Drain outfall at a low tide level in excess of 7.25 O.D. would require the raising of the Vernatts Banks to 13.0 O.D. on each side wherever necessary, together with additional pumps to replace the two old pumps at Pode Hole Station, which would not be capable of discharging into the Vernatts at the higher levels which would prevail.

In addition it would be necessary to pump the water from the Counter Drain and the Gravel Drain Outfall of the Baston, Langtoft and the Deepings Internal Drainage Board into the Vernatts Drain when the level exceeded 9.5 O.D. at Pode Hole.

The estimated capital cost of these works is £130,000.

17. Conclusions.

The result of the investigation shows that a 1947 flood may only occur about once in 80 years, on the other hand no one can predict by the 'law of averages' what the cycle of floods or adverse tidal conditions may be. To be practical one must consider whether it is prudent to risk a flood on occasions or whether the consequences will be so grave that all possible steps should be taken to avert valuable land being flooded.

Considering the various Internal Drainage Boards concerned, those worse affected must be those where outfalls into the River Welland are situated further upstream towards Spalding and those draining the largest areas of low land.

Taking this criterion, the Deeping Fen, Spalding and Pinchbeck Internal Drainage Board, with 34,000 acres of land at levels ranging from 3 to 8 O.D. relying on a pumped outlet into the River, together with the Baston, Langtoft area with their 4,800 acres relying on a free discharge into the Vernatt's Drain, are both bound to be vitally affected by any obstruction to the free flow into the River Welland at all times.

It may well be considered in addition, that the Lord's Drain area of the South Welland Board, some 5,400 acres with an average land level of 10 O.D., and the areas served by the North Welland, Five Towns and Risegate Eau districts, will also be vitally affected by a major flood in the River Welland.

If the Board decide to proceed with one or other of the proposed schemes and carry out the necessary works to provide full facilities for

dealing with large floods, it should be borne in mind that Scheme (1) which consists of enlarging the tidal section of the river would enable the Board to put 'its own house in order' and provide the facilities for good outfalls for its Internal Drainage Boards, even better than they may have been in the past.

At the same time it would considerably improve conditions for the Glen outfall and allow a discharge level some 3 ft. lower at Surfleet than the level allowed for under the proposed improvement scheme. (in the design of the Glen Scheme allowance could not be made at that time for any improvement of the Welland channel).

Scheme (3) would allow for the Internal Boards to have full control of their own levels at all times by pumping.

The report and hydrographs show that the design figures for the River Welland Major Improvement Scheme and the proposed Glen Improvement Scheme conform very closely to the latest hydraulic data and investigations. It also shows that in a full flood, the River Glen peaks some hours before the Welland and that any improvement works to the Glen would help to increase this time factor and improve conditions for all concerned.

18. Ministry Grants.

As the problems involved in this report are those of the tidal section of the river, it may be anticipated that any work approved by the Ministry of Agriculture, Fisheries and Food would be eligible for the higher rate of grant usually applicable to the tidal length of the river.

19. Acknowledgements.

This report has been produced in co-operation and after full discussions with the Regional Engineer of the Ministry of Agriculture, Fisheries and Food, and the Engineers to the Deeping Fen and the North Welland Internal Drainage Board, and I am very indebted to them for their valuable help, co-operation and information supplied. I would particularly like to thank the Ministry Engineer, Mr.R.H. Miers, M.B.E., A.M.I.C.E., who has made a particular study of these problems in neighbouring areas and who has given us a greal deal of valuable advice and help on the subject.

Of our own staff, all have played their part, and in particular Mr. G.E. Bowyer, B.Sc., (Hons), who carried out the complete survey of the tidal section of the river and has spent a greal deal of time on research, investigations and calculations on the intricate problems involved in producing this report.

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November 1959.

Plans accompanying this report are:-

Fig. 1. Map of Welland Catchment Area.
Fig. 2. Hydrograph for River Welland at Folly River Junction.
Fig. 3. ditto.
Fig. 4. Hydrograph showing flow of water onto Washes.
Fig. 5. Hydrograph at Marsh Road Sluices.
Fig. 6. Hydrograph of River Glen at Surfleet.
Fig. 7. Combined hydrographs at Surfleet.
Fig. 8. Backwater curve, Tab's Head to Marsh Road Sluices.