

though it seemed possible that the shingle-spit on the east side would have to be assisted to scour by dredging, with the view of widening the channel so as to make up for the waterway cut off.

Mr Reynolds's reason for advising the dredging here is that he considers, unless the grade-lines specified by Sir John Coode are approximated to, the berthages for shipping at the wharves, &c., will be rendered less safe owing to an increased velocity attained by the current, due to the upper training-wall (*vide* his report)

Having these considerations in view, Mr Reynolds shows an alternative line for the training-wall, which he would recommend if the Board desired to do without dredging, pointing out at the same time that the alternative can be made so as to work into his first proposal if at any time dredging is decided on, and it is desired to build the walls from above the Buller Bridge. This alternative commences 700ft. above Martin's Island, and runs into Sir John Coode's line at cross-section FF

From the Buller Bridge, downstream, to the proposed commencement of this wall the river-bank would be protected with hand-packed rubble. Bank-protection of the same class is shown for 2,000ft. above the Buller Bridge, and the head of Martin's Island is also to be protected.

Turning now to Mr Bell's proposal This commences at the Buller Bridge, and leads downstream near the west bank of the river When it reaches about 500ft. above Martin's Island its course falls very close to Mr Reynolds's alternative line, and the two locations from this onward are practically identical until they reach cross-section FF where they merge into Sir John Coode's line. Mr. Bell's shows a small amount of dredging along the edge of the heavy shingle-spit on the east side of the river sufficient to widen the waterway to 500ft. Viewing these two schemes, the question of dredging above the wharves towards the Buller Bridge, to secure a grade-line previously referred to, which is an important factor in one of the schemes, requires to be first considered. I would advise that this, in common with all dredging undertaken inside the tidal compartment, will have a temporary tendency to shoal the bar, as there is a certain amount of detritus disturbed by the dredge, but not actually lifted, which the current during freshes acts on, and carries gradually out of the river While this is passing over the bar it must be detrimental to a regular continuance of deep water thereon. Add to this the estimated cost of such work, as already noted, and these points, I think, virtually place on one side any plan including heavy dredging operations, leaving Mr Reynolds's alternative line and Mr Bell's under consideration. As already mentioned, from cross-section FF to 500ft. above Martin's Island there is no choice, both lines preserving the same course. Above this Mr Reynolds's line merges into bank-protection, while Mr Bell's shows a training-bank in shallow water There is very little between the courses, but of the two I prefer Mr Bell's, as commencing to train the river sooner, and inducing its currents into one particular channel for a longer distance upstream. I shall, however be quite prepared to find that some of the bank-protection proposed by Mr Reynolds may eventually prove necessary and, if so, it will have to be executed, but need not be undertaken at present. Mr Reynolds's recommendation that the walls in the upper reaches of the river should be kept a little low I will keep carefully before me, and act on, should it seem desirable so to do.

*Consideration of Middle Section.*—Considering the middle section from cross-section FF to the mouth of the lagoon, a distance of 3,700ft., it will be found that both reports agree—that the lines are one and the same, and vary very little from that laid down by Sir John Coode, except that Mr Bell's plan exhibits an entrance to Martin's Island to allow of access by water, which it would be advisable to leave when constructing the wall. At the lower end of this length of training-wall, where an opening is left to provide for drainage of the lagoon on both plans, the works are curved slightly to the west, with the view of lessening the amount of dredging required by making the future channel more to the west than Sir John Coode intended—that is, more in the present deep water Also, as is very lucidly explained by Mr Reynolds, the curved course will more effectually train the river-currents, bringing the currents during the early part of the ebb into play, as well as those approaching half-tide.

*Consideration of Lower Section.*—The lines suggested in connection with the outer training-walls on the west side, though not precisely similar, do not greatly diverge from one another, and the ends of the walls on the two plans coincide exactly as to length, if the shorter section provided by Mr Reynolds is alone considered, and the outer extension, for which he made provision if considered necessary in the future, is eliminated. Mr Bell specifies that the wall on the portion of his line which crosses the present fairway should not be constructed until the new channel is dredged. On the east side of the river both show a training-wall, starting from the existing training-wall and trending seawards and towards the west. On this point both are agreed as to position and length, the walls being counterparts of each other As in the case of the west training-wall, however, Mr Reynolds shows beyond this a future extension.

With regard to the west training-wall below the lagoon, in the position this is placed by Mr Bell, it conducts the centre-line of the channel sought to be established seawards, in a line parallel with the outer ends of the breakwaters but, instead of being in the centre of the channel, it is nearer the west breakwater A tendency of the line of fairway towards the east breakwater, he explains, would be likely to be objectionable, as the prevailing ocean-currents, which here travel in a south-easterly direction, meeting at an angle the currents going north, cause the resultant direction on the bar, and outside it, to lie between the two, in a direction which varies as their respective forces vary, but which is always inclined to fan out towards the east, being the most sheltered side of the harbour, thus preventing a straight run out over the bar, and nullifying a large amount of scouring-power The possible advisability of extending the breakwaters now being seriously discussed is another reason for keeping the fairway from trending to the east, as in the event of an extension the position would be aggravated, and the deepest water would be found near the east breakwater, which in the heaviest weather experienced here—namely N.N.W. to