We must draw attention to the characteristic of all shingle rivers, which tend to flow alternately on their right and left banks as the shingle piles up and diverts their courses by gradually raising the whole river-bed. The result is that the Wairau may at any time flow against its left bank, following the old main channel, which must therefore be constructed and regulated to a size adequate to carry the whole of its water. On the other hand, it may swing against the right bank, as it threatens to do in more than one place at present. This tendency may at any time have the effect of forcing the whole of the water into the Opawa, which would result in a serious disaster to Blenheim and the rich lands adjacent. As the Wairau has for long tended to the left side of the delta, the time must be approaching when the direction would be reversed in the absence of works to prevent it.

Another cause of flood to Blenheim and the lands adjacent is the Taylor River and the Fairhall, Mill Creek, and Doctor's Creek, which join the Taylor above Blenheim and run in the old course of the Omaka. The old course of the Omaka was insufficient to carry this water, and even now with the stop-banks which have been erected it is doubtful whether it is large enough. The 1911 flood demonstrated this inadequacy, and the town was flooded 4 ft. deep in Market Square. It is to be noted that the banks have been raised since this flood, but the waterway, especially under the bridges, is insufficient.

A proposal has been made to divert the waters of the Fairhall and Mill Creek into the Opawa at or about the confluence of these streams, a course which we consider necessary, though the most favourable point can only be determined after further investigation.

The Tuamarina River is the only tributary of the Wairau of any importance on the left bank. It flows down the Waitohi Valley, through large swamps which fill up in flood-time, and is the cause of much flooding in it own valley and at its confluence with the Wairau. There is a small system of banks, and further work is required before the flat lands can be cultivated. It flows into the Wairau very close to the point where the channel is badly constricted, and a very small rise in in the Wairau causes backing up in the Tuamarina.

Rainfall.

Unfortunately our rainfall records are somewhat inadequate. Around Blenheim the normal rainfall for the last twenty years is about 30 in., for the last four years only 24 in., and as low as 19 in. in one year. Nevertheless the Wairau district has suffered more from floods—notably the floods of July and November, 1916—than for the last eighteen years. This shows how little information as to floods can be obtained from the rainfall records, as floods are due to special storms. Probably the rainfall at the headwaters of the rivers in the ranges is very much greater and more liable to sudden bursts.

Flood Characteristics.

From the information before us, which is anything but ample, it appears that the amount of water carried by this river in proportion to its drainage area is very great. This may be accounted for by the steepness of the sides of the valleys of the river and its tributaries, together with the regular and steep fall, straightness and open nature of the channels, allowing the flood-waters to reach the head of the delta in the shortest possible time. The scantiness of the soil on the hills and the imperviousness of the rocks and the absence of forest are also contributory causes.

The high mountains encircling the watershed carry more or less snow in winter, the melting of which on a sudden change of temperature may cause a flood out of all proportion to the recorded rainfall.

In addition to the floods in the main Wairau caused by north-westerly rains, southerly rains cause floods in the lower tributaries. Floods from the mountains take longer to reach the plain than do those from the lower tributaries, so that in the event of southerly rain following northerly rain, by twelve to eighteen hours the flood-waters reach the plain simultaneously. When this occurs we have what is called an " old-man flood."