The Wairau River outlet and harbour-mouth: About 1907 the Wairau Harbour Board constructed a training-wall shutting off the old outlet of the Wairau flowing north to the sea, and by making a cut through the boulder-bank diverted the river straight out to the sea. This had the effect of giving a shorter and more direct outlet for the escape of flood-waters. To what extent this advantage will be maintained depends altogether upon the preponderating influence as between river-floods and south-east gales. An interesting series of blue-prints (Plan No. 10) is attached to this report showing the constant fight for supremacy that is going on between the river and the littoral drift.

History and Condition of Present Works.

This has been so well and fully described in the report of the Wairau River Commission of June, 1917, that your Commissioners consider it unnecessary to further enlarge on this aspect of the matter, except in regard to the following particulars:—

(*a.*) "Opawa Breach": A careful examination of this spot, where the Opawa leaves the Wairau River, convinces us that the danger of floods in the Wairau River becoming more and more diverted down the Opawa channel is a very serious one and calls for immediate remedial measures. The injunction granted some years ago restraining the Lower Wairau River Board from closing the Opawa breach, whilst possibly legally justifiable, was in our opinion quite opposed to what was necessary when viewed from an engineering standpoint.

(*b.*) The Fairhall River, at present running along the original Omaka channel, has, where it flows through Sections 21 and 23, built itself in so that it is now running along a well-defined ridge which is higher than the adjoining lands. The result of this is that when the Fairhall overflows its banks at this point the whole of the country right down to the Taylor River and for some mile and a half to the south is flooded. The suggestion to divert the Fairhall from near this point direct into the Opawa has for its object the prevention of this overflow, with its consequent flooding of some four to five square miles of country.

(*c.*) The Waihopai River, which, near its junction with the Wairau, threatens to break into the old channel, known as "Gibson's Creek," running down through Renwicktown and into the Opawa, has so far been prevented from doing so by the construction of groynes at its confluence with Gibson's Creek. The largest of these groynes, owing to its pointing somewhat down-stream, is being considerably undermined—in some places as much as 3 ft.—for nearly half its length. To prevent the ultimate collapse of this portion of the groyne short spur groynes should be constructed at intervals along its upper side, and the willow plantation continued farther down towards the river-edge.

Travel of Shingle in Rivers.

It is repeatedly asserted by witnesses, in regard to shingle-rivers, either that the bed is rising or that more shingle comes down than formerly, or both. The fact that a shingle-bank appears in some reach of the river where formerly no bank existed doubtless leads people to the belief that the bed as a whole is rising, but it will be found as a rule that where such a bank has been formed a corresponding channel has been cut or deepened, and that the mean level across the river-bed at any point is fairly constant, or fluctuates within very narrow limits of a constant level. (This does not apply where large quantities of mining debris enter a river.) An instructive instance of this is seen in the bed of the Wairau River at the Renwicktown traffic-bridge (Plan No. 3), where two cross-sections of the river-bed, taken in 1918 and 1920, while showing considerable divergence in the surface contour of the bed—channels having been formed where formerly banks existed, and *vice versa*—yet the mean level of the bed as a whole taken right across does not show a variation of more than 3 in. On the other hand, the cross-sections taken over a number of years at the railway-bridge crossing the Wairau show not only changes in the surface contour of the bed, but also considerable differences in the mean bed-level, the maximum difference between 1911 and 1916 amounting to nearly 3 ft. The lowest observed bed-level was in 1916, and this may be