

We had a long discussion with Mr. Wellman, and criticised as fully as we could his assertions as to the capabilities and advantages of his system of suction-dredging. We think there is sufficient evidence to justify us in recommending the adoption of the plant detailed in Mr. O'Connor's report; that is, a suction hopper-dredge capable of lifting from 1,200 tons of shingle per day; the capacity of the hopper to be 300 tons, on a draught of about 7ft., and a speed of six miles an hour, provided with surface condensing-engines of ample power and all latest improvements.

The capacity of this plant is apparently considerably in excess of the requirements; but, considering that there is some uncertainty as to the amount of dredging that the Board may find it necessary to do, both on the shingle accumulation and the sand in the harbour, and that there is a probability of shoals being formed outside the harbour by contending currents, we think it is advisable that the Board should have ample dredging power at its command. A suction-dredge of the above power, with a hopper-barge of the capacity for 300 tons, will, we think, insure every reasonable chance of being able to deal with all contingencies that may arise.

We annex a sketch-plan of the most suitable method of working this dredging-plant, the suction-pipes being extended from the hopper-dredge to the beach on staging arranged as shown on plan; this would command a length of 700ft. of the beach, and would be sufficient, in our opinion, to prevent any increase in the accumulation of shingle. There are, however, some points in the details of this arrangement which can only be decided by actual experience, the principal of which is in the effect of dredging a large basin or hole in the shingle at the water edge, and the manner in which the waves will re-fill such an excavation; in other words, in what manner will the sea "feed" a stationary dredge; and, if not satisfactory, then what amount of travel in the suction-pipes is it necessary to provide for daily or weekly? Your-engineer, Mr. Marchant, as well as Mr. Wellman, concur in the necessity for having some experience as to the action of the sea under these circumstances, and we fully agree in the advisability of having some preliminary dredging done before committing the Board to a large expenditure on plant.

The Board has a steam hopper-barge of 100 tons capacity, and a Priestman dredge of the largest size. Mr. Marchant represented that for an expenditure of £300 or £400 he could commence dredging shingle on the beach near the breakwater at the rate of from 300 to 500 tons per day, and at a cost of about 3½d. per ton dredge and discharge at Dashing Rocks. This is a very reasonable cost; indeed, it is less than we would have thought possible by a Priestman dredge, and we would strongly recommend that dredging by this machine be commenced as soon as possible, and from the observed results the requirements of the suction-dredge can then be more fully determined.

We recommend the Board to instruct the Engineer, Mr. Marchant, to visit the locality where Mr. Wellman is working with his suction-dredge, and inspect its working. We should have expected that there would be excessive wear on the pipes and pump from the friction of the shingle and sand. Mr. Wellman assured us that the wear was trifling, but it would be as well to make sure of this before determining on the adoption of the suction-dredge.

As it is impossible for us to assure the Board that the system of suction-dredge advocated by Mr. Wellman, and recommended by Messrs. O'Connor and Goodall, will work satisfactorily under the peculiar conditions existing at Timaru, we would take the precaution to advise your Board to make such an arrangement with Mr. Wellman that the liability of proving the suitability of his dredge for this kind of work shall rest with him: for this purpose he might arrange to erect the plant and maintain it at work for six months, when, if satisfactory, the Board would take it over; but if not, he should be required to remove it at his own expense, or make such modifications as experience pointed out to be required.

The Board being provided with dredging-plant above indicated, and having to dredge every year the calculated quantity of, say, 120,000 tons of accumulated shingle, will be in no worse position than many important harbours which are only kept open by continual dredging, often of far greater quantities than is calculated as necessary in this case. The breakwater now being constructed at Napier is subject to the same trouble from travelling shingle, and anticipated damage to the coast north of it.

Before this work was commenced, Messrs. C. Napier Bell and D. H. Scott were called to report on the scheme, and pointed out the risks to which the work would be liable from the travelling shingle; on which subject the report (dated the 23rd May, 1884) shows that "all the anticipated effects consequent on the stoppage of the shingle by the construction of the breakwater might be remedied by excavating the shingle which accumulates on the windward side of the breakwater, and transferring it to the exposed part of the coast on the lee side." In the case of Napier the annual cost of thus removing the accumulation was estimated at £4,700 a year, which has not deterred the Napier Harbour Board from undertaking the work.

In order to be able to give an approximate estimate of the cost of the plant and fixed work which would be required to carry out the dredging by suction-dredge, we have, in consultation with Mr. Wellman, prepared a sketch-plan of the staging and other erections to be put up on the beach, from which it appears that the plant, steam screw hopper-barge to carry 300 tons, with suction-dredger, piping and fixed staging on the beach, would cost about £14,800, and the yearly expense of working would be £3,971; half of this cost would be chargeable to dredging shingle, and the other half to whatever other work the dredger should be employed on when not dredging shingle; thus the cost of dredging 120,000 tons of shingle would be about 4d. per ton.

It is possible that when details of construction of plant are drawn out and drawings made for the necessary staging, that your Engineer may be able to see his way to somewhat reduce the estimate of cost here given; and in order that he may fully investigate our figures, we have sent herewith all the details and calculations on which we have founded our estimate of cost.

Your Harbourmaster kindly gave us some particulars respecting the "range," that is, the wave undulation inside the harbour, which is found to be troublesome to vessels moored at the