According to the published meteorological reports, the nearest station at which observations of rainfall have been taken is at Oamaru: from these it appears, as might be expected, that the quantity of rain in the district varies considerably. In Dr. Hector's tabular statement referred to, the average annual rainfall in the watershed of the Opihi is given at 28 inches. The four years for which I have the published returns show 16¼ inches in 1871, 20 inches in 1872, 28 inches in 1873, and 21¾ inches in 1874. In the last-named year rather more than 5½ inches, or one-fourth of the whole annual rainfall, occurred in the month of September, whilst the total fall for three successive months in the same year, April, May, and June, amounted to only 1½ inches, or a mean of ½ inch per month. Taking the average of the four years above named, there were four months out of the twelve in which less than 1 inch of rain fell within the whole month. It is obvious therefore that, as in so many other cases, it is mainly upon the tidal-water that dependence must be placed for the scouring power at Milford, although the fresh-water discharge would occasionally afford valuable assistance on the occurrence of floods or freshes.

Proposed Works.

Having described the general physical features, in so far as they affect the question under consideration, I now come to the proposal of Mr. T. M. Hardy Johnston, C.E., whose recommendations are described in his final report, dated 19th October, 1877, and are shown on the several drawings which accompanied it. From these it appears that the south pier, as scaled from the plan, is proposed to be 1,200 feet in length (from *B* to *D* on the accompanying drawing), and the north pier 1,050 feet (from *G* to *E*). From the inner ends of each of these piers wharf-walling would be constructed along the eastern shore of the lagoon, to the extent of 500 feet from *H* to *G*, on the north side, and 600 feet from *A* to *B*, on the south side. The mode of constructing these piers and wharves would be similar in principle throughout, and consists generally of timber-framing and blocks of concrete within, so placed as to admit of settlement. Where necessary the interstices between the blocks and piles are intended to be filled with liquid concrete, either as mass-work or in bags, the outermost or seaward faces of the piers being protected by large blocks deposited pell-mell.

Mr. Johnston further proposes to cut a channel between the River Opihi and Mill Creek, at a point about 1½ miles westward of the lagoon entrance (*I* to *J*, on plan), so as to direct a considerable portion of the flood-waters of the river through Mill Creek, with a view to create a more direct and equal scour through the channel between the lagoon and the sea, and facilitating the formation of a large and deep basin within the entrance. The banks of the Mill Creek at its lower end are proposed to be rectified and protected by training-walls of fascine work.

Estimated Cost of Works.

With regard to the cost of the piers and wharf-walling, just described, Mr. Johnston estimates that in their first stage, which he describes as provisional, they will cost £67,837, including £3,670 for the diversion of the Opihi River, and 10 per cent. for contingencies on the whole; also that the measures requisite for consolidating and completing these works would entail a further expenditure of £24,090, thus making a gross outlay of £91,927 for the harbour works proper; which, added to the sum of £7,500 for a branch railway to Temuka, would bring the total of Mr. Johnston's estimate to, in round numbers, £100,000.

Opinion as to Proposed Works.

The general principle of the design put forward by Mr. Johnston is sound, and would be quite suitable, assuming the forces at command in this case to be sufficient to overpower the shingle in such a manner as to maintain a good navigable entrance channel at all times. The character of construction which he proposes is also adapted to the conditions, in so far as it would admit of the subsidence which would be certain to occur as the work advanced, and, subsequently, in times of exceptional floods. The first and cardinal point, however, to be determined in this case is: Whether or not the scouring power due to the influx and efflux of the tidal and fresh waters is sufficient, under the most favourable conditions of training, controlling, and directing works, for securing a permanent approach, with a sufficient depth for navigation purposes, between Milford Lagoon and the sea? Upon this, I much regret to be obliged to say that I am unable to express a favourable opinion, for, having regard to the exceptionally large quantity of shingle continuously passing along this part of the coast, and also to the limited character of the tidal and fresh-water discharge under ordinary conditions, and the comparative infrequency of floods, it appears to me that the physical conditions which prevail at Milford are so adverse as to render the success of any works which may be undertaken there so extremely problematical, and the prospect of any adequate benefit being derived from them so uncertain, as, in my view, to render it inexpedient and undesirable that the large outlay should be incurred which would be necessary for their construction.

Instances can be adduced where a navigable approach of limited depth has been formed and maintained across the line of shingle-drift; but, in all the cases with which I am acquainted, where even a moderate amount of success has been achieved, there the travel of the shingle or sand has been much less formidable in extent, and less persistent and continuous in character, than along the sea-front at Milford. Moreover, were the piers to be completed to the full length contemplated in the first instance, namely—to 1,200 feet and 1,050 feet for the south and north moles respectively—I feel assured that by the time these structures had reached the points contemplated for their termination, the shingle along the beach would have advanced so far seaward as to travel around the end of the southernmost work, and, in the absence of the requisite scouring power to which I have alluded, would inevitably block up the entrance channel between the moles for a considerable portion of each year.

A material augmentation of the velocity of the currents might be produced by bringing the heads of the two piers closer together than 500 feet, the distance proposed by Mr. Johnson; but, notwithstanding all that it is practicable to do in this direction, the probabilities of success are so remote, that, having regard to the great outlay required, I am reluctantly unable to recommend the construction of any harbour works at Milford.