

From the fact that the greater the flood the less frequently does it occur, it follows that the annual risk of damage is relatively less for big floods at long intervals than for smaller floods at frequent intervals, even taking into consideration the fact that the damage done by the big flood may be several times that done by smaller floods.

Your Commissioners hold the view that, whatever the character of the ultimate works, partial protection—viz., protection against medium floods—should be provided as early as possible, especially as this can generally be done without unduly, if at all, increasing the ultimate cost of any complete scheme for dealing with larger floods. Absolute immunity from *all risk* of damage by floods is not obtainable.

EXISTING REMEDIAL WORKS ABOVE NGAHINA.

Although not included in the order of reference, a brief review of these works is necessary as bearing upon the lower Waihou below Ngahina. Previous to the erection of the stop-banks on the west or left bank of the upper Waihou above Ngahina a considerable portion of the flood-water from big floods, such as that of 1910, overflowed the left bank and found its way across country, rejoining the Waihou River lower down, about five or six miles below Ngahina. When the left river-bank above Ngahina has been effectively stop-banked (work approaching completion) it is obvious that in the event of another big flood the whole of the flood-discharge will be by way of Ngahina, and that consequently the settlers for about six miles below Ngahina, and also those in the direction of Hikutaia, will be in a worse position as regards flooding than they were previous to the construction of the works above Ngahina. The value of their lands must therefore continue to be further depreciated until such time as more or less adequate protection is afforded them.

PHYSICAL CHARACTER.

For some distance below the Ngahina Bridge the present channel, without overflowing its banks, would not accommodate more than 25 per cent. of the maximum flood-discharge, and for some twelve miles has only about 50 per cent. of the required discharging-capacity. This capacity can be increased in three ways: (1) By dredging the channel until its cross-sectional area multiplied by the velocity equals the desired discharge; (2) by building levees to enclose the flood-waters, thereby increasing the height of the floods and consequently the cross-sectional area until it is adequate; (3) by a combination of the above methods, striving to balance the amount of material dredged with that required for the levees. The levees may be placed close to the existing banks, thus necessitating the greater raising of the floods, or may be placed some distance back, thus involving less disturbance of the natural conditions by raising the flood levels. In this connection it must be remembered that the value of the waterway over the berms is small as compared with the deep water in the main channel, while it involves interference with large areas of the best land. In common with most rivers running through alluvial lands, the best land is immediately along the banks.

Under the provisions of the Waihou and Ohinemuri Rivers Improvement Act, 1910, the betterment principle operates in such a way that the riparian owners have to bear all the loss of land without adequate payment, while those more remote from the river whose physical betterment is greater (generally much greater) obtain this without any loss of land.

NAVIGATION.

The Commission is of opinion that the improvement of the river from the sea to Paeroa to give 5 ft. minimum depth at low water, and the proper maintenance of the channel to this depth, is of supreme importance not only to the lands between Ngahina and the sea, but also to the whole district; and, as the country grows in value and becomes more thickly populated, the river, interconnected by canals with the Piako and other rivers, as a highway for internal communication and for the export and import trade of the district will become much more valuable. No scheme for river-control below Ngahina should be entertained which does not contain as an integral feature the development and improvement of the river for navigation.