

or either, suitable for concrete can be obtained in large quantities near either or both sides of the entrance; and, if so, particulars should be sent of the position with relation to the entrance of the site or sites whence they can be obtained, and approximately the quantity, which may be arrived at from the area and thickness of the deposits; a box of about one cube foot containing a fair average sample of such shingle to be sent to England, also one or more samples of about one-eighth part of a cubic foot of clean sand from the beach; or, if the character of the sand on the beaches in different parts of the locality should vary, a sample of each might be sent, with notes as to the best mode of transport, and approximate cost per ton delivered at the starting-point or root of each of the breakwaters.

6. *Fresh Water Supply*.—Information will be useful as to the supply of fresh water available for steam power and general purposes near the sites of the suggested works, on either side, especially as to quantity, quality, and extent of fluctuation.

C.—Prices.

7. Unless intimation be given to the contrary, it will be taken for granted that the information as to prices of labour, timber, ironwork, &c., given in replies furnished by Mr. Simpson, in October last, to Sir John Coode's queries with relation to the Upper Harbour, will apply in the case of works at the entrance, subject to some addition being made for the distance from town. Any particulars by the Engineer as to the percentages or allowances to be made on this head will be valuable.

8. *Sections*.—Transverse sections should be furnished of the north-eastern portion of the sand-hills, and of the sand-flat on the western side of the entrance, upon the respective lines numbered 1 to 7 inclusive on Drawing No. 2; also a longitudinal section on the line Z, Z, on Drawing No. 2, and also on the lines of the proposed east and west breakwaters. The longitudinal scale for all the above-named sections to be 200 feet to an inch, and the vertical scale 20 feet to an inch. They should all be plotted with figured heights from a datum line corresponding to low water of ordinary spring-tides, as previously described.

JOHN COODE.

PATEA.

SIR,—

5, Westminster Chambers, London, S.W., June, 1879.

Having carefully investigated and considered the documents and data which have been forwarded to me from the colony, I am enabled to submit the following report on the improvement of the Patea River and Harbour.

Physical Conditions.

In their respective reports, Mr. Carruthers and Mr. Thomson have described the leading physical conditions of the river, and have referred to the benefits which would be derived from an improved entrance. Although these documents are doubtless in the recollection of many, it is nevertheless desirable, in order that the nature of my recommendations may be clearly understood, that I should here give a brief description of the river, more particularly of that portion between the bridge and the sea, to which my attention was of necessity especially directed during my visit to the locality in May of last year.

General Description of the Course of the River.

Patea River, which rises under the slopes of Mount Egmont, is about 60 miles in length; its course is extremely sinuous, and its bed encumbered by many obstructions. The influence of the tidal flow is said to extend to 20 miles above the Town of Carlyle. The information available on this head is vague, and but little which is reliable seems to have been recorded of the actual condition of the river beyond the eel-weirs which the Natives have constructed, about 6 miles above the bridge. The accompanying drawing (No. 1) gives a plan of that portion of the river to which I shall more particularly refer—namely, from about three-quarters of a mile above the bridge to the sea. It will be observed that along this length, with the exception of one abrupt bend northward of the bridge, the low-water channel is in fair train, and comparatively uniform both with regard to curvature and width, the latter being not less than about 200 feet. The river is represented as discharging into the sea at the north-west side of the boulder-bank, this being the normal position of the outfall under the conditions which formerly existed, but are now changed by the diversion of the ebb and flood currents, due to the partial construction of the work which was commenced soon after my visit to the colony.

Depth of the Existing Channel.

At the abrupt bend above the bridge much of the useful effect of the outgoing current is mis-spent, as we find that on the concave sides of the curves immediately below the projecting point on the north bank of the river there is an abnormal scour, and a useless depth of from $2\frac{1}{2}$ to $3\frac{1}{2}$ fathoms at low water. From the bridge downwards to the sand-hills the ruling depth is mostly 6 feet at low water; thence to the sea the channel rapidly shoals until the bar is reached, between the east end of the sand-spit and the boulder-bank, where the average depth at low water of spring tides is only 2 feet, and has been as little as 6 inches; there are, however, special conditions with reference to the frequent changes in the channel at the outfall, to which it will be requisite now to refer.

Changes at Entrance.

The prevailing winds are north-westerly, from which direction they are said to blow for nine months in the year. The heaviest seas on the bar are caused by winds from W.N.W. to N.N.W.; it follows, therefore, that the prevailing waves impinge on the beach with an easterly bias, resulting in an all but persistent tendency to drive the outfall channel towards the east. Hence it is found that the position of the entrance oscillates between the boulder-bank on the east and the western head, the opening up of the channel in the latter direction being due to the fact a strong fresh, not being able to escape with sufficient rapidity by the route near the boulder-bank, forms for itself a direct passage across the sand-spit, and thus runs seaward with less resistance than by the course along the western face of the boulder-bank. This new channel is in turn driven eastward by the surf, and hence it is