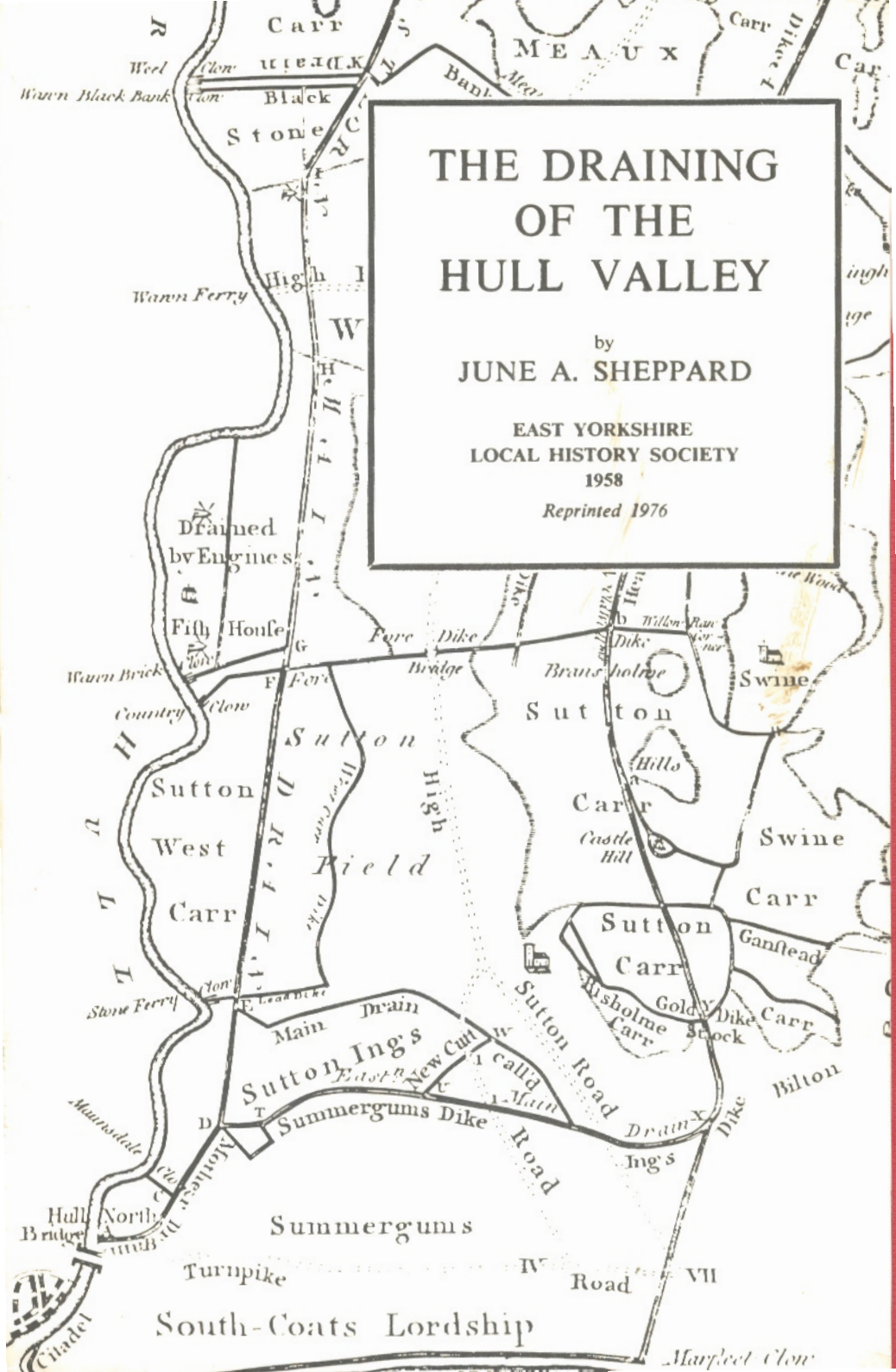
THE DRAINING
OF THE
HULL VALLEY
by
JUNE A. SHEPPARD
EAST YORKSHIRE
LOCAL HISTORY SOCIETY
1958
Reprinted 1976
Carr
MEAUX
Weel
Clow
Wawn
Black Bank
Black
Stone
Wawn Ferry
High
Drained
by Engines
Fish House
Fore Dike
Bridge
Wawn Brick
Country
Clow
Sutton
West
Carr
Sutton
Field
High
Sutton
Carr
Castle
Hill
Swine
Carr
Sutton
Carr
Ganstead
Bisholme
Carr
Golden
Dike
Stock
Carr
Stone Ferry
Main
Drain
Sutton Ings
East
New Cut
called
Main
Sutton Road
Summergums Dike
Drain
Dike
Bilton
Ings
Road
Hull North
Bridge
Summergums
Turnpike
Road
South-Coats Lordship
Citadel

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Cover Illustration: *Part of a plan of John Grundy's scheme of drainage, 1764. Reproduced from the Local History Collection in Hull Central Library by kind permission of the Director of Leisure Services, Humberside County Council.*

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JUNE A. SHEPPARD M.A., Ph.D.

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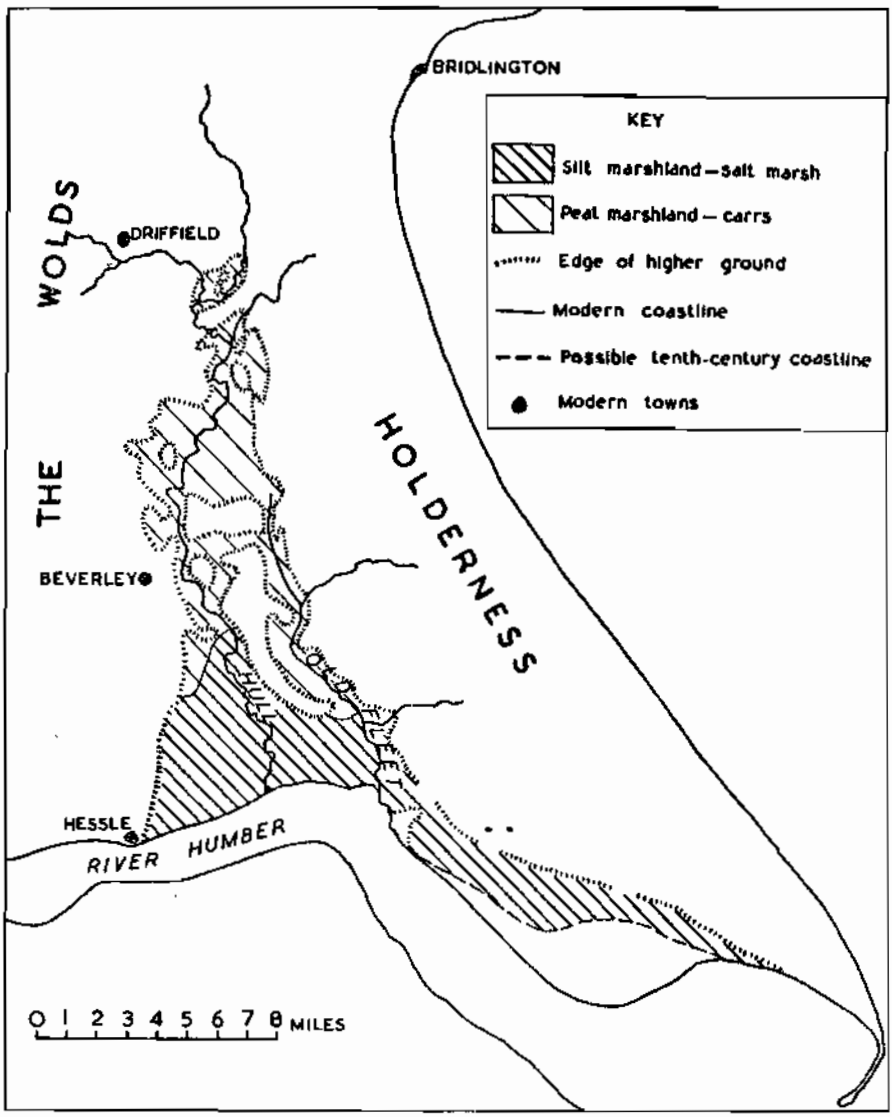

Fig. 1. The Hull valley before drainage.

The Draining of the Hull Valley.

EAST YORKSHIRE at one time contained some of the most extensive areas of marshland in England outside the Fenland, and one of the largest tracts was in the Hull valley. There marshes stretched northwards for about twenty miles from the Humber, where the city of Kingston upon Hull now lies, to near Driffield. The valley varied in width from about two to five miles, and separated the hummocky clay land of Holderness on the east from the lower slopes of the Yorkshire Wolds on the west (fig. 1). Here and there islands of higher land rose out of the marshes, and the largest of these islands at Sutton, Wawne and Tickton form a chain that divides the middle section of the valley into two parts, a wide western part drained by the river Hull itself, and a narrower eastern part which must originally have been drained southwards by a separate stream. A creek known as the Old Fleet that enters the Humber between Marfleet and Hedon is probably a remnant of this stream. Water drained into the Old Fleet valley from the clay lands of middle Holderness, while the main valley received streams from north Holderness and from powerful springs at the foot of the Wolds, especially near Driffield.

This stretch of marshland remained entirely in its natural state during the period before the Norman Conquest. In the south the marshes were subject to flooding by the tidal waters that flowed up the Humber and into the Hull and Old Fleet. Centuries of flooding of this type had led to the accumulation of river mud or silt in the lower valley, and this had raised the level of the land, especially close to the main channel of the Hull. It seems likely that by the tenth century some land was above the danger of tidal flooding except during particularly high spring tides, but much was subject to regular floods and carried salt-marsh vegetation. A few small hamlets, e.g. Drypool, Marfleet, Myton and Southcotes, had appeared on the dry sites by 1086 but the rest of the salt-marsh was avoided.

North of about Wawne in the Hull valley and Sutton in the Old Fleet valley the tidal influence was small, and the marshland consisted of extensive fresh-water swamps (fig. 1). Large amounts of water were poured into the valley all the year round by the springs to the west and north, and in wet weather the streams from the Holderness clays added a further considerable volume. The gradient of the valley was very slight, and the rivers were so meandering, braided and choked with vegetation that the water which poured in could not find its way out fast enough. Instead it overflowed to fill the whole of the valley, the depth of water probably varying from a few inches at the margins to more than six feet in the centre. This lake expanded and contracted in accordance with the inflow of water and the amount of evaporation,

and was most extensive in winter. Some parts of the valley were therefore subject to seasonal flooding only but much was permanently covered with water. Water-loving plants such as alders. willows and sedge flourished where flooding was seasonal and the depth of water never very great, while the margins of the permanently flooded areas were colonised by a tangle of reeds, rushes and other aquatic plants. The areas of deepest flooding probably remained as open water or meres. All decayed vegetation was converted into peat which therefore formed a layer several feet thick throughout the valley, and acted as a sponge holding the water even in dry seasons. This type of peat marshland is known locally as "carr". The whole upper part of the valley was a most unattractive area, difficult to penetrate or cross, and no doubt supporting swarms of mosquitoes that carried ague (malaria) to those who came too near. It was not surprising therefore that the carrs were at first largely ignored by the Anglo-Saxon and Danish settlers, who placed their villages rather on the adjacent higher land or on the larger islands. As the years passed, the villagers may have begun to exploit the fish, reeds and peat of the carrs, but probably not on a very extensive scale.

The Medieval Period

Efforts to improve conditions in the Hull valley may be said to have begun in earnest during medieval times. Since the southern salt-marsh areas were the most useful and most easily improved, the most extensive medieval improvements took place there. In order to protect additional tracts from flooding at high spring tides, the hamlets within the area and the nearby villages such as Anlaby, Hessle and Sutton constructed banks along the Humber and Hull which eventually linked up to form a continuous barrier against the sea. Such banks were certainly in existence by the beginning of the fourteenth century, for Edward II appointed commissioners to inspect and repair them in 1311 and 1313. The early banks were probably built of mud and turves, however, and were not strong enough to prevent the tides breaking through from time to time; the Chronicle of the Abbey of Meaux records, for example, that the Humber floods reached as far inland at Cottingham in 1265. It was to prevent the recurrence of such floods that the king appointed commissioners of banks and sewers who were responsible for arranging for the repair of any breach. Since commissioners were only appointed when the damage was done, however, and only functioned for a few months, there was no means of preventing further breaches resulting from lack of attention and upkeep.

The new banks not only held out the salt water but also held in the fresh water that had previously drained away by the creeks through the marsh. A network of channels had therefore to be cut to carry this fresh water into the Hull and Humber and primitive sluices constructed to prevent the entry of tidal water where these

channels passed through the main banks. The new banks and drains encouraged the growth of new hamlets, e.g. Stoneferry, Sculcoates, Newland and Wyk (which Edward I renamed Kingston upon Hull when he obtained it in an exchange of land with the monks of Meaux in 1293. The low-lying nature of the land, however, and the primitive character of the medieval sluices made it difficult to keep the old salt-marsh entirely free from fresh-water floods, and this is reflected both by the fact that the new hamlets still sought bank sites, and by the need to construct causeways across the valley in the early fourteenth century to carry the roads linking the port of Hull with the surrounding villages. But such land was quite suitable for summer pasture and in Sutton and Wawne especially was in such great demand for this purpose that stints* had to be imposed during the thirteenth century.

There were fewer changes in the carrs in medieval times, because it was so much more difficult to drain them than the old salt-marshes. The medieval communities learnt instead to take greatet advantage of their resources, especially the fish, reeds and peat. Such changes as did take place were mainly the result of monastic activity. About 1150 William le Gros, Earl of Albemarle, granted to the Cistercians one of the chain of islands that separates the Old Fleet and Hull valleys, where they established the Abbey of Meaux. The abbey came in succeeding years to hold land in various parts of the Hull valley and in nearby townships, e.g. at Skerne, Heigholme, Arnold, Wawne and Sutton, and since all these outlying lands required markets for their produce, it was essential to provide them with some means of ready communication with the outside world. The only practicable method of travel through the carrs was by boat, therefore the monks cut a number of channels (or enlarged existing streams and fence ditches) to link their possession to the river Hull and thus to the Humber. The most important of these channels were Eschedike (1160-82) which linked the abbey to the Hull, Monkdike (1210-20) which diverted part of the waters of the Lambwath (one of the main Old Fleet tributaries) through the abbey grounds into Eschedike, Forthdike (1221-35) which improved an old fence-ditch between Wawne and Sutton and carried much of the rest of the Lambwath water, and Skernedike (1210-20) which served a grange in the north of the valley. (fig. 2). Although the large size of these channels (e.g. Monkdike 20 ft. wide, Forthdike 16 ft. wide) meant that they soon developed drainage functions by drawing some of the water off the carrs, the predominantly east-west direction adopted makes it clear that improved drainage was only a secondary preoccupation of the monks. It must have been clear to them that the natural direction of drainage was southwards, and the diversion of the Lambwath

* stint--limitation according to size of holding on numbers of livestock any person might turn on to a common pasture.

waters through Monkdike in particular must have increased the incidence of flooding in the carrs round Meaux rather than have brought any improvement. After some years, however, when the old drainage channels (especially the Old Fleet) had become choked through disuse, the drainage function of the medieval cuts came to eclipse their navigation function, for they were by then the only outlets for the waters of their headstreams. Thus, when a commission enquired into the drains and banks that existed in Holderness in 1367, the Meaux cuts figured very prominently.

Although there was some change in the pattern of drains in medieval times, therefore, there was little change in the condition of the carrs. The new channels were probably larger and straighter than the Old Fleet had been, but they entered the Hull where the level was frequently so high that they could not flow into it. Primitive sluices, known locally as clows, prevented the Hull water flowing into the drains when the river was high, but as the clows were sometimes unable to open for long periods the water in the channels then stagnated and seeped into the adjacent carrs. Although the abbey may therefore have used the carrs surrounding the island of Meaux in the same way as the other local communities —i.e. as a source of peat, reeds and fish—and may have used the margins for summer pasture, for the most part they did little to change the character of this land.

Improvements in Drainage Organisation

Few banks or drains appear to have been added in any part of the valley between about 1300 and 1550. But during this period of relative inactivity there gradually grew up a system of maintenance of existing works that took into account the area to benefit from each bank or drain, and laid the foundations for the imposition of drainage taxes. Commissions of Sewers were appointed from time to time during the fourteenth and fifteenth centuries whenever the need for some repair of existing drains and banks became apparent, but there was no regular or comprehensive system of control before the 1532 Statute of Sewers. This established Commissions of Sewers for the main marshland areas of England and Wales, each Commission having fixed procedures and considerable powers in all matters concerning drainage. The Commissioners were, like Justices of the Peace, appointed by the Crown from among local landowners, and just as Justices of the Peace exercised their authority through Quarter Sessions Courts, so the Commissioners of Sewers worked through Courts of Sewers. The Courts were assisted by juries of 24 men in each hundred that included marshland. Each jury was responsible for inspecting the drains and banks of its own hundred, deciding which of these were

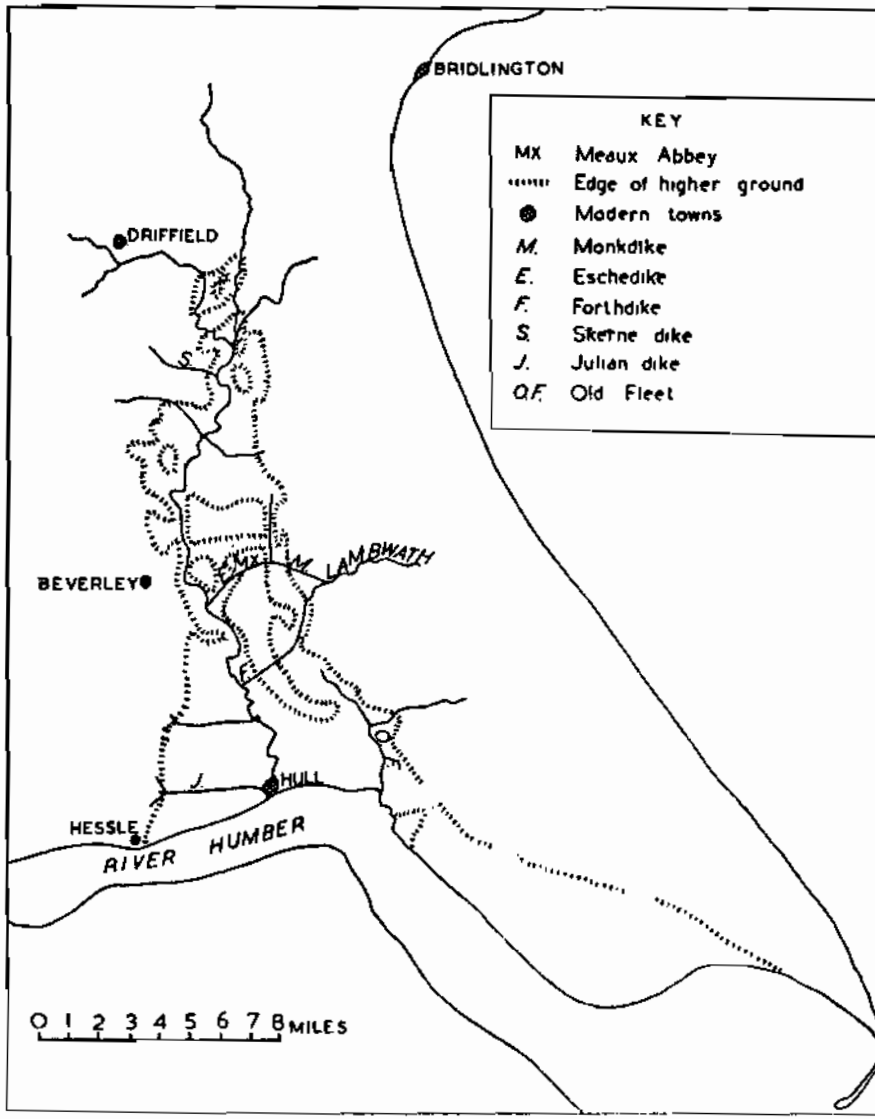

Fig. 2. The Hull valley in medieval times.

public responsibility, who should clean and repair them and how much they should be fined if they did not fulfil their obligations.

Two Courts of Sewers were held within the Hull valley. The larger and more important was the Court of Sewers for the East Parts of the East Riding, which had its headquarters in Beverley, and under which there were separate juries for North, Middle and South Holderness, Hunsley Beacon, Bainton Beacon and Dickering. The other Court was for Hullshire, an administrative county in the south-west of the valley between Hull and the Wolds. It was very convenient for Hull that this area should have a separate drainage administration, for the special interests of the town carried greater weight than they would have done if the whole valley had been under one authority. Hull was surrounded by salt and brackish water, and had no fresh water available within its walls. In 1402, therefore, a channel known as Julian Dike had been cut to carry fresh water to the town from springs in Anlaby (the site of the present Springhead water-works). This channel disrupted the system of land-drains and had been a constant source of friction between the town on the one hand and the owners and users of land through which it passed on the other. The main task of the Court of Sewers for Hullshire was to maintain a fair balance between the two sets of interests.

These Courts of Sewers were empowered to maintain old works rather than construct new drains and banks. Their records, in the form of minutes, letters and pains (lists of drains and banks with their dimensions, times when these had to be scoured or repaired, and the fines to be imposed if the repairs were not done) are now held by the East Riding Record Office and the Hull Corporation Record Office. There are very few records for the period prior to 1580, a fair number for the years between 1580 and 1660, and an abundance after 1660. This variation in numbers of records probably reflects to some extent the intensity of activity, although it is possible that some earlier records have been lost or that the earlier clerks did not bother to keep written minutes.

Prior to 1660 the Courts of Sewers were mainly concerned with the upkeep of the drains and banks they had inherited from medieval times, and which had frequently suffered from many years of neglect. Such past neglect is revealed in several records. In 1602, for example, there was a complaint by the North Holderness jury that the rudimentary banks along the Hull were more or less useless through lack of repair. More revealing still is the fact that in 1597 Julian Dike and the banks alongside were in so bad a condition that "ye inhabitants of kingston-upon-hull had no swete water coming or running to ye town but onely by boats or lighters to ye excessive charges of thinhabitants". If the valuable Julian Dike had been allowed to get into this state, the condition of the

land drains can be imagined. The Humber bank at Drypool broke during a storm in 1646, and the Court of Sewers declared that this was the result of neglect, although the inhabitants of Drypool blamed the Parliamentary garrison stationed in the township during the siege of Hull. The scouring of many drains had also been neglected during the fifteenth and sixteenth centuries, and some that joined the Hull well upstream had therefore become almost useless. Eschedike and some neighbouring smaller drains suffered particularly, and the water that the monks had diverted into this channel tended more and more to revert to a southward course. It was apparently in order to provide an improved outlet for this water that the commissioners arranged for a new channel to be cut in 1580 to carry the Monkdike waters through the eastern part of Wawne lands into Forthdike. Monkdike by that date no longer received any water from the Lambwath, but it collected by a series of feeders the water that drained into the northern part of the Old Fleet valley. Nearly all the water from the east side of the valley therefore flowed into the Hull through Forthdike after 1580, and only a few small drains continued to depend upon Eschedike clow. Forthdike clow opened more readily than did Eschedike clow as it was lower down the Hull valley where the river level was lower at low tide. A very similar change took place on the western side of the valley in 1647. The inefficiency of two drains that entered the Hull near Thearne led to the main Hull-Beverley road being flooded from time to time and the Privy Council ordered the commissioners to prevent this happening. It was decided to link the two drains to a new clow (Wharton's clow) farther south, near the present Sutton road bridge in north Hull, where the water could flow more easily into the river at low tide. Apart from these two cases, however, there was little change in the medieval pattern of drainage before 1660, and probably little change in the character of the carrs.

The year 1660 saw a marked increase in the efficiency of the Court of Sewers for the East Parts of the East Riding. A very full enquiry was made by the jury of each hundred between 1660 and 1662, and pains for the whole region based on these enquiries were written in a large book now in the East Riding Record Office. Minutes of the meetings of the commissioners, usually held about once a fortnight, were written into another large volume. The improvement in administrative efficiency revealed by these changes was accompanied by an awakening to the need for an improvement in the drainage techniques used. Some other marshland areas of England that in their original state had resembled the carrs (e.g. the Bedford Level in the Fenland and Hatfield Chase in the West Riding), had been subject to schemes of improvement during the earlier part of the seventeenth century, and had been relieved of so much of their flood water that it became possible to grow crops in some parts, while the remainder provided pasture for a longer

period each year. Details of these improvements were contained in William Dugdale's "History of Imbanking and Drayning" published in 1662, and the knowledge of what had been done elsewhere must have awakened local landowners to the potentialities of the Hull valley carrs. It was probably this that gave rise to the greater interest in drainage matters that marked the years following 1660.

1660 to 1760—Early Attempts to Improve the Carrs

The greatest interest in improvement at this time was centred upon the south-eastern part of the valley. The inefficiency of the east-west drains of that tract had become increasingly apparent, and the demand grew for a return to the natural direction of drainage southwards by the Old Fleet valley to the Humber. While the Old Fleet waters had been flowing westwards into the Hull, however, the inhabitants of Sutton had taken the opportunity to build a bank across the narrow part of the Old Fleet valley before it reached the reclaimed silt marshlands to the south. There was a narrow opening in the bank, about eighteen inches square, known as Gold Dike Stock (fig. 3). Water from the carrs to the north was allowed to pass through this stock in summer, but during the winter months it was blocked up so that the whole capacity of the drains to the south should be devoted to carrying the water off the silts and their valuable meadows. The carrs therefore depended entirely on Forthdike in winter for an outlet for their waters, while even in summer most of the water had still to drain that way. The first efforts after 1660 to obtain a reduction of flooding in the carrs therefore took the form of demands that the dimensions of Gold Dike Stock should be increased and that it should remain open during the winter. The inhabitants of Sutton naturally opposed this, and in face of such opposition the Court of Sewers could do little to help the landowners farther north, for Gold Dike Stock had existed long enough to be regarded as one of the established works that the Court was expected to maintain. The Sutton bylawmen were ordered to keep the stock clear of obstruction, and an additional channel was cut in 1690 to carry some of the water from the stock to the Humber at Marfleet. The stock may also have been kept open for a longer period each year by 1730, for its opening and closing were then controlled by a body which included four members of the Sewers jury for Middle Holderness in addition to four Sutton bylawmen. But such minor changes were far from sufficient to cope with the water on the carrs to the north, and it is not surprising that other means of improvement were sought.

The first attempt to find an alternative outlet for the water was in 1671 when Mr. Snow, one of the Commissioners of Sewers, proposed that a large new drain should be made from Forthdike to the Humber at Marfleet, passing through the higher land of Sutton

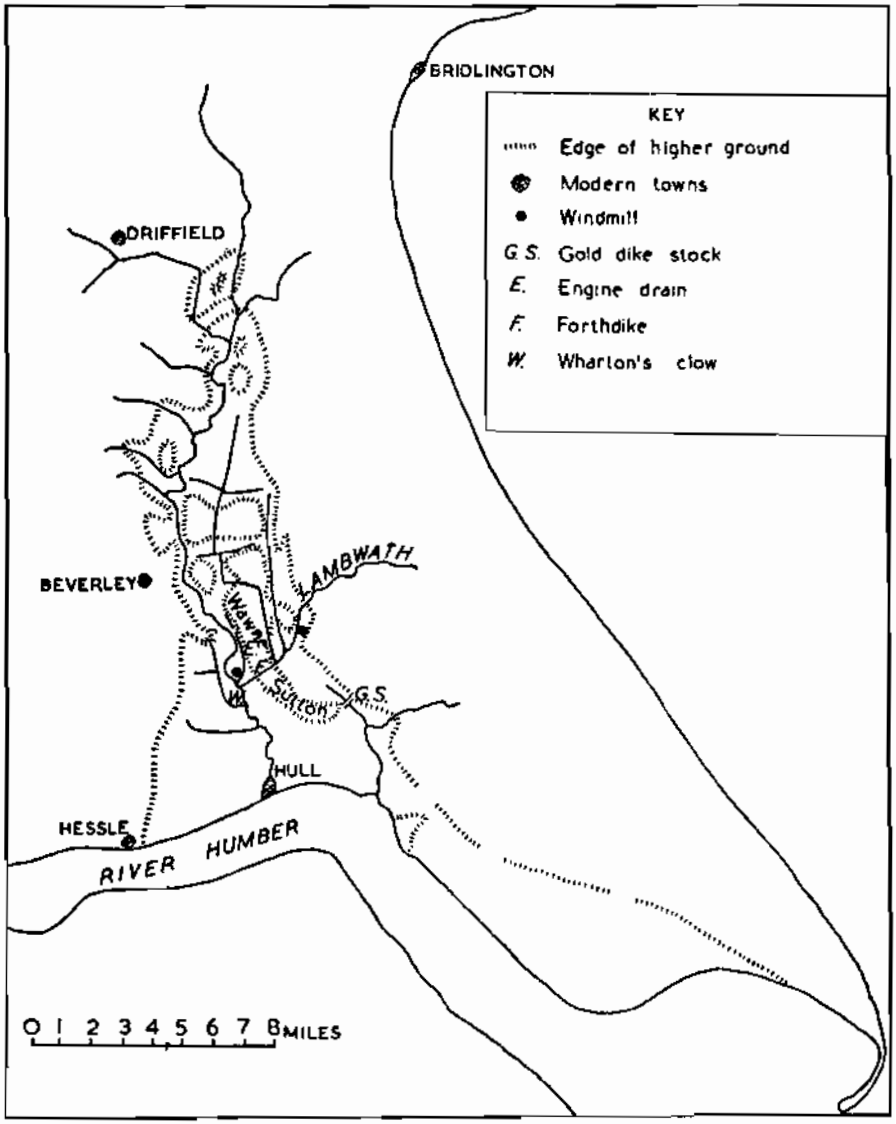

Fig. 3. The Hull valley at the end of the seventeenth century.

just east of the village. Snow was willing to cut this drain if in return he were granted the use of the drained land for 21 years. Such a scheme required the assent of the landowners and the backing of an Act of Parliament; Snow apparently could not obtain these, for nothing further is heard of the proposal.

Since there seemed to be no prospect of improvement by carrying the water away southwards, those landowners who wished to drain their carrs were forced back upon their own resources and upon alternative methods of getting rid of the water. The first person to attempt this challenge was Sir Joseph Ashe, who had been granted the manor of Wawne after the Restoration. In 1675 he produced a plan to drain Wawne carrs, and we know some of the details of this plan because it involved changes to existing drains and thus required the approval of the Court of Sewers. He dispensed with Eschedike and diverted the water that had previously drained through it round the margins of his Wawne estate into the drains that connected with Forthdike. He raised banks round Wawne (especially Black Bank on the north, whose name may derive from the peaty soil of which it was built) in order to prevent water from other parts of the valley getting on to Wawne lands, and in Wawne carrs themselves he cut a new drain (Engine Drain) and built two windmills to lift the water out of this drain into the river Hull (fig. 3). Further windmills were added at a later date, probably when the drainage of the carrs had caused the peat soils to shrink so that Engine Drain was even farther below the level of the Hull than when it was first cut. The windmills made it possible for the drain to be cut deeply into the carrs so that the water-level was kept below the surface (except when there was insufficient wind to drive the mills). Other landowners followed Sir Joseph Ashe's example; e.g. Sir James Bradshaw erected a drainage windmill in Routh in 1693, and Lord Micklethwaite announced his intention to drain a part of Swine in this way in 1726. Arthur Young noticed a number of drainage windmills or "engines" when he visited Holderness in the mid-eighteenth century, and he included an illustration of one in his "Six Months' Tour through the North of England". The Hull valley never had the large number of drainage windmills that characterised the Fenland, but there were probably a dozen or so in the area in the early eighteenth century, concentrated in the south-eastern part of the valley.

There was much less activity in the rest of the Hull valley, for the greater distance from the Humber and the powerful nature of the springs in the north-west made the physical problems of drainage more intractable. Some new drains were cut during the early eighteenth century in Brandesburton, but the main improvement came from greater supervision of the clearing of weeds and mud-banks from the Hull, which increased its efficiency as a main drain. The bed of the river was lowered in 1721 at Weel and Wawne,

where causeways that had once carried fords produced pronounced obstacles to the flow. There was also a proposal in 1711 that a lock should be constructed at the lower end of the Hull to prevent the entry of salt water, but nothing further was heard of this. The improvements to the Hull may have brought some slight reduction of flooding in the carrs in the north and west of the valley, but they were insufficient to alter the general character of the land.

Until the middle eighteenth century, therefore, the carrs remained much as they were in medieval times and earlier, except in small areas in the south-east. The local people mostly took the carrs for granted, while visitors to the district seldom went to these inaccessible and insalubrious parts, so there are not many contemporary descriptions. A few accounts do exist, however, which help us to visualise pre-drainage conditions. The depth of winter flooding varied considerably, but when John Grundy surveyed the eastern side of the valley in December 1763 he found the average depth to be between 2 ft. 4 ins. and 4 ft. 8 ins. Greater depths would probably have been encountered in the west and north of the valley. Conditions in the worst-flooded tracts are revealed by Thomas Brown's survey of Brandesburton for the City of London Corporation in 1743. He described Great Ox Carr (49 acres) as "coarse boggy land in which no cattle can go it is in a Dry Year always mown and the Sedge and Flaggs serve for young or dry cattle in the winter but this is under water 9 months at least and sometimes all the year". Ing Carr (556 acres) contained some higher parts more suitable for pasture: "Above three parts of it is nothing but Boggs upon which no Cattle ever goes and in a wett summer at least 9 parts in 10 lyes under water and the Gates or Comons* are then not worth 2d. a piece, but such summers as the three last they have been let from 2s. 6d. to 4s. The surface of the water upon Hull River is higher than four fifths of this Comon . . ."

These descriptions make it clear that the carrs had some value as areas of summer pasture for cattle, and in this way released better-drained land for use as meadow or arable. When the carrs were flooded in winter the cattle could depend upon the aftermath of the hay fields, the stubble, and hay gathered in summer. Thus the carrs fitted well into the local economy, although they were less valuable than the meadow or arable land. (The carrs let at between 2d. and 2s 6d. per acre in 1763, while other land fetched between 10s. and 20s. per acre).

Pasture for cattle was not the only use to which the carrs were put, however. They also provided reeds and rushes for strewing on the floors of the cottages, for thatching and for candlemaking, peat for fuel, brushwood for fuel and light constructional work, and some fish as a little variety in a monotonous diet. The rights

* Gates—rights to pasture a specific number of livestock.

of fishing and catching the wild fowl that abounded in the wastes were, however, frequently retained by the lord of the manor for his own pleasure. Humberstone's survey of the Leconfield estate of the Earl of Northumberland in 1570 reveals how the interests of the lord of the manor and of the villagers sometimes clashed: "To the sayd manour also belongyth a great fenne, called the Carre, th'erle hath a great marke of swannes and also many wyld fowle, and a very proffitable fishing which th'erles have alweyes reserved to their owne possession for th'use and comodyte of their house, and appoynted foure kepers or overseers, as well of the fowle as the fyshe, and every of them hath for his travayle or paynes about the same iiis. iiijd. And where as the tenauntes had comen of pasture in the same dry yeres, the dryft of the cattell dyd disturbe the bredying of the wyld fowle and especially of the wyld swannes, the late erle compounded with the tenaunts to forbere there comen in that fenne and payeth them yerely in recompence thereof xiijs. iiijd. . . ." A number of duck decoys were constructed in the carrs, e.g. in Leven, Meaux and Rotsea. These were stretches of water where tame ducks were trained to attract wild birds into the narrow end of the decoy where they could be trapped. Although fowling and fishing were important uses of the carrs, they were not valued so highly as the cattle pasture; e.g. in Leven in 1650 the pasture rights were valued at £50, the fishing and fowling at £5. The carrs were a valuable asset to the poorer cottagers, who could obtain brushwood, fuel, thatch and perhaps some fish from them at no cost. It was the cottagers and smaller farmers, too, who especially valued the right of common pasture. They therefore benefited most from the continued existence of marshland, while it was the landowners who saw most clearly the advantages of improvement and the possibilities of increasing their income thereby.

The small areas drained by windmills in the south-eastern part of the valley must have provided a sharp contrast to the rest of the carrs. The windmills could not ensure complete freedom from flooding because they could not work during calm weather, but they were able to prevent bad damage, and land could be cropped. Rape was the most popular crop, the seed being crushed locally to provide colza oil which was in increasing demand for oil lamps.

The silt marshlands derived from the old salt-marsh at the southern end of the valley were by the seventeenth century largely free from flooding, for the Court of Sewers saw that the banks and drains were fairly efficiently maintained. There was always the danger that a severe storm might break down the banks, though, and the year 1646, when Drypool banks broke, was long recalled. Stoneferry "was drowned by the force of ye waters for the time of 26 weeks and the inhabitants of Stoneferry, Sudcoates and Marfleet were enforced eyther to leave their houses or betake themselves to

their Chambers and putt forth their goods to other places, and many of their goods were drowned to their great loss and damage . . . for a longe time all people both horse and foot inhabiting that pte of Holderness were deprived of going to any markett but with boates . . ." There was never again such a serious breach in the banks. Controversy still raged in Hullshire round Julian Dike, and waterlogging and flooding were characteristic of the land through which this passed, until the Legards of Anlaby cut a series of new drains leading to Hessle Haven during the first decade of the eighteenth century. Most of silt land was under grass; Leland noticed that this was "very fruteful of medow and pasture" when he travelled through the area in the sixteenth century. There is no doubt that this part of the valley was valued more highly than the carrs.

1760 to 1830—First Major Improvements

Although the marshlands were thus far from useless during the seventeenth and eighteenth centuries, there was a growing awareness that they could be made even more productive if drainage conditions were improved. Then crops could be grown and the supply of summer pasture made more abundant and reliable. This awareness of the potentialities was particularly strong in the eastern part of the valley where it was stimulated by the sight of windmills surrounded by fields of rape and improved pasture. The landowners concerned decided in 1763 that they would make an effort to drain the rest of the carrs on the east side of the Hull as far north as Brandesburton and Burshill, and they obtained an Act of Parliament which excluded the tract from the jurisdiction of the Court of Sewers and established instead an independent body known as the Holderness Drainage with powers to make new banks and drains. John Grundy, a well-known engineer, drew up a scheme of drainage for the new authority. He proposed that the banks along the Hull should be raised, and that old drains should be linked and enlarged to form two new main drains, one of which was to follow the Old Fleet valley and enter the Humber at Marfleet, while the other was to run between the islands of higher land and the river Hull and flow into the Hull at Stoneferry just north of the outskirts of the town of Hull. Unfortunately the scheme was not carried through. This was partly a result of financial difficulties which made it impossible to take the western drain through Wawne as had been proposed since that required the payment of compensation. The amount of widening and straightening of drains that could be carried out was similarly limited. But more important in preventing the completion of the scheme was the opposition to a drain to Marfleet on the part of the navigation interests in Hull. Hull's shipping was the basis of its prosperity, and at that date all vessels had to anchor in the lower part of the river Hull, known as the Old Harbour. Any mud that might accumulate in this reach

and reduce the depth of water was scoured away by the fresh water that came down the river at low tide, and it was regarded as vital for the efficiency of the Old Harbour to have as much fresh water coming down the Hull as possible. The port interests were alarmed when they heard the proposal to carry a considerable volume of water to the Humber at Marfleet, as they feared that this would reduce the amount of fresh water coming down the Hull and thereby reduce the scouring of the Old Harbour. Various comments in the drainage records make it clear that some pressure was brought to bear upon the Holderness Drainage to abandon the Marfleet drain and send all the water into the Hull; their impecunious position probably led the Trustees of the Drainage to succumb readily to such pressure.

The drainage pattern that finally emerged in the Holderness level after 1764 thus bore little resemblance to Grundy's plan (fig. 4). Only one major new drain was made, that leading from Forthdike to the new clow in Stoneferry, and even this was only 16 ft. wide instead of 24 ft. that Grundy had recommended when the drain was intended to take only part of the water. This drain brought improvements especially to the southern carrs, where some land had increased in value by more than 5s. per acre by 1775. Even in these areas, however, flooding was still liable to occur for a few weeks each winter. The water from the carrs farther north could only reach the new drain through the old narrow winding channels, so that in many parts, e.g. Leven carrs, there was scarcely any change from the pre-1764 conditions. A plan of the Holderness level made about 1775 (of which a copy exists in the Hull City Reference Library) shows several irregularly-shaped meres in Leven and Tickton carrs. Most of the level must therefore have remained as pasture, although in places this could be used for a larger part of the year than formerly.

The improvement in the Holderness level was sufficient to inspire other parts of the valley to attempt to improve drainage conditions. Cottingham obtained a joint enclosure and drainage Act in 1766, and a new main drain was cut to join the Hull just north of the Holderness clow at Stoneferry (fig. 4). This served to improve a section of land where silt and peat marshland mingled. The landowners of the area south of Beverley that had drained since 1647 to Wharton's clow in Cottingham obtained the Beverley and Skidby Drainage Act in 1785, and a new drain was cut to allow their waters to enter the Hull lower down the river. The Hessle and Anlaby lowlands in the south-western part of the valley were constituted a separate drainage area by an Act of 1792, and improved drains were constructed to Hessle Haven. These three small drainage authorities covered between them the western side of the valley south of Beverley. This was an area where flooding had never been so severe as farther north, for much was old salt-marsh rather than carrs; therefore these small authorities were

able to cope with the problems relatively easily.

One result of these drainage Acts was to isolate from the Humber the remaining tract of undrained carrs in the northern part of the valley. This tract continued under the jurisdiction of the Court of Sewers, as also did the river Hull upon which it depended for drainage. The continued existence of these undrained carrs was a great boon to the Holderness drainage, for the flood waters were able to spread out there and exerted little pressure on the Holderness banks. When the landowners of these undrained carrs combined in 1796 to consider means of improving their lands, the Holderness Drainage was therefore far from pleased. The Drainage Trustees stipulated certain limitations on drainage works on the west side of the valley in order to safeguard the Holderness level; any banks on the west side of the Hull must be at least 150 ft. from the Holderness level banks in order to give the river sufficient space in times of flood, and so prevent it exerting too much pressure on the existing banks; new banks on the west side should not exceed the height of the Holderness level banks immediately opposite; and one stretch 300 yards in length of the new banks must be at least six inches lower than the lowest 100 yards of the Holderness banks, so as to ensure that if the river overflowed it would be the west side that suffered, not the east. The landowners of the west side carrs had no choice but to accept these limitations if they were to obtain any improvement.

There was much discussion between 1796 and 1798 as to the method that should be adopted to drain the remaining carrs. Several engineers were consulted, and they all pointed out the necessity of embanking the Hull and its principal tributaries fed by the springs, and carrying the water away from the carrs by a separate drain at a lower level. Where they did not agree was on the direction the lowland drain should take, the possible outlets being into the sea at Barmston, into the Humber at Dairycotes, or into the Hull near the Cottingham clow. The Dairycotes outfall gained the most support, for it would have provided the most adequate gradient. But the same interests that prevented the Holderness drainage opening a drain to Marfleet were at work to weigh the balance against the Dairycotes outfall in favour of an outfall into the Hull. Hull's first dock, later know as Old Dock and then as Queen's Dock, had been opened in 1778, but ships using it had to pass through the Old Harbour, so the condition of this reach of the Hull was still of vital concern to the port. The Hull Corporation, the Dock Company and Hull Trinity House therefore combined to persuade the landowners to choose the Hull outfall for their drain by offering to contribute £200 each towards the cost of cleansing and deepening the Old Harbour to make it a more efficient drain. The landowners agreed to adopt the Hull outfall, but there is no record to suggest that the £600 was ever spent on improving the Old Harbour.

The Beverley and Barmston Drainage Act was finally passed in 1798 and the new drain was cut during the subsequent few years. In addition, various channels were deepened at the northern end of the valley and all the water from north Holderness that had previously drained westwards to the Hull was diverted to the sea at Barmston. A barrier near Foston-on-the-Wolds separated these streams from the water that drained to the Hull, and the Sea End (as it became known) developed into a separate drainage region (fig. 4). In the main Beverley and Barmston area, the 300 yards of lower banks (known as the overfall) insisted on by the Holderness Drainage were placed at the southern end of the level, just north of Grovehill near Beverley.

The Beverley and Barmston level was drained more efficiently than the Holderness level, for the main drain was larger and straighter than the Holderness drain and was concerned with low-land water only, whereas the Holderness drain was expected to carry both the streams from the surrounding higher land and the water from the carrs. In spite of this advantage, however, several other factors combined to make flooding a fairly frequent occurrence still. The limitations on the height of the banks and the existence of the overfall were contributory factors, while the powerful spring-fed tributaries were difficult to embank and control. Navigation developments in the northern part of the valley added to the problems. The Driffield navigation canal had been cut to link the town of Driffield with the Hull near Emmot-land after an Act of Parliament obtained in 1769, while in 1801 the trustees obtained a new Act which enabled them to cut across a meander of the Hull at Hempholme and build a lock there. Although the Act stipulated the maximum depth of water upstream from the lock in the interests of the Beverley and Barmston Drainage there is no doubt that the agreed level was frequently exceeded and contributed towards the flooding and waterlogging of the surrounding land. These limitations on the efficiency of the drainage works meant that many parts of the level were still flooded for a few weeks each winter, while there were also occasional summer floods, as in July 1828 when the surveyor of the Drainage "sailed in a boat, without much interruption, over land and fences, in a direct line from Hull Bridge to Frodingham Bridge". In spite of the danger of floods and the consequent risk of losing the crop, most of the carrs in the Beverley and Barmston level were ploughed and grew wheat, oats and barley. Some of the lowest parts remained under pasture, however

Many of the landowners in both the Holderness and the Beverley and Barmston levels were conscious from the start of the inadequacy of the new drainage works, and the limitations became even more marked as the years passed, because the peat shrank

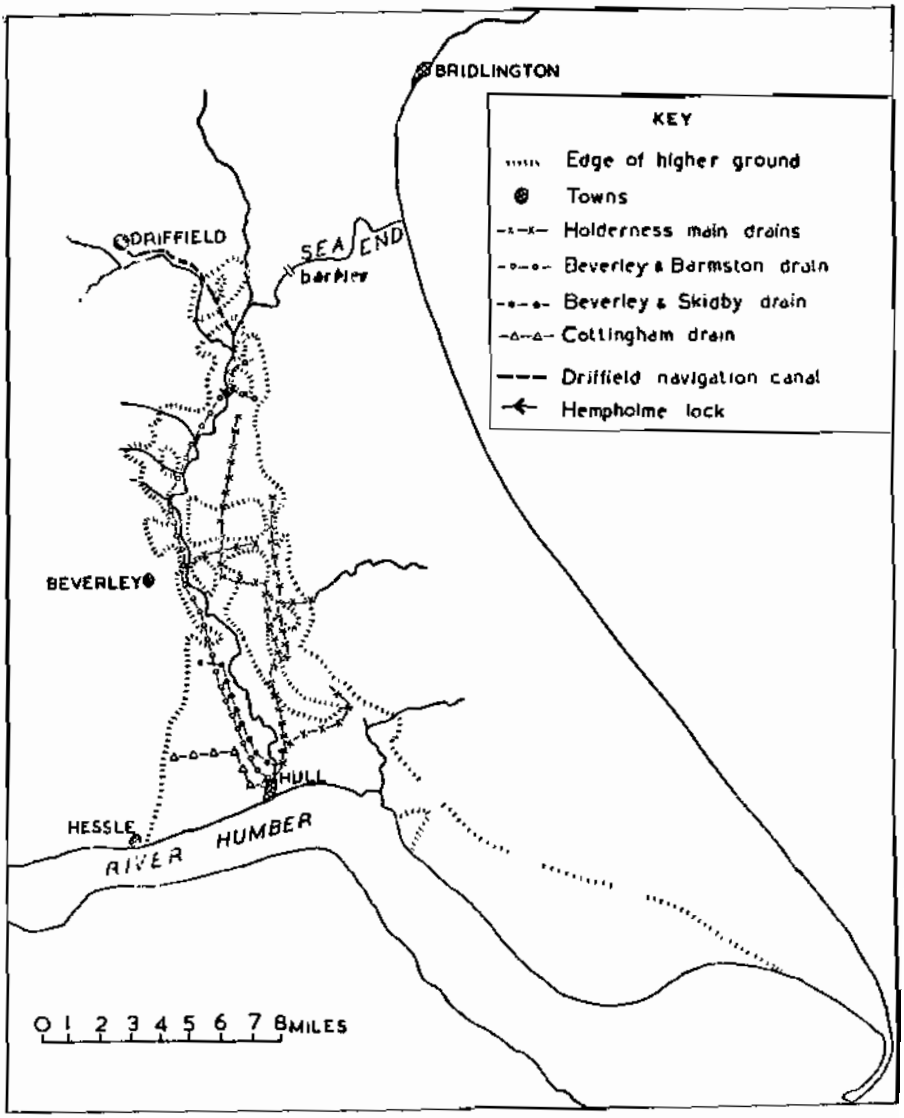

Fig. 4. The Hull valley about 1810.

when it dried out and brought some land below the level of the drains. There were reports of flood water up to 1 ft. 8 ins. deep in 1785 and 1786 on the carrs in Sutton and Wawne, the part of the Holderness level that had received most improvement from the new drain. There were a few small piecemeal improvements from time to time in this level, but the landowners felt that no great change could be expected without a drain to Marfleet. The opposition of the navigation interests to the cutting of such a drain continued at least until 1810, while from about 1815 to 1830 agriculture passed through a period of depression and there was no money to spare for drainage improvements. It was during this period of drainage inactivity, however, that the foundations of later improvements were laid. The port of Hull was developing rapidly, and more and better accommodation for larger vessels was needed. Acts of Parliament were therefore obtained which enabled two new docks to be constructed, Humber Dock, opened in 1809, and Junction Dock (now Prince's Dock) opened in 1829. These were located on the west side of the town, and channels linked them with one another and with Old (Queen's) Dock so that Old Dock could then be reached from the Humber via the other two docks. The Old Harbour thus became less vital to the prosperity of the port. This stretch of the river Hull had, on the other hand, steadily deteriorated as a drainage channel between 1780 and 1830. Warehouses had encroached on it from both sides, beds of chalk had been made for small vessels to rest on at low tide, and rubbish was frequently deposited in it. The capacity had thereby been reduced, and it formed a bottleneck ponding back the water upstream, which in turn meant that the main drains were often unable to flow into the river. When agriculture began to recover from depression about 1830, therefore, the Drainage authorities found that twenty years of neglect together with this deterioration of the Old Harbour made conditions in the carrs worse than they had been in the first decade of the century. But they also realised that they were no longer tied to sending their waters into the Hull. Another period of improvement therefore followed.

1830 to 1885 — Later Improvements

The Holderness level was the first to take advantage of the changed situation. An Act of Parliament was obtained in 1832 that sanctioned the cutting of a new drain to open into the Humber at Marfleet. It was decided to separate the upland and lowland waters, and while the water of the streams draining Holderness continued to flow into the Hull by the old main drain which was raised and embanked where it crossed the carrs, the water from the carrs was collected into the new drain to Marfleet where the clow was set lower than the old clow and where therefore there was a more adequate gradient for this lowland water (fig. 5). The lowland drain passed under the upland drain in a

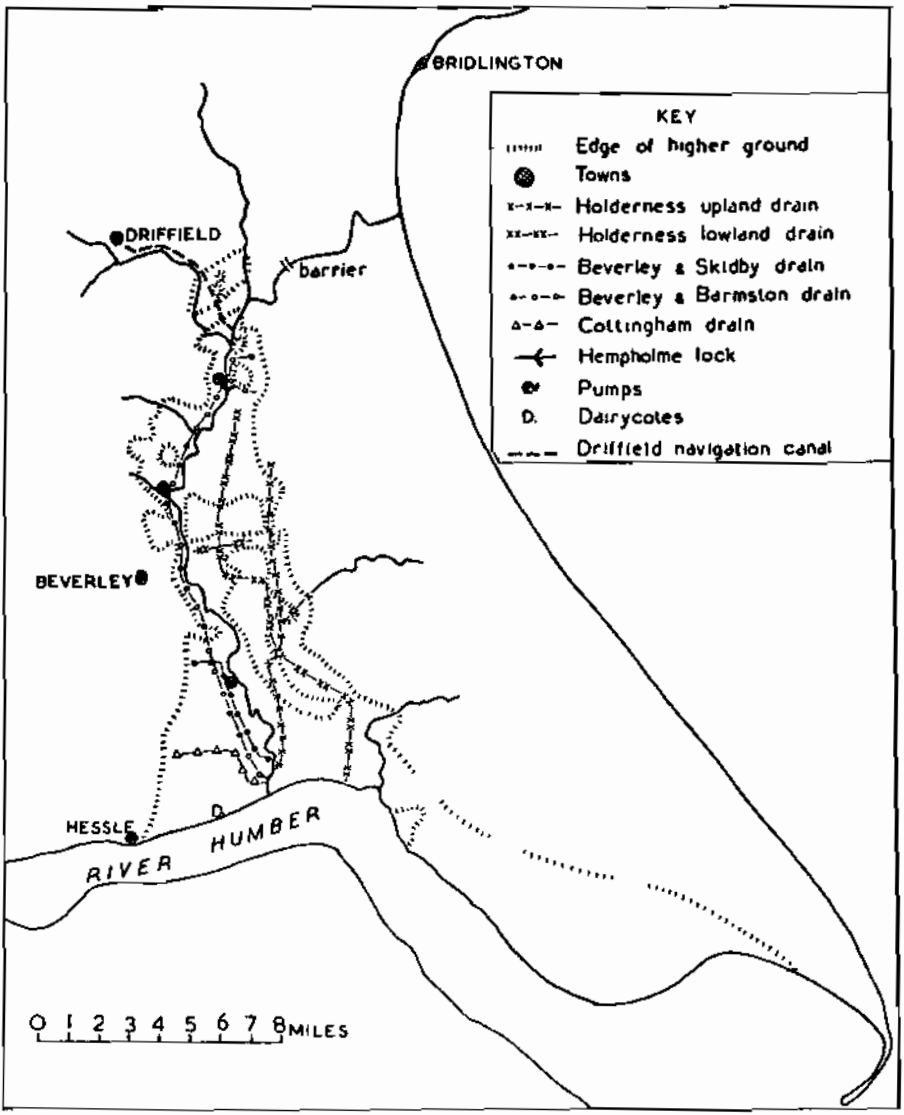

Fig. 5. The Hull valley about 1885.

culvert. At the same time as the new drain was cut, the old drains were straightened, widened and deepened. When all these changes had been carried out, the meres disappeared from the Leven and Tickton areas and flooding was much reduced. Although in 1854 one sixth of the taxable land in the level was still subject to inundation for a few weeks in winter, the improvement had been such that almost all the carrs had changed from pastoral to arable use.

The need for change was not so apparent in the Beverley and Barmston level, so that interest in further improvement developed later than on the east side of the valley. Discussion of how to obtain this further improvement started in earnest about 1846 and during the subsequent fifteen years several engineers and committees were called upon for advice. The obvious approach to the problem of removing the excess water from the carrs was to cut a drain direct to the Humber as the Holderness Drainage had done, and this was the course constantly advised by the engineers and committees. Nevertheless, although this solution was obvious on engineering grounds, it had many drawbacks when considered from other points of view. Hull's function as a port serving the West Riding and Midland industrial areas meant that by the middle of the nineteenth century it was linked to those areas by several major roads and railways. These extended across the course of any new drain linking the Beverley and Barmston level to the Humber. Roads and railways were difficult to tunnel under and the expenditure on such tunnelling or alteration would have raised the cost of such a new drain to an excessive amount. (When the Holderness Drainage cut the Marfleet drain, only one main road barred its way, for Hull's links to the east and north-east were less important and less developed than those to the west and north-west). The Commissioners of the Beverley and Barmston Drainage were most concerned with the cost when time after time they turned down proposals for a drain to Hessle Haven or Dairycotes.

The principal alternative to cutting a new drain was to improve the old drain by scouring the Old Harbour and so lowering the water level upstream in the Hull. At first the Beverley and Barmston Drainage Commissioners tried to persuade other authorities to help them with this scouring since they felt that it would benefit the drainage of the whole valley and the shipping that used the Old Harbour. The other authorities were unable or unwilling to co-operate, however, so in 1864 the Drainage undertook the task on its own. 16,000 tons of material were removed from the bed of the Old Harbour between April and July, and this enabled the Beverley and Barmston main drain to flow much more readily. Unfortunately the improvement was short-lived, for the "greasy" nature of the silt in the lower Hull valley led to the adjacent land, under pressure of the buildings, creeping into the space formed by the scouring, and causing damage to the foundations of the

adjacent warehouses and mills. The Drainage had to line the bottom of the river hurriedly with three feet of chalk to prevent its bill for compensation becoming even greater. Much of the advantage gained by dredging was therefore lost, and yet another means of improvement effectively barred.

Since the two obvious methods of improvement were closed to them, the Drainage Commissioners cast round for some other approach to the problem. They decided that a steam pump might help, and erected one in 1868 where the main drain passed under Arram Beck. This was intended to pump water from the drain into Arram Beck and so into the Hull, thus increasing the ability of the main drain to cope with the water from the carrs. The pump was not very effective, however, because the capacity of the Hull itself was limited by the lowness of the banks, and it could seldom carry extra water without spilling over the overfall at Grovehill. There was little point in pumping water from the drain into the river at Arram if the river only spilt over and returned the water to the drain at Grovehill. The 1798 Act was still in force and the Beverley and Barmston Drainage was therefore still unable to raise the banks and so prevent the water spilling back. The Commissioners made an attempt to solve this problem in 1873 by persuading the Holderness Drainage to join it in dredging the Hull, using the mud to raise the banks on both sides equally. Unfortunately this aroused the opposition of the Driffield Navigation so that little dredging actually took place.

It was not until 1880 that the impasse was finally broken. A new Drainage Act was then obtained which allowed the Commissioners to dredge the Hull between the Old Harbour and the Driffield canal, provided that they altered the lock at Hempholme to suit the lower water-level. The Act also did away with the overfall and the limitations on the height of the banks. The Commissioners immediately set to work to dredge the river bed and raise the banks and by the winter of 1882-3 the capacity of the river had been enlarged sufficiently for the pump at Arram Beck and another at Hempholme to start work (fig. 5). Flooding in the Beverley and Barmston level was thereby brought to an end. The dredging of the Hull also enabled the Beverley and Skidby Drainage to erect a steam pump at Dunswell, where its chimney until recently formed a landmark for travellers on the main road from Hull to Beverley.

Pumping was so successful in solving the problems of the Beverley and Barmston level that interest in this technique was aroused in the Holderness level, where some tracts were still flooded for a few weeks in winter. Winter flooding had increased in the level between 1840 and 1880 because many farmers in Holderness had inserted tile-drains in their fields and these carried

the rain-water away more rapidly and gave rise to an increase in the peak flow of the main drains. Much of this water drained into the Holderness upland drain and therefore did not have much influence on the carrs, but some from the islands and margins of the upland drained towards the Marfleet outfall, and the water from the carrs often stagnated until the upland peak flow had passed. The Holderness Drainage Trustees therefore toyed with the idea of erecting a pump at Marfleet to work at high tide when the clow was shut and thus increase considerably the volume of water the drain could handle. But it so happened that the Trustees were able to obtain the benefit of pumping without cost to the level, for in 1885 they made an agreement with the Company responsible for the construction of Alexandra Dock just west of the Marfleet outfall which allowed water to be pumped regularly from the drain into the dock. Water from the Marfleet drain was also sought for the King George V Dock when this was opened in 1913. This pumping enabled the drain to function more efficiently and flooding has become a very rare occurrence in this level as on the west side of the valley.

Conclusion

The drainage of the Hull valley marshlands was therefore virtually complete by the end of the nineteenth century. The present century has seen only two minor changes: the steam pumps have gone out of use, and have been replaced by two oil pumps at Wilfholme; and the Hull and East Yorkshire River Board, which has been responsible for the drainage of the whole of Holderness since 1950, has linked the Cottingham and the Beverley and Skidby drains to the Beverley and Barmston drain so that there is now only one outfall on the west side of the valley. The valley should also benefit from a Hull Corporation scheme that is at present under construction, which aims to supplement the city's water-supply by the removal of some 12 million gallons a day from the river upstream of Hempholme lock. This will reduce the volume of water the river has to cope with at times of flood.

The Hull valley is the marshland area of East Yorkshire that has seen the greatest changes as a result of drainage. The swamps, meres and salt-marshes of the tenth century have given place to land now largely free from standing water, crossed by a network of drains and banks, and given over to crops, grassland and dwellings. The carrs in particular are now better-drained than comparable tracts elsewhere in the county. Several factors have contributed to favour the Hull valley. Size was important: it was a large enough area to make large-scale schemes worthwhile and to provide a sufficient income to support such schemes. It was an area that possessed one of the most active Courts of Sewers in the country in the seventeenth and eighteenth centuries, so that

attention had long been focussed on drainage problems, and co-operation in solving the problems was readily resorted to. The existence of several drainage authorities in the valley in the nineteenth century was to some extent a disadvantage, but also provided the stimulus of rivalry. The physical problems involved were difficult, but not insurmountable, while rival interests such as those concerned with navigation were not so powerful as to override drainage interests. In addition, the two main towns in the county, Hull and Beverley, were so close to the tracts concerned that the problems of the Hull valley were probably more widely recognised and given greater attention than were those of the other marshland areas of the county. Such a happy combination of factors was rare, and it is not surprising therefore that the Hull valley is now one of the best-drained marshland areas of England.

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