

As the result of the works at Kakanui has been referred to in support of the proposed harbour at Milford, I may observe that, in so far as regards the quantity of shingle, and the rate of movement along the coast, which form such all-important elements at Milford, the conditions are so entirely different in the two cases that no comparison can be drawn between them. I may further remark that the piers proposed by Mr. Johnston would necessitate the erection of a series of groynes, for a considerable distance along the north-east side of the entrance, in order to retain the shingle in sufficient quantity to prevent the north pier from being outflanked by the sea, as it certainly would be in the absence of such provision, seeing that the supply of shingle would be cut off from the north side, whilst the beach was gathering southward of the south pier.

*Estimated Cost of Mr. Johnston's Works.*

With regard to the sufficiency of the amounts stated as the probable cost of the proposed works, upon moneying out the quantities computed from the drawings furnished by Mr. Johnston, and adopting the prices he has supplied as the basis, I find that the south pier and wharf-wall, together 1,800 feet in length, if completed to the full height contemplated by Mr. Johnston, would cost £229,700; and the north pier and wharf-wall, together 1,550 feet in length, likewise completed to the full height, £173,600: giving a total outlay required, exclusive of the cost of the groynes, of £403,300.

The greatest depth within the lagoon generally, and that only for about one-half its breadth, is from 3 to 4 feet at low water, or 10 to 11 feet at high water of spring tides, and about 8 to 9 feet at high water of neaps. A considerable amount of dredging would therefore be necessary in order to accommodate small coasting vessels and steamers, the cost of which should be added to the above-named sum.

The Secretary, Marine Department, Wellington.

I have, &c.,

JNO. COODE.

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## NAPIER.

SIR,—

5, Westminster Chambers, London, S.W., March, 1880.

Having duly considered the facts and data contained in the several documents transmitted (in accordance with the memorandum which I framed when in the colony), for the purpose of enabling me to report on the works I should recommend in order to provide a suitable harbour for the Port of Napier, and having also examined the plans and report of Mr. J. McGregor, C.E., with reference to his proposal to form a harbour at Napier Bluff, I have now the honor to submit my report on the whole subject.

I should remark, by way of preface, that when in the locality I personally examined the whole length of the sea-beach and foreshore along the eastern front of the Town of Napier, and thence around by the Bluff to the harbour, and the beaches and boulder-banks on the northern side of the entrance. I also visited the mouth of the River Tuki Tuki, and the sea-beach for some distance to the north and south of it; my inspection of the sea-frontage of this particular district being greatly facilitated by the courtesy of the Hon. Colonel Whitmore, M.L.C., then Colonial Secretary.

I understand that my opinion is requested on the following points: First, with reference to Mr. J. McGregor's proposal for a harbour to be formed at Napier Bluff; second, the works I would recommend for the provision of a suitable harbour for the Port of Napier; and third, whether, in view of the future commerce of this port, it is desirable to construct a bridge across the harbour, commencing at the inner extremity of the west quay on the south side, and extending to the Meanee Quay, near the site of James Street, on the north side; and also, whether the introduction of one or more swing spans across the principal channels would modify any objection which might otherwise be possibly entertained to the erection of such a bridge.

Before proceeding with the consideration of these three important points, it is desirable that I should refer to a few of the governing physical conditions of the site, and briefly describe the works which have been already executed for the improvement of the entrance channel, and the effects which have been produced thereby. A careful study of the salient features is essential to a correct understanding of the principles involved, and cannot fail to afford a key to the proper solution of the questions upon which my opinion is desired. I may mention that inasmuch as the Resident Engineer of the pier works, Mr. Weber, presented a lucid report to the Napier Harbour Board in March of last year, wherein he dealt in detail with the changes which had taken place in the entrance from time to time prior to the construction of the training works, and described the conditions of the shingle travel, &c., it is unnecessary that I should again go over this ground, except in general terms.

### *Changes in Entrance Channel.*

Numerous records are available showing the changes which have occurred in the configuration and width of the entrance channel, consequent upon alterations in the points and outlying banks since 1851, the date of the first survey of Port Ahuriri District. From these it would seem that, prior to the execution of the pier works, the distance between the points or heads of the shingle banks on either side of the entrance had steadily increased, and that, notwithstanding frequently recurring fluctuations dependent upon the prevailing weather, there was, as might have been expected, a loss of navigable depth proportionate with the increased width of water-way between the points; nor could the scouring agency be effectively utilized for keeping open the entrance whilst the banks were subject to frequent alterations in position and form, seeing that under such conditions the action of the currents was being continually brought to bear upon fresh ground. It is not a matter of surprise, therefore, that there was a loss of depth in the channel from 15 feet at high water, as shown on the Admiralty chart of 1855, to an average depth of 9 feet, as appears from the pilot's returns of 1873.