3.15	1863
Long Riston	152	1/6	9	146	2.0.	369
Leven	2336	1/6	10	264	0.10.2	2124
Heigholme	95	2	5	11	-.10.11	90
Holly Tree Holme	119	1/6	10	26	1.16.2	215
Brandsburton	205	1/6	6	10	14.5	148
Birdsall	790	1	10	111	1.2.6.	891
Eske	689	1	11/6	78	10.6	632
Tickton	459	6d	9	63	1.2.2	509
Weel	750	0	10	111	1.3.10	896
Routh	1315	1/6	11/6	190	1.3.3	1533
Meaux	502	6d	12/6	125	2.0.0.	1007
Wawn	733	2	14	267	2.18.8	2151

Total 11,211 £ 24.000

(ii) WINESTEAD DRAINAGE BOARD TAX ASSESSMENT 1811

(from files of Crust, Todd & Mills Solicitors)

Parish Winestead	Acres	Value in £s.
Winestead	490	98
S. Frodingham	120	24
Rimswell	16	3 - 4-0
Watherfields	50	10
Patrington	600	120
Hollym	268	53-12-0
Withernsea	11	2-4- 0
Howthorne	16	3-4-0

Total = £314

(j) THE COST OF TILE DRAINING HEAVY CLAY LOWLAND IN 1850.

(From j.R.A.S. Vol; 6. p.126)

Depth of Drain	Dist; Between Drains	Length per acre	Cost of Tile Draining	Soil	Owner
3'	33'	80rods	£1-7s-11d	Uniform Clay	Hammond Penshurst Kent.
3	33'	80 "	£1-7-11d	"	Putland Saylherst
3-4	33'	80 "	£1-14-7d	"	Thompson Horley Surrey
4	50'	53 "	£1-11-9d	Clay with stones	Penshurst
2'6 Highest	20'	1.32 "	variations	Clay stiff loam	Kent
4	66	40rods	£1.10-0.	Clay Gravel sandy loam.	Kent

Despite recommend; for 4' - Arbuthnot p. 129. 503.

A P P E N D I X

I I

ANALYSIS OF AGRICULTURAL STATISTICS.*

* Based on Ministry of Agriculture Parish Statistics for 1801, 1867 and 1956.

(a) <u>The Percentage of Parish Arable Acreages Under:-</u>

Arable - as % of Total acreage (Ar; %) Wheat= (wh) Barley = (Ba) Oats= (Oa) Potatoes = (Po) Peas = (Pe) Beans = (Be) Turnips or Rape = (R.M.) All Bulb Roots = (All; B.R.) Permanent Grass as % of the Arable Acreage = (P.G.)

(1) 1801

(2) 1867

(3) 1956.

Holderness Parishes.

Parish	Ar. Acreage	W.	B.	O.	Po.	Pe.	Be.	T.	F.	P.G.
Aldborough										
Atwick	-	-	-	-	-	-	-	-	-	-
Barmston	1544	33.4	.9	1.8	.1	.4c	-	2.7	-	-
Brandesburton	2623	32.6	10.6	26.5	.2	.3	.3	15.0	.3	44.2
Burstwick	2388	48.0	36.1	19.6	.1	1.6	5.6	8.7	15.2	46.4
B. Pidsea	1268	36.1	4.0	21.2	9.9	2.8	9.9	5.7	15.6	50.9
Carnaby	946	29.1	13.2	21.7	.1	2.6	.6	28.8	-	46.1
Driffield	2781	32.5	10.8	15.5	1.0	4.7	0	26.2	1.0	29.2
Drypool	-	-	-	-	-	-	-	-	-	-
Easington	1471	39.5	4.9	11.2	.4	3.8	9.3	4.2	20.7	17.6
Foston & B'm	1374	36.4	4.4	23.5	.5	3.7	1.3	16.0	3.7	39.0
Fraisthorpe	1083	36.0	5.8	25.3	.1	1.3	.2	23.1	-	25.0
Frodingham	1728	34.5	5.1	23.9	.3	3.1	2.0	11.2	10.0	16.4
Goxhill	601	36.9	3.8	26.6	.1	.4	3.6	9.9	14.9	39.1
Hilston	328	39.6	2.4	16.7	-	1.8	10.0	4.2	22.8	24.0
Withernsea Hollym	1349	37.0	9.8	24.3	.2	9.3	10.6	7.8	34.6	28.8
Holmpton	765	31.1	7.4	15.9	.4	7.3	5.7	4.2	20.7	17.6
Hornsea	1711	34.4	4.5	20.8	.8	2.0	9.2	10.4	15.1	35.1
Humbleton	684	43.7	.5	19.8	-	.7	2.4	15.7	14.4	26.0
Elstronwick	768	33.9	3.7	21.8	-	2.9	5.5	6.3	22.9	18.4
H'ton Cransw'k	2927	32.8	9.3	20.9	.1	4.7	1.5	13.3	8.3	27.2
Keyingham	1870	32.2	5.0	17.5	-	6.6	10.5	6.3	12.0	52.7
Kilnwick	-	-	-	-	-	-	-	-	-	-
Kirkella	-	-	-	-	-	-	-	-	-	-
Leconfield	2006	31.9	9.6	22.9	.1	1.3	3.8	16.0	.7	48.3
Lowthorpe	574	37.2	5.6	19.6	.3	2.7	1.3	23.5	-	62.8
Mappleton	1104	35.5	6.1	25.6	.9	4.5	3.0	9.6	11.6	29.9
Marfleet	-	-	-	-	-	-	-	-	-	-
Bewholme	1226	33.7	5.7	23.7	.9	2.2	3.7	16.3	9.3	36.3
Patrington	1912	33.9	5.8	18.0	.2	3.0	12.1	4.2	16.3	38.1
Paull & C.C. Sands	2518	34.9	3.3	16.4	.3	7.5	10.3	6.2	12.1	48.7
Thorngumbald	852	46.0	4.3	21.7	1.2	3.7	7.2	2.4	11.2	39.9
Preston	2625	35.5	5.5	19.7	.5	2.8	10.8	6.1	14.2	42.7
Rise	909	36.1	5.6	20.9	-	-	1.3	18.0	6.0	74.1
Roos	900	32.3	4.3	19.5	-	6.3	9.7	6.8	16.0	29.3
Sigglesthorne	762	32.0	14.3	18.3	.6	1.3	5.9	18.6	2.9	48.2
Skeffling	1225	40.0	4.0	14.9	-	2.0	9.7	2.6	21.1	21.9

cont.

(2) Cont

Parish	Ar. Acreage	W.	B.	O.	Po.	Pe.	Be.	T.	F.	P.G.
Skerne	1549	33.4	5.6	22.8	0	1.6	6.0	17.1	10.2	33.3
Skipsea	952	32.6	8.0	23.7	.5	5.0	4.7	15.7	5.0	45.9
S. Ottringham	-	-	-	-	-	-	-	-	-	-
Sproatley	619	38.2	5.0	22.4	-	3.8	7.4	9.2	7.2	47.0
Sutton	-	-	-	-	-	-	-	-	-	-
Swine	12 69	41.8	1.1	24.1	-	.7	5.3	7.0	17.3	50.2
Bilton	490	44.6	1.2	21.0	-	.6	6.5	9.3	12.4	106.3
Skirlaugh	1053	33.9	7.4	23.7	.8	2.1	5.2	9.5	13.2	47.1
Tunstall	901	28.5	6.6	22.7	-	4.1	8.4	6.6	16.8	29.7
Ulrome	-	-	-	-	-	-	-	-	-	-
Wawne	1994	36.0	4.9	25.7	.1	4.5	5.6	8.2	12.0	45.9
Withernwick	1218	37.2	2.3	22.0	.2	3.9	5.4	12.6	11.8	46.2

Wolds Parishes

Fimber	1183	26.9	11.6	25.6	-	-	-	34.2	-	15.8
Helperthorpe	1311	17.3	23.9	23.3	.5	.5	-	33.1	-	13 .1
Huggate	3766	27.0	10.0	28.0	.1	2.7	-	27.3	-	29.9
Middleton	2431	23.8	19.4	25.9	-	-	-	16.6	-	9.9
North Cave	1550	27.4	18.5	12.6	4.9	3.0	1.6	17.1	6.8	22.1
North Dalton	3031	27.9	11.9	24.6	-	1.3	-	30.9	-	8.0
North Grimston	551	24.6	19.6	16.6	.7	3.9	2.1	27.4	2.9	100.3
Rudston	4105	29.9	3.5	22.9	.1	3.4	-	31.5	-	15.2
Tibthorpe	1967	30.3	10.3	23.4	-	1.1	-	29.6	-	3.7

(3)

Parish	Ar. Ac.	W.	B.	O.	Pe + Be	All B.R.	F.	P.G.
Holderness Parishes								
Aldborough	2716	38.6	21.2	14.6	3.7	7.7	1.4	34.2
Atwick	1148	28.2	20.0	18.9	9.7	6.8	5.3	56.2
Barmston	2411	27.9	24.1	22.6	.3	19.6	-	43.8

(3) Cont

Parish	Ar. Ac.	W.	B.	O.	Pe + Be	All B.R.	F.	P.G.
Brandsburton	3137	24.2	27.2	16.0	4.0	15.9	1.0	41.8
Burstwick	2343	39.3	22.7	11.3	5.9	5.2	2.4	43.4
B. Pidsea	1431	38.7	16.7	7.8	3.7	9.9	1.3	21.8
Carnaby	1930	21.8	32.9	20.7	7.8	19.3	-	35.8
Driffield	1441	23.6	35.9	14.0	2.3	18.5	-	247.1
Drypool	-	-	-	-	-	-	-	-
Easington	1671	28.7	20.7	15.9	13.6	2.9	3.1	29.2
Foston & B'm	1390	26.6	30.5	12.5	11.0	20.1	.6	55.4
Frodingham	1552	24.8	22.5	23.0	1.8	17.5	.5	47.7
Goxhill	-	-	-	-	-	-	-	-
Hilston	-	-	-	-	-	-	-	-
Hollym	1110	31.2	19.8	21.5	9.6	1.9	4.6	45.9
Holmpton	1128	36.8	15.4	16.9	10.9	2.8	3.7	35.6
Hornsea	1237	26.1	23.3	19.3	9.9	8.4	1.4	55.5
Humbleton	2484	35.3	26.0	6.5	.7	10.4	1.6	15.6
Withernsea	185	26.4	15.1	17.8	6.4	5.9	4.8	72.9
Elstronwick	1001	36.5	24.1	11.8	3.5	4.4	1.9	42.4
H'ton Cransw'k	3280	28.1	27.3	14.4	5.5	16.2	2.0	66.9
Keyingham	2787	37.2	23.8	3 .9	5.6	10.9	1.7	15.8
Kilnwick	-	-	-	-	-	-	-	-
Kirkella	-	-	-	-	-	-	-	-
Leconfield	2467	33.2	22.8	17.2	2.5	11.5	2.4	64.3
Lowthorpe	-	-	-	-	-	-	-	-
Mappleton	1420	30.5	23.2	23.3	8.5	4.5	6.0	37.3
Marfleet	-	-	-	-	-	-	-	-
Bewholme	2144	27.1	26.4	19.2	5.5	10.5	2.7	37.8
Patrington	3342	34.4	28.4	8.6	5.1	6.3	3.5	32.1
Paull & C.C. Sands	2190	42.9	21.0	6.9	4.2	4.4	4.1	36.6
Thorngumbald	1899	31.7	17.7	10.4	8.0	5.3	3.2	61.0
Preston	2148	34.9	24.3	12.1	6.9	7.2	3.6	52.8
Rise	1204	30.4	28.8	9.1	5.8	12.4	8.8	37.0
Roos	3541	35.4	24.2	15.4	4.7	4.0	1.7	51.0
Sigglesthorne	555	30.0	22.8	12.7	6.3	18.9	3.2	39.2
Skeffling	1189	30.1	23.2	15.2	11.2	.7	4.1	30.5
Skerne	1427	27.0	27.8	18.0	6.7	15.6	.5	111.0
Skipsea	1452	27.5	23.1	22.5	3.8	15.9	-	45.2
S. Otringham	-	-	-	-	-	-	-	-
Sproatley	713	31.1	24.2	15.6	6.5	12.0	-	39.1
Sutton	-	-	-	-	-	-	-	-
Swine	2080	34.8	23.1	14.6	3.9	8.8	3.7	31.7
Bilton	1299	37.9	15.5	14.6	.3	4.3	1.6	64.9
Skirlaugh	815	34.3	23.5	8.0	3.1	12.2	-	35.2
Wawne	3109	33.5	25.8	18.5	9.8	4.9	2.4	75.2
Withernwick	1501	33.7	24.4	15.4	5.3	5.2	7.5	35.9

(b) The Mean Percentage of the Total Arable Acreage Under Each Crop Significantly Affected by Improvements in Land Drainage.*

(1) 1801

(2) 1867

(3) 1956

* Based on returns from fifty nine parishes in 1801 and forty parishes in 1867 and 1956.

Crop	Holderness			The Wolds		
	1	2	3	1	2	3
Wheat	38.3	35.9	31.1	18.7	26.1	+
Barley	6.0	6.4	22.8	27.6	14.7	+
Oats	31.0	20.6	14.7	29.0	22.5	+
Pe. and Be.	17.3	8.5	6.2	4.5	2.4	+
Fallow	+	11.8	2.8	+	1.0	+
Turnips	6.6R	12.1	9.6	20.1	27.5	+
Arable as a % of total Ac,	34.3	+	+	30.0		+
Perm Grass as % of Arable Ac,	+	38.33	44.4	+	14.7	+

(iii) <u>Parish Deviation From The Mean Percentage of The Arable Acreage Acgeage for-:</u>

Arable as a % pf total acreage (Ar.%)

Wheat (Wh) Barley (Ba) Oats (Oa)

Potatoes (Po) Peas (Pe) Beans (Be)

Turnips or Rape (T.R.) Rye or Maslin (R.M)

All Bulb Roots (All B.R.) Fallow (Fall)

Permanent Grass as a % of the arable acreage (P.G.)

(1) 1801

(2) 1867

(3) 1956.

Parish	Arable %	W	B	O	Pe Be	T
Aldborough	+13.3	+2.3	-1	+15	-12	-5.0
Atwick	+5	+7	-2.5	+3.4	-3.4	-1.0
Barmston	+1.5	-26	-4	+27	-17	+20.5
Brandsburton	-2	-3	0	+6	-13	+19
Burstwick	+6	-13	-5	+23	-8	+2.0
B.Pidsea	0	+3	-3	-2	+3	-2
Carnaby	-9	-11	+10	-13	+3	+11
Driffield	-10	-2	+13	-16	-3	+8
Drypool	-9	+15	-5	-10	+6	-6.6.
Easington	+7	+3	-1	-11	+9	-3
Foston	+35	-2	+11	+2	-7	-3
Brigham	No.fig.	-36	+8	+38	-16	-4
Fraisthorpe	-12	-10	+.5	+13	-14	+9
Frodingham	-8	+8	-3	+19	+21	+1
Goxhill	-15	+19	-6	+3	1-13	-4
Hessle	+38	+4	+4	-7	-2	-2
Hilston	+1	+8	-5	+9	-12	+1
Hollym & Withernsea	-10	+13	-5	-1	-2	-6
Holmpton	+10	+8	-3	-11	+9	-6
Hornsea	0	+7	-4.5	-14	+14	-4.0
Humbleton	-4	+5	-5	+5	-8	1-4
Elstronwick	+1	+12	-6	-23	+24	-6
H.Cranswick	0	+5	0	-5	+2	-4
Keyingham	-8	+7	-4	-13	+14	-6
Kirkella	-3	+6	+7	-15	+5	-6
Leconfield	-14	-4	+8	-7	+7	0
Lowthorpe	No.fig	-3	+3	+5	-14	+7.0
Mappleton	-18	+10	-6	-11	+13	-6
Marfleet	No.fig.	0	-6	-5	+15	-5
Bewholme &N	-6	+2	-4	+12	-13	+3
Patrington	+10	-3	-5	+10	-3	+4
Paull & C.C.S	-4	-2	-2	-11	-7	-6
Thorngumbald	+7	+4	-3	+4	+1	-6
Preston	+5	+4	-3	-14	+19	-6
Rise	-16	-35	+38	--31	-2	-6
Roos	+8	+7	-5	-4	+3	-1
Sigglesthorne	-6	-7	-2	+16	-11	+4
Skeffling	+11	+8	-3	-9	+8	-3
Skerne	-11	+7	0	+1	-4	-6

1 cont;

Parish	Arable %	W	B	O	Pe Be	T
Skipsea	-12	-8	-2	+13	-7	+3
S.Ottringham	None	-16	+10	-7	0	+9
Sproatley	+2	-8	+4	+5	+1	+10
Sutton	+2	+6	-3	+5	-4	-5
Swine	-6	+5	-4	+8	-13	+2
Bilton	-3	-4	-6	+9	-14	+14
Skirlaugh	+6	-10	+2	+11	-11	+8
Tunstall	+3	0	-5	+9	0	-3
Ulrome	+4	-12	-5	+11	+7	-3
Withernwick	-4	+7	-6	+14	+18	-4

Parish	Ar. %	Wh.	Ba.	Oa.	Pe Be	T. R.	Fall.	P.
Barmston	-	-2	-5	-19	-8	-8	-12	-15
B'burton	-	-3	-4	6	-7	4	-11	6
B'wick	-	13	30	-1	-1	-3	4	8
B.P.sea	-	-	-2	1	5	-6	4	12
Carnaby	-	-6	7	1	-5	17	-12	-8
Driffield	-	-3	4	-5	-7	15	-11	-9
Easington	-	4	-2	-9	5	7	9	-21
Foston & Brigham	-	1	-2	3	-4	5	-8	1
Fraisthorpe	-	0	0	5	-7	12	-12	-13
Frod'ham	-	-1	-1	3	-3	0	-2	-22
Goxhill	-	1	-3	6	-4	-2	3	1
Hilston	-	4	-4	-4	3	-7	11	-14
Hollym (W'thernsea)	-	2	3	4	11	-4	23	-10
Holmpton	-	-4	1	-5	4	-7	9	-21
Hornsea	-	0	-2	0	1	-2	4	-3
Humbleton	-	8	-6	-1	5	4	3	-12
Elstronw'k	-	-2	-3	1	-1	-5	11	-20
Hutton Cranswick	-	-3	3	0	-2	2	-3	-9
Keyingham	-	-3	-1	-3	9	-5	0	14
Leconfield	-	-4	3	2	-3	5	-11	10
Lowthorpe	-	2	-1	-1	-3	12	-12	24
Mappleton	-	0	0	5	0	-2	0	-9
Bewholme & N'keeling	-	-2	-1	2	-2	5	-2	-2
Patrington	-	-2	-1	-2	7	-7	5	0
Paull & Cherry Cob Sands	-	-1	-3	-4	10	-5	0	10
Thorngumbald	-	10	-2	1	2	-9	0	1
Preston	-	0	-1	-1	5	-5	3	4
Rise	-	0	-1	0	-7	7	-5	40

2 Cont.

Parish	Wh.	Ba.	Oa.	Pe Be	T.R.	Fall.	P.
Roos	-3	-2	-1	8	-5	5	-9
Sigglesthorne	-3	8	-2	-1	7	-9	10
Skeffling	5	-2	-6	3	-9	10	-17
Skerne	-2	-1	2	-1	6	-1	-5
Skipsea	-3	2	3	1	4	-6	7
Sproatley	3	-1	2	3	-2	-4	9
Swine	6	-5	4	-2	-4	-5	12
Bilton	9	-5	1	-2	-1	1	58
Skirlaugh	-2	1	3	-1	-2	2	9
Tustall	-7	0	2	4	-5	5	-9
Wawne	0	-1	5	2	-3	0	-7
W'wick	2	-4	2	0	1	0	8

3. Holderness Parishes.

Parishes	Wh.	Ba.	Pe. Be.	Oa.	B.R.	T.	F.	P.G.
Aldbrough	5	-2	-2	0	-2	-3	-1	10
Atwick	-3	-4	4	4	-3	0	2	12
Barmston	-3	1	-5	8	10	1	-3	0
Brandesburton	-7	4	-1	1	6	3	-2	-2
Burstwick	8	-1	0	-4	-4	-4	0	-1
B. Pidsea	7	-7	-2	-7	0	-4	-2	-22
Carnaby	-10	9	-4	6	10	13	-3	-8
Driffield	-8	12	-3	-1	9	10	-3	203
Easington	-3	-3	8	1	-7	-3	0	-5
Foston & B'ham	-5	7	6	-3	10	10	-21	10

3 (Cont.)

Holderness Parishes

Parishes	Wh.	Ba.	Pe. Be.	Oa.	B.R.	T.	F.	P.G.
Frodingham	-7	-1	-4	9	8	8	-2	2
Goxhill	-	-	-	-	-	-	-	-
Hilston	-	-	-	-	-	-	-	-
Hollym	0	-6	4	7	-8	-5	2	2
Withernsea	-5	-9	1	3	-4	0	2	29
Holmpton	5	-8	5	2	-7	-3	1	-8
Hornsea	-5	0	4	4	-1	1	-1	11
Humbleton	4	3	-5	-8	1	-4	-1	-28
Elstronwick	5	1	-1	-3	-5	-3	-1	-2
Hutton C'wick	-3	4	0	0	7	8	-1	28
Keyingham	6	0	0	-11	1	1	-1	-28
Leconfield	2	-1	-3	2	2	3	0	20
Mappleton	-1	0	3	9	-5	-2	3	-7
Bewholme	-4	3	4	0	1	2	0	-6
Patrington	2	5	0	-6	-3	-5	1	-12
Paull	11	-3	-1	-8	-5	-4	1	-7
Thorngumbald	0	-6	3	-5	-4	-4	5	17
Preston	3	1	2	-3	-2	-3	1	9
Rise	-1	5	0	-6	3	4	6	-7
Roos & Tunstall	4	1	-1	0	-6	-5	-1	7
Sigglesthorne	-1	1	1	-2	9	-1	.5	-5
Skeffling	-1	0	6	0	-9	-5	1	-13
Skerne	-4	4	1	-6	6	5	-2	56
Skipsea & Ulrome	-6	0	-2	-2	6	4	-3	21
Sproatley	0	1	1	-8	2	-3	-3	-5
Swine	3	0	-3	-9	-1	-4	1	-12
Wawne	2	2	4	-5	-5	-5	0	31
Withernwick	2	-9	0	-8	-4	-3	5	-10

Changes in the Percentage of the Arable

Acreage under ;

Wheat (W) Barley (B) Peas and Beans (Pe, Be)

Turnips (T) Fallow (F) Permanent (P.G.)

For Forty Two Holderness Parishes

1. 1801 - 1867.

2. 1867 - 1956.

Parish	W	B	O	Pe Be	T.
Aldborough	-	- .7	-56.7	+ .1	- 25
Atwick	-				
Barmston	+23.4	.7	-56.7	+.1	- 25
Brandesburton	-2.7	+ 4.4	-10.8	+.2	0
Burstwick	+22.6	+34.7	-34.6	-2.5	+.2
B.Pidsea.	-5.6	[illegible]	+.6	-8.0	[illegible]
Carnaby	+1.8	-2.7	+3.6	-17.3	+11.1
Driffield	-3.6	-8.3	+.4	- 9.1	+11.8
Drypool	-	-	-	-	-
Easington	-1.7	0	-9.1	-13.5	+.8
Foston	+.3	-12.6	-9.2	-5.8	+13.2
Fraisthorpe	+7.8	-.7	-18.9	-3.5	+8.1
Frodingham	-11.8	+1.9	+11.7	-33.5	+4.2
Goxhill	-20.6	+ 5.1	-8.8	0	+7.6
Hessle	-	-	-	-	-
Hilston	-6.3	+ 1.4	-22.6	+6.5	-3.7
Hollym & Withernsea	-14.1	+9.2	- 5.9	+4.2	+ 7.6
Holmpton	-15.4	+6.3	+4.1	-13.7	+ 3.9
Hornsea	-9.4	+2.9	+2.8	-2.2	- 6.7
Humbleton	+.3	+1.0	-16.7	-6.1	+ 5.5
Elstronwick	-16.4	+3.7	-14.7	-33.0	+ 6.3
Hutton Cranswick	-10.7	+3.3	-6.0	-13.2	+10.8
Keyingham	-13.2	+10.5	-1.3	-14.8	+ 6.3
Leconfield	-2.6	-4.4	-1.2	-20.0	+9.8
Lowthorpe	+ .4	-3.8	-17.0	+1.0	+9.7
Mappleton	-13.2	+6.0	+5.2	-23.0	+9.4
Bewholme & Nunkeeling	-7.1	+3.9	-20.8	+1.7	+7.3
Patrington	-1.3	+4.5	-23.3	+1.5	-6.6
Paull & Cherry Cobb Sands	-1.6	-.7	-3.2	+7.5	+6.2
Thorngumbold	+3.6	+1.2	-23.9	-7.8	+2.4
Preston	-6.6	+1.8	+2.6	-21.6	+6.1
Rise	+33.1	-31.2	+20.9	-14.3	+18.0
Roos	-13.1	+2.8	-2.2	-4.8	+1.5
Sigglesthorne	0	+11.0	-29.0	+1.0	+8.0
Skeffling	-6	+1.3	-7.9	-13.0	-1.0
Skerne	- 12	-1.0	-9.0	+5.5	+16.0

cont;

cont;

Parish	W.	B	O	PeBe	T	F.	P.G.
Skipsea	+2.6	+4.2	-21.0	-.3	+5.0	-	-
Sproatley	+12.0	-5.8	-14.0	-7.0	-7.0	-	-
Swine	-2.3	-1.2	-15.0	+1.0	-1.0	-	-
Bilton	+10.0	+1.2	-19.0	+4.0	-1.0	-	-
Skirlaugh	+5.5	-.3	-19.0	+.5	-5.0	-	-
Tunstall	-9.0	+6.0	-18.0	-5.0	+3.2	-	-
Withernwick	-8.3	+2.3	-5.0	-26.0	+12.6	-	-

(2)

Barmston	-6.5	+23	-21	0	+12	-	-
Brandesburton	-8	+16	-10	-3	-6	+7	-3
Burstwick	-9	-14	-8	-1	-7	-13	-3
Burton Pidsea	+2	+12	-14	-8	-4	-14	-2.9
Carnaby	-7	+20	-1	-2	-10	0	-11
Briffield	-9	+25	-1	12	-10	-1	0
Easington	-11	+14	+4	+.5	+1	-17	+12
Foston & Brigham	-10	+26	-11	+6	0	-3	+14
Frodingham	-10	+17	-1	-2	-3	-9	-31
Hollym	-6	+10	-3	-10	-7	-30	+17
Holmpton	+5	+8	+1	-7	-2	-17	+18
Hornsea	-11	+19	-1	+.5	-3	-14	+20
Humbleton	-8	+25	-13	-2	-3	-13	-11
Elstronwick	+3	+21	-10	-5	-3	-28	+24
Hutton Cranswick	-4	+9	-.6	+.5	+6	+30	+39
Keyingham	+5	+18	-13.5	-12	+.5	-11	-37
Leconfield	-1	+10	-5	-2.5	-8	+2	+16
Mappleton	-4.5	+17	-2	+1	-4	-5	+8
Beholme & Nunkeeling	-6.5	+21	-4	+.5	-9	-7	+1.5
Patrington	+1	+23	-10	-10	-4	-13	-6
Paul & Cherry Cobb Sands	+8	+18	-10	-13	-5	-8	-12
Thorngumbald	-15	+13	-11	-3	-1	-8	+22
Preston	+7	+16	-13	-9	-4	-10	-6
Rise	-6	+23	-11	+4	-8	+21	-34
Roos	+3	+20	-5	-12	-5	-15	+22
Sigglesthorne	-2	+6	-6	-1	-14	0	-9
Skeffling	-10	+19	0	0	-2	-17	+9
Skerne	-6	+22	-4.5	-1	-7	-10	+76
Skipsea	-5	+15	-1	-6	-6	-5	+20
Sproately	-7	+19	-7	-5	-1	-7	-8
Swine	-7	+22	-10	-2	-5	-14	-19
Withernwick	-4	+22	-7	-4	-10	-4	-10

A P P E N D I X III

L A N D D R A I N A G E C E N S U S R E T U R N S.

1. Total Acreage Covered by the Census.

2. The Percentage of This Acreage Affected By Land Drainage.

3. Analysis of the Drainage Complex of each farm making a Return in the Census.

(1)

TOTAL ACREAGE COVERED BY THE LAND DRAINAGE CENSUS

Dr'ge Area (see fig 46)	No.of Farms	Total Ac'ge	Average Farm Acreage	Acreage Tile Drained	Ac'ge Mole Drained	Ac'ge for which D'ge is a farming factor	Acreage Water logged.
(1)	18	3975	221	3305	-	1,857	443
(2)	37	8281	224	2,609	5	1,867	768
(3)	54	12,298	228	9,942	325	10,550	3441
(4)	45	8,470	188	6,833	141	4487	1263
(5)	14	2,709	195	2,273	82	1517	323
(6)	72	18,163	252	14,466	1283	10,593	1,753

Drainage Areas
1 = Northern Watershed (Barmston Sea-End)
2 = Wold Flanks
3 = Hull Valley.
4 = Hull Valley Flanks.
5 = Interior Basin (Lambwath)
6 = South Draining to Siltlands.

(2)

PERCENTAGE OF THE TOTAL RETURNED ACREAGE

AFFECTED BY LAND DRAINAGE

Drainage Area	1.	2	3	4	5	6
Tile Drained	83	31.5	80.8	80.6	80.0	79.6
Mole Drained	0	.06	2.6	1.6	3.0	7.0
Drainage Assessed as a Factor in Land Use	46.7	22.5	85.7	50.3	50.6	58.3
Area Affected By Waterlogging	11.1	9.2	27.9	10.5	1.2	9.6

III FARM ANALYSES

(See Fig. 46)

Key :-

Qu. No. = Number of Questionnaire

% W. = % of the Total Farm Acreage Waterlogged after Heavy Rain.

% M. = % of the Total Farm Acreage drained by the Mole System.

% T. = % of the Total Farm Acreage drained by the Tile System.

% F. = % of the Total Farm Acreage for which Drainage is a factor in land use.

(a) The Northerh Watershed

Qu.No.	Tot.Ac.	%W.	%M.	%T.	%F.
439	103	100 100	-	100	-
23	473	3.1	-	100	100
264	182	7.6	-	100	-
53	244	-	-	100	100
236	315	5.0	-	92	3.2
305	220	6.8	-	100	100
10	291	13	-	34.3	2.7
201	333	13.2	-	90	9
206	235	-	-	66	89
325	165	-	-	100	100
359	150	-	-	96	16.6
393	88	-	-	97.7	-
111	114	2.6	-	100	18.4
419	180	68.3	-	83.3	100
365	233	4.3	-	12.8	30
161	112	21.4	-	71.4	100
165	320	6.8	-	81.25	100
324	217	6.9	-	100	-
460	166	12	-	70	22.2

(a) (Cont.)

Qu. No.	Tot. Ac.	%W.	%M.	%T.	%F.
465	73	-	-	-	-
513	56	8.9	-	96	-
561	117	6	-	-	-
544	174	.5	-	61.4	61.4
567	46	100	-	46	58
89	164	6	21.3	-	21.3
94	172	1.1	-	5.8	3.4

(b) Hold Flanks

Qu. No.	%otAc.	%W.	%M.	%T.	%F.
58	178	-	-	28	-
121	325	15.3	1.5	1.5	3
226	442	1.8	-	95	16.6
234	177	12.9	-	93.2	-
391	390	43.4	-	15.3	100
453	222	13.5	-	100	13.5
345	258	3.1	-	7.7	9.6
494	108	-	-	11.1	-
495	250	2	-	6.4	2.2
529	50	-	-	100	100
288	45	33.3	-	100	-
295	96	2	-	60	-
396	133	3.7	-	100	100
403	92	4.3	-	31.5	31.5
208	1400	5.7	-	35.7	40.7
397	260	-	-	19.2	19.2
508	34	35.2	-	44.1	-
497	300	100	-	66.6	100
99	143	76.9	-	80.4	56

(c) Hull Valley

Qu. No.	Tot.Ac.	%W.	%M.	%T.	%F½
434	200	27.5	-	21.5	100
537	243	4.1	-	100	100
330	370	16.2	-	94.5	100
339	55	-	-	100	100
379	194	1.5	-	87.6	-
389	99	10	-	100.0	50
15	161	31	-	37.2	1
20	600	100	-	100	100
22	173	-	-	100	-
200	98	45	-	100	100
227	46	24	-	69.5	76
600	96	41.6	-	72	100
581	412	1.2	2.9	12	66
437	147	100	-	100	6.1
468	32	-	-	-	-
149	76	2.6	-	75	60
172	150	1.3	-	100	100
341	215	52.6	-	64.6	100
80	313				
602	249	60.2	-	100	48
331	223	67.2	-	100	100
40	400	80	-	50	75
207	252	-	-	100	100
283	150	50	-	100	80
358	270	55.5	-	74	96
49	185	2.7	-	100	100
252	57	35	8.7	-	70.1
454	302	46.3	-	16.5	100
294	362	25	-	100	93.9

(c) (cont.)

Qu.No.	Tot.Ac.	%W.	%M.	%T.	%F
506	104	-	-	100	-
556	30	-	-	-	-
550	300	26.6	-	20	40
568	69	21.7	-	100	100
17	495	8	-	98	98
547	200	100	6.5	100	100
426	282	3.5	-	95	100

(d) Hull Valley Flanks

Qu. No.	Tot. Ac.	%W.	%M.	%T.	%D.F.
120	73	13.6	-	No figs.	13.6
326	183	6.5	-	100	22.9
235	324	1.5	-	100	100
285	400	2.5	-	No figs.	-
180	43	23.2	-	100	-
489	50	-	-	100	100
586	160	62.5	8.7	91.2	-
219	121	4.9	-	100	4.9
216	25	-	-	-	-
573	3	-	-	100	-
147	161	-	-	7.4	-
313	228	100	-	100	100
595	40	25	-	75	10
585	130	1	47	100	-
481	165	37.5	-	100	100
480	65	6.15	-	89	100
300	129	19.3	-	68.9	10
303	24	8.3	-	33.33	33
214	69	-	-	100	100
150	212	23.5	-	100	-
45	377	5.3	-	100	-
569	334	4.4	-	14.9	23.9
238	326	-	-	92	100
267	135	7.35	-	100	80
257	440	.4	-	100	100
230	214	2.8	-	97.1	100

(d) (Cont)

Qu.No.	Tot.Ac.	%W.	%M.	%T.	%D.F.
30	73	120	-	80	-
464	4	-	-	100	-
373	200	4.5	-	100	100
274	520	7.6	-	38.46	13.4
135	128	3.2	-	100	3.2
118	365	87.6	-	100	66.6
589	285	12.3	-	100	100
112	128	35.9	-	100	9.37
487	140	75	-	90	-
563	287	10.45	-	100	-
24	316	63.29	-	100	31.6
494	163	61.3	-	100	61.3
572	220	1.8	4.5	81.8	86.3
510	268	14.9	-	100	14.9
609	180	16.6	-	77.7	100
502	202	7.42	22.2	97.1	-
275	11	-	100	-	100
137	260	3	-	57.6	-
533	288	-	-	100	100

(e) Interior Basin

Qu. No.	Tot.Ac.	W%	M%	T%	D.F.%
441	50	20	-	80	-
457	272	735	-	90	7.35
202	201	2.4	-	100	-
130	195	5.12	-	-	97.0
184	122	34.4	-	65.5	65.5
314	72	1.0	?	100	-
31	220	2.3	-	100	1000
433	212	49	23.5	75.4	70
124	160	12.5	-	50	11.8
97	306	-	-	91.5	-
169	150	-	-	66	66
106	202	-	-	89.1	100
48	421	28.5	-	55.5	91.2
62	126	28.5	-	95	100

(f) <u>South Draining</u>

Qu.No.	Tot.Ac.	%W'logged	%M'Dr'nd.	%Tile	%Factor
54	261	7.5	6.4	89.2	100
195	301	-	7.5	82.3	100
564	74	-	16.2	83.7	100
541	220	-	-	100	100
505	117	-	-	18.8	100
504	300	-	18	83.3	100
409	37	-	-	100	100
187	160	2	-	100	100
188	537	1	3.5	96.4	100
231	177	7.3	-	100	100
233	250	8	-	92	100
166	10	1	-	100	-
168	50	-	-	100	100
183	150	13.3	13.3	86.7	100
95	156	11.5	20.5	79.4	100
38	38	1	-	71	80
66	126	9.5	-	47.6	100
136	465	84.7	-	100	90
93	630	.6	60.3	6.3	100
146	305	19.6	-	100	100
560	27	4	-	81	100
181	1200	12.5	8.3	75	100
176	111	41.4	-	81	27
170	60	16.6	-	100	84
134	302	14.9	-	72.8	8.2
127	170	4.1	-	95.8	95.8
551	329	-	-	100	100
444	90	-	-	100	-

(f) (Cont.)

Qu.No.	Tot.Ac.	%W'logged	%M'Dr'nd.	%Tile	%Factor
410	132	-	-	-	-
273	53	20	13.5	92	100
258	320	6.2	9.3	46.8	100
255	420	16.6	-	100	-
245	146	-	13.6	86.3	-
232	223	4.4	-	100	100
212	300	10	15.3	84.7	100
7	189	100	15.8	100	100
438	120	16.6	33.3	25	41.6
421	62	16	-	100	100
405	474	-	-	100	100
382	414	-	-	78.7	-
369	128	3.9	-	100	100
335	133	4.5	-	100	-
286	1000	5	10	90	100
279	165	66	33	66	100
277	95	14.7	-	100	-
193	170	14.3	-	100	100
250	211	1.4	-	94.7	100
531	157	6.3	12.7	100	-
540	900	11	16.6	66	100
308	234	4.2	-	89.7	85.4
311	367	Free	draining	8.1	8.1
301	240	10	-	100	100
171	236	-	-	94.4	-
312	244	12.2	-	100	100
222	129	14	-	85.2	14

(f) (Cont.)

Qu.	Tot. Ac.	%W'logged	%M. Dr'nd.	%Tile	%Factor
251	65	6	-	100	100
221	125	10.4	-	100	100
154	43	4	28.5	100	100
198	509	6.6	-	84.4	8.8
163	102	29.4	29.4	100	29
65	71	-	-	100	100
104	104	3.8	-	84.6	84.7
109	648	-	-	49.8	-
588	140	-	-	100	100
42	490	.4	-	96.5	960
117	288	7.2	-	100	100
71	395	3	-	100	100
92	278	-	35.8	46.5	-
471	226	39.8	4.2	39.8	-
476	100	-	None	100 sands	100
211	123	9.7	-	100	4.8
244	540	4.4	-	91.1	100