

ALTERNATIVE No. 2—BY DREDGING.

Although I have already stated that there are only 90,000 tons of shingle per annum to contend with, yet, to be quite safe, I am willing to presume that the amount may be 120,000 tons, or, say, an average of 500 tons daily to be removed in 250 working-days, which I take as a fair number of working-days that may be got out of a year.

I cannot agree to add 15,000 tons per annum for the accumulation of Caroline Bay, as it is not possible that the shifting of shingle at the south of the breakwater would prevent the usual quantity of sand from travelling round the breakwater and so increase the quantity to be shifted, for as soon as a ton of shingle is removed there will be another to take its place, to be subjected to the sand-making process; and the base of operations is so small that were it the case that it were so affected, the amount would be so insignificant that it would be inappreciable.

Nor can I concur with Mr. O'Connor that the dredging-capacity should be 1,500 tons per day of eight hours. One-half that capacity should be enough, as any unusual necessity for clearing away the shingle could be met by working extra hours.

I would therefore recommend the adoption of a pump hopper-barge capable of lifting 300 tons per hour, and having hopper-capacity for 150 tons of sand or shingle, with the best and most improved engines, indicating (50) fifty-horse power.

This vessel should be able to fill her hopper, proceed to opposite Dashing Rocks, discharge, and return, in about one hour and a half, including all necessary stoppages. This would be equal to five trips a day, or 750 tons gross daily. Such a barge and pump would cost about £4,000, and, with staging, hand-crane for suction-pipe, and contingencies included, the whole plant would not exceed £5,000. The cost of dredging and dumping the spoil, after taking into account every working cost, interest of capital, depreciation of plant, and contingencies, would be from 2½d. to 3d. per ton, and the total cost per annum for shifting 120,000 tons at 3d. per ton would therefore be £1,500 per annum, and I am fully convinced that this estimate is far in excess of the actual amount that will be incurred.

In all other matters I fully concur with Mr. O'Connor's views.

I have, &c.,

JOHN GOODALL, M. Inst. C.E.

DISCUSSION.

THE reports having been read, the Chairman said,—I see Mr. O'Connor makes an addition to the accumulation for a quantity ground up. Mr. Goodall declines to admit that addition. Both agree that preparation for action is immediately necessary, but Mr. Goodall is more moderate in his views.

Mr. Teschemaker: I understand Mr. O'Connor thinks that if we take away some shingle, there will be less sand to go round.

The Chairman: Yes; but Mr. Goodall says that though we do shift a quantity of shingle, we still leave a sea-face, and there would be the same grinding.

Mr. Stumbles quite agreed with Mr. Goodall there.

The Commissioners were then invited to attend, and a conference was begun by Mr. Teschemaker asking for an explanation of the difference between their estimates of the quantity of shingle to be dealt with.

Mr. O'Connor said he reckoned on an average of 80,000 yards a year, Mr. Goodall on 60,000. He (Mr. O'Connor) derived his information from Mr. Marchant, who made the average over a number of years 75,000 yards, and allowing a little margin, he (Mr. O'Connor) made this, in round numbers, 80,000 cubic yards. He had also checked this result by making independent calculations of the accumulation as it now stands. He did not know where Mr. Goodall got his 60,000 yards from. This was the chief difference between them. He (the speaker) made it 80,000 yards, on the average of the last 12 years.

Mr. Goodall said he arrived at his figures by taking Mr. Marchant's measurements for the last five years, as he did not consider the earlier measurements so trustworthy as the later ones, and five years was long enough time to found an estimate on. At the same time he was quite willing to provide for a larger quantity.

Mr. O'Connor said Mr. Goodall apparently took the measures of individual years as being more correct than the total to date. But these measures of individual years were only got by subtracting the measures of earlier years from the total at any time, and all were referred to Sir John Coode's plan as their base. Starting from the state of things shown on that plan, they found 900,000 cubic yards accumulated in twelve years, or 75,000 yards a year. The amount of accumulation fluctuated from year to year—in 1888 it was only 40,000 yards—so the average was taken over a long period of years.

In reply to questions by members, Mr. O'Connor said in some years much larger quantities might arrive. The calculations made in 1881 by Mr. Austin and himself were being proved to be fairly accurate, and this showed that the accumulation was proceeding steadily. The area of the gathering-ground was over-estimated in 1881; on the other hand the rate of accumulation had not been quite so great as was then reckoned on, but the two errors balanced, so that the progress of the shingle along the breakwater was just what was calculated.

Mr. Stumbles: You prefer to shift the shingle rather than extend the breakwater?

Mr. O'Connor: Yes; the figures in the report are in favour of that course.

Mr. Stumbles: But would it not be doing better with the money to spend it in a work which would be useful in the course of time, by sheltering the harbour?

Mr. O'Connor: The report deals with that question also. You would have to go out more than 1,000ft. before you increase the shelter at all. The breakwater already reaches to more than