

APPENDIX V.—WAIKATO RIVER IMPROVEMENT.

[Report by WILLIAM C. BREAKELL, C.E., to the Waikato Drainage Association.]

IN accordance with the request of your association, I have taken a series of levels from the Waikato Bar to Pungapunga, on the Waikato River, also from the mouth of the Whangamarino to its junction with the Maramarua, and from said junction up the Whangamarino (about six miles), also from above-named junction up the Maramarua Creek to the canal to the coal-mines (about eight miles).

Gauges have been erected at many points along the river (Waikato) for the purpose of registering tide and flood levels, and also to indicate the irregularities of the summer levels, and where they occur.

Reference to the longitudinal sections herewith attached will afford confirmation of what I have above mentioned.

The cause of these irregularities is that the present (but not the true) bed of the river is very uneven and irregular, and the width of the waterway varies considerably; consequently the sectional area of the waterway is variable. Reference to the cross-sections attached clearly delineate how uneven at the various points is the sectional area of the river-bed.

The longitudinal section hereinbefore referred to shows the irregularities of the present bed of the river, the depths thereon shown being the deepest part of the river at the various points (see note on long section), and said long section indicates, to my mind, the original sole of the river before the impedimenta, snags, and *débris* piled up the now-existing sand-banks. I am satisfied that if some action is not taken soon the bars and sand-banks will continually increase and extend, and the consequence will be increased number of floods and their longer duration.

The sand-banks near Okahu on old charts (1960) prepared by Imperial Government are shown and described as shifting sand, but their position does not appear to have changed since the date of the chart, but they have evidently risen in height, and extend further up the river.

The sand-banks higher up the river are of modern creation, many being formed and covered with willows within the memory of residents in the vicinity.

It is to be noted that there has been no controlling body, consequently no attempt has been made to preserve the river.

All kinds of *débris* are brought down by the floods and allowed to remain where they strand, consequently a sand-bank is rapidly formed: then all kinds of vegetation and waste from the flax-mills settle there; then a willow is felled or falls into the river, is floated to the first bank that retains it, takes root, and in a very short time an island is formed to further reduce the sectional area of the waterway; consequent thereto the flood-waters are checked in their course to the sea, hence floods and their long duration.

Flood-level.—If you refer to the longitudinal section you will ascertain the height of flood-level (1907) at various points along the river, the heights given being from a datum 50 ft. below height of said flood on a spring tide (h.w.) at the wharf, near the Waikato Heads.

Low Water.—The longitudinal also shows and gives the levels of low-water spring tides, and higher up the river the levels, at the various localities (on the river), dead summer level; consequently at the various points their difference of level is easily ascertained both as to flood and low water.

The Swamp.—When reporting to the Government as to the drainage and reclamation of the Whangamarino and Maramarua Swamps I stated it was impracticable to do so under existing conditions, but that if the Whangamarino and Maramarua Creeks were enabled to exercise their original and natural functions, the drainage and reclamation of said swamp would be simple and comparatively inexpensive.

I stated that the initial point was the Waikato River, and that until the present bed of said river was either dredged or otherwise deepened to its original "sole" the drainage of the swamps was impracticable; but I also stated that I considered it would be practicable and a comparatively simple matter to lower the Waikato River so as to render it feasible to drain the swamps above referred to.

If the channel of the Waikato was dredged to its original sole and all impedimenta removed, I apprehend that you will agree with me, after referring to the sections and diagrams hereto attached, not only will it be possible to drain the swamps, but freedom from continued serious floods is assured.

The local "freshes" would be discharged into the ocean long before the country freshes arrived here; hence the serious accumulation of water during flood-time would be considerably reduced. Further, the guidance of the currents by groins or otherwise would give increased scour, and probably materially improve the Waikato Bar. Reference to the sections will, I think, afford you all the information you require, and illustrate matters referred to herein; and it is plainly indicated by them the reason of the water during flood-time being detained, the obstructions and difference in sectional area being the cause.

There is one question to which I ask your attention. I consider the functions of the proposed River Board are too restricted. They should have full administration, at least as far as Hamilton, for reasons hereinafter explained.