E. Latham

REPORT

re BOURNE SOUTH FEN AND
THURLBY FEN DRAINAGE BOARD.

by

Ernest Latham.
F.C.G.I.
M. Inst., C.E.,
M.I. Mech. E.,
M. Cons.E., etc.,

Copy to Mr. E.H. Dennis.

1st November 1938.

Leopold C. Harvey Esq.,
Clerk to the River Welland Catchment Board,
11, Market Place,
Spalding.
Lincolnshire.

Dear Sir,

re: Bourne South Fen & Thurlby Fen Drainage.

Board - Proposed New System of Drainage.

In accordance with your request I have to report to you as follows.

1. General. I understand that the Bourne South Fen and Thurlby Fen Drainage Board have made a proposal to the River Welland Catchment Board with the idea of securing permission to pump their land drainage waters into the River Glen, presumably at the point close to the site known as Tongue End. I understand that youare desirous to know how the interests of the River Welland Catchment Board would be affected if such a proposal were put into practical operation.

The River Glen is a main river of the River Welland Catchment Board under the Act of 1930. The first necessity is, therefore, to consider the nature of this river and the functions it performs which I deal with in the next clause.

2. Regime of the River Glen. The River Glen and its tributaries pick up their highland waters at places as far afield as beyond Oakham to the West and Ropsley to the North and these waters pass down the valleys into the River. The River is canalised from near Kates Bridge whence it continues to its junction with the River Welland at a point known as the "Reservoir" where there are tidal gates beyond which the two Rivers, Welland and Glen, run out as one into the Wash. From Kates Bridge to these tidal gates (a distance of at least 18 miles as roughly measured on the map) the River is virtually a Canal running at a high level above the fens and between high earth embankments.

It is important to consider what the Catchment Basin area drained by the River Glen is as the area which the River drains is not confined to lands in the River Welland Catchment Board's area. Your Superintendent, Mr. H. Bain, informs me that some 110 square miles of the River Welland Catchment Board's territory is drained by the River Glen above Kates Bridge but without making a prolonged examination of the actual water-shed drained by the River it is quite clear that at the very least 180 square miles out of the total of 707 square miles of the Welland Basin are drained by the River Glen above Kates Bridge.

Additional land drainage is taken at the present time from the outfall of the Bourne Eau and from 4250 acres pumped into the River Glen from the Spalding and Pinchbeck area.

It is difficult to estimate the maximum amount of water which flows into the River Glen from Bourne Eau in flood time. The Bourne Eau takes water from the Car Dyke at the former's head and it is important to recognise that whatever the original system of drainage was the now derelict dyke has a low level at the point where it joins the Bourne Eau from the North and the South. The flow in the Car Dyke is from the South to the North on the Southern section and from the North to the South on the Northern section. In other words, the Bourne Eau takes water from what is virtually a sump in the Car Dyke system. In this respect it is curious to note that where the line of the Car Dyke crosses the

iver Glen there is a fresh water connection which is not used and hat from this point to where itdischarges into the Bourne Eau (a distance of over three miles) it is marked as a Main River.

In addition to the above waters there are springs in the neighbourhood of Braceborough Spa which provide additional waters to be taken by the River Glen. The Bourne Eau also takes the town water from Bourne. In brief, therefore, the total basin drained is as under:-

Catchment Basin above Kates Bridge not less than	115,200 acres.
Spalding & Pinchbeck area	4,250 acres
Catchment area being surface of canalised portion below Kates Bridge. (Estimated)	180 acres
Surface of Bourne Eau from Bourne to Glen	negligible.
Total ..	119,630 acres.

In addition to the rainfall off this acreage as already stated there is the Bourne Eau discharge which takes the Car Dyke waters and the town water of Bourne and Braceborough Spa Spring water.

3. Proposed additional duty to be put on the River Glen. In dealing with this matter I am at present not quite satisfied in my own mind as to what area the Bourne South Fen and Thurlby Fen Drainage Board are proposing to pump into the River Glen. Various figures have been given to me but for the purposes of this report I am bound to take the figure given to me by your Superintendent, Mr. H. Bain, who is quite definite that the area concerned and to be pumped will not be more than 3,000 acres.

Assuming that you had an even rainfall all over the Catchment Basin of the River Glen then these 3,000 acres would be responsible for approximately 2½ per cent of the total run off to be discharged into the River Glen and this would be the extent of the overload which the River Glen would be called upon to take. This percentage would, of course, vary with the distr ibution of rainfall over the district but I think that it is a fair figure on which to base an opinion. Of course, in addition to this overload there would be a tendancy to back up the River above the point at which the additional water is taken from the pump. Also technical arguments could be adduced to give a slightly higher percentage than 2½ per cent, but on the whole I think that this is a fair proportion to assume.

It is now necessary to consider what the behaviour of the River Glen has been in the past years and how, if at all, its condition has altered.

4. Changes in condition and behaviour of the River Glen in recent years. The embankments of the River Glen have apparently been a frequent source of trouble and the banks were last breached in 1910 when the North Bank broke near Tongue End on 3rd December and caused considerable flooding. In 1897 the North Bank also broke at Guthram which at that date was the highest flood known in the Glen. In 1882 the Glen Bank broke on the South side.

I visited the site of the first and last of these breaches accompanied by Mr. E. Bain Junior, on Friday last the 28th October and was able to see the present conditions of the banks of the River which are on the whole now in good condition.

In 1912 I am informed that although there was no actual breach the water in the Glen was in places actually at a level with the crest of the bank. Mr. H. Bain gave me this information at my interview with him at Spalding on the afternoon of Friday last, the 28th October abd I understand he personally observed this.

As far as the Board is concerned the worst danger would arise from a breach in the South Bank and should the same conditions again occur as that mentioned above then it is obvious that 2½ per cent increase of water would be bound to cause a breach resulting in the flooding of the valuable agricultural lands in Deeping Fen.

Against the above I have to consider the recent history of the River Glen which you were good enough to give me at an interview with you before I made my inspection. I understand that steady works of improvement from Kates Bridge to the sea have been going on since the year 1910, the river being cleared and the embankments repaired from time to time. It is, therefore, very unlikely that an actual recurrence of 1912 water level in relation to embankment crests will occur in future. In everything, however, the unexpected does frequently happen especially in the Fenlands which are subject to the most violent rainfalls over local areas and which may and have reached over 5" in twenty-four hours.

5. Opinion. In view of the foregoing considerations I feel that I can now give your Board a definite opinion.

I do believe that the River Glen is capable normally of taking the pumped land drainage from the Bourne South Fen and Thurlby Fen Drainage Board always provided that the area to be drained does not exceed the figure given me of 3,000 acres. It is now necessary to consider the safe-guards which would have to be conformed to if pumping is to be permitted into the River Glen and they must be of a very strict character because they must ensure that so far as it is humanly possible no breach or crack in the banks of the River Glen may occur which would cause the flooding of very valuable agricultural land existing in the Fens. I deal with this matter below.

7. Safe-guards to be imposed. It was suggested to me by Mr. H. Bain that a water level guage could be established at a point where the pumping will take place and that the pumping would have to automatically stop when the water in the River Glen at this point reaches a certain level or mark on this gauge. This certainly seems to my mind to be one practical method of dealing with the situation but I can conceive physical conditions where this would not be a sufficient safe-guard, since with advanced notification of heavy hill rains the normal control level would require to be lowered and it would seem, therefore, that at least two level marks would have to be established; one for normal purposes when perhaps general rainfall over a large area may cause the River Glen to become swollen and one a lower level mark for conditions when there is abnormal rainfall on the hills. This idea of two marks, however, seems to me to be one which it would be very difficult to put into practical form as someone would always have to determine which mark was the governing factor at any particular time. I think, therefore, the responsibility of determining when pumping must stop so as not to endanger the River Glen will have to rest with one individual so that the water level recorded on the water level gauage could be used in conjunction with information as to rainfalls coming through on the telephone from the upper reaches of the River Glen. Such an official would have to consider what the gauge water level was in conjunction with rainfall conditions in the Glen Basin area and would have to be in telephonic communication with Tongue End to ascertain the water level and a-lso with such rainfall stations as there may be in the high lands. I would suggest that for this purpose the Superintendent to the River Welland Catchment Board or his senior Assistant should assume this responsibility.

8. Alternative Scheme. You suggested to me than an alternative scheme would be to recondition the Car Dyke for at any rate a portion of its length from Bourne Eau to the River Witham and thus isolate it from the Bourne Eau. The drainage of the Bourne South Fen and Thurlby Fen Drainage Board could then be pumped into the reconditioned Car Dyke. You also pointed out to me that incidentally such a scheme would enormously benefit the drainage system of the area under the control of the Black Sluice Drainage Board.

I agree with this view and I think if practicable it is the ideal scheme. I cannot, however, pursue this matter at this juncture for the following reasons:-

(a) A long and elaborate survey would be required.

(b) This might shew that after the hundreds of years which have lapsed since the Car Dyke was originally constructed the Fenlands levels may have altered so much as to render a return to the old system either impracticable or far too costly to be considered.

(c) Both the exploration of this scheme and its contruction would take so long that it could not come into operation in any event for some years, and I understand the present application for permission to pump into the River Glen is to gain more or less immediate relief.

9. Summary. Summarising the remarks made in this report, I am of opinion that it will not be possible for the Board at any Public Enquiry to resist an application to pump the drainage from the Bourne South Fen and Thurlby Fen Drainage Board area into the River Glen. If any such enquiry is held, however, the River Welland Catchment Board must press for some particular safe-guard arrangements to be entered into.

I understand that Mr. E.J. Silcock, M. Inst.C.E. has been advising the Bourne South Fen and Thurlby Fen Drainage Board in this matter and if so instructed by the River Welland Catchment Board it might be advisable, that, on your behalf, I should confer with him on this matter.

In this event some friendly arrangement between the River Welland Catchment Board and the Bourne South Fen and Thurlby Fen Drainage Board could be arrived at as to safe-guards and then this point, (i.e. the permission to pump) need not be dealt with at any Enquiry which may be held into the matter by the Government.

I would strongly recommend that in any event a tidal gauge be put up at Tongue End immediately and water levels observed daily or in time of heavy rainfall and flood every few hours. This I think would be an absolute necessity before any specific and satisfactory safe-guard could be arrived at.

Yours faithfully,

(Signed) Ernest Latham.
F.C.G.I.
M.Inst.C.E.,
M.I.Mech.E.,
M.Cons.E.,

Chartered Civil Engineer.
Chartered Mechanical Engineer.

36, Victoria Street,
Westminster.
LONDON S.W.1.