PAPERS RELATING TO THE RIVER TYNE, MARCH, 1836

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649312795

Papers relating to the river Tyne, March, 1836 by The River Committee

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

www.triestepublishing.com

THE RIVER COMMITTEE

PAPERS RELATING TO THE RIVER TYNE, MARCH, 1836

Trieste

PAPERS

RELATING TO

THE RIVER TYNE,

ORDERED TO BE PRINTED

BY

THE RIVER COMMITTEE,

MARCH, 1836.

NEWCASTLE:
PRINTED BY T. AND J. HODGSON, UNION-STREET.
1836.

MR. RENNIE'S REPORT.

London, June 17, 1816.

THERE is, perhaps, no river in Great Britain on which it is more difficult to give a satisfactory opinion, as to the best mode of improving its navigation, than the river Tyne. In this river not only is great depth wanted, but likewise great width, to accommodate the immense number of ships which resort to it; these two qualities, however, are incompatible with each other. If the width of the river were to be contracted by a solid embankment, its depth would be increased, but then the space for the accommodation of shipping would be lessened; and, as a less quantity of tide water would thereby be admitted, it would have less effect in keeping down the bar; but this is not all, for when ships are working into the harbour with an adverse wind and flowing tide, there would be less current to carry them across the bar, so that in gaining depth of water in the channel of the river, care must be taken that the depth on the bar be not diminished. A solid embankment on the side of the river must, therefore, be avoided, or at least limited to a certain extent, and other means devised to effect the object; but to both there is a limitation, and, therefore, it becomes a nice point to settle with precision what depth can be obtained and maintained in the river Tyne, between its mouth and Newcastle Bridge, without contracting it to a degree that may prove materially injurious to the navigation.

From the very correct survey of the river Tyne, within the limits I have specified, and of its mouth, made by Mr. Giles

in the year 1813, and also the soundings and sections taken by him, it appears that on the 30th day of May, 1813, being the second day after new moon, the rise of tide, from low water to high water at Shields, was 14 feet 11 inches; at Hebburn Quay, the same day, it was 12 feet 5 inches; at Newcastle, 11 feet 8 inches. The second day, after the first quarter, being the 7th of June, it rose 9 feet at North Shields, 8 feet 2 inches at Hebburn Quay, and 7 feet 7 inches at Newcastle. The second day after full moon, being the 16th of June, it rose 12 feet 7 inches at North Shields, 10 feet 8 inches at Hebburn Quay, and 10 feet 2 inches at Newcastle Quay. The second day after the last quarter of the moon, being the 23d of June, it flowed 11 feet 3 inches at North Shields, 10 feet at Hebburn Quay, and 8 feet 8 inches at Newcastle.

When the first and second observations were made, the wind was easterly, and blew fresh: when the observations after the full moon were made, it blew a strong northerly wind; but when the last observations were made, it was nearly a calm.

Many other tides were observed, as will appear by the sections or tables which accompany this report; from the inspection of which, it will appear that many of them differ considerably from those I have described. Taking, for example, the second day after new moon on the 30th of June, when the weather was moderate, the rise was 15 feet 2 inches at North Shields, 12 feet 2 inches at Hebburn, and 11 feet 3 inches at Newcastle: the neap, on the 7th of July, at North Shields, rose 8 feet 7 inches, at Hebburn Quay 8 feet 2 inches, and at Newcastle 7 feet 3 inches.

From the first set of observations I have stated, namely, the 31st of May, it appears that the rise at North Shields was 2 feet 6 inches more than at Hebburn, and 3 feet 3 inches more than at Newcastle; from the second observations, on the 7th of June, it appears that the rise was 11 inches more at North Shields than at Hebburn, and 1 foot 8 inches more than at Newcastle: from the third observations on the

16th of June, the rise at North Shields was 1 foot 11 inches more than at Hebburn Quay, and 2 feet 5 inches more than at Newcastle; and on the 28d of June, the rise at North Shields was 1 foot 3 inches more than at Hebburn Quay, and 2 feet 7 inches more than at Newcastle. Thus, the difference on these four respective tides at North Shields and Newcastle, was 3 feet 3 inches, 1 foot, 5 inches, 2 feet 5 inches, and 2 feet 7 inches. But the tide of the 30th of June, when the weather was calm, the difference was 3 feet 11 inches; the quantity of tide water thrown into the Tyne at each tide therefore varies exceedingly. This variation depends not only on the state of the tides themselves, but on the winds and on the quantity of fresh water which is in the Tyne itself; this renders it exceedingly difficult to draw any correct inference from calculations founded on data so very variable. It appears, from the observations made on the tides by Mr. Giles, for about four months, that the average rise of springs at North Shields was about 14 feet; at Hebburn, about 11 feet 10 inches; and at Newcastle, about 11 feet 7 inches; thus making a difference of rise, between North Shields and Hebburn Quay, of about 2 feet 5 inches, and of Newcastle 2 feet 8 inches. The average neap tides, for about the same period, flowed at North Shields 8 feet 10½ inches, at Hebburn Quay 7 feet 9½ inches, and at Newcastle Quay 7 feet 2½ inches; thus making a difference of rise, between North Shields and Hebburn Quay, of about 1 foot 1 inch, and of Newcastle of about 1 foot 8 inches. The tide observed on the 31st of May, though not an average spring tide, as it rose 14 feet 11 inches, is that which was taken as a data for all the soundings marked on the plans. This was done to save time; for had the soundings been delayed until the average spring tides had been ascertained, a principal part of the summer would have been lost. From the soundings, it appears that the whole quantity of water in the Tyne, between Shields Narrows and Newcastle Bridge, at the low water of the 31st of May, 1813, was about 214,262,000 cubic feet, and that at high water on the same day it was about

940,888,000, thus leaving 726,621,000 cubic feet for the quantity of tide water thrown into the above district. The velocity of the current of the flowing tide in springs, above Shields Narrows, is about 3 knots per hour at half flood; and about half ebb, the current is about 3¾ knots per hour. The width of the river is, however, so very various, that the rate of the current varies in almost every part of it, and is generally the greatest when Jarrow Slake is just covered, which is a little before half flood. Vessels entering the harbour at this time, frequently derive advantage from this great expanse; for if they enter with an adverse wind, the increase of current helps them over the bar, when they otherwise would not be able to enter the harbour at all. This slake is of great extent, covering upwards of 350 acres, and when the water is covering it, there is an increase in the velocity of the current of nearly one quarter of a mile per hour, an increase of material advantage to the shipping; and, indeed it forms a considerable portion of the area of the river between Shields Narrows and Newcastle Bridge; the whole of which, including this slake, is about 1694 acres at high water. Although a great extent of space to receive tide water is essential to the preservation of a good outfall, it must be observed, that the most advantageous space for the reception of this tide water is not the surface exclusively, which is in a considerable degree the case with the Tyne, where there are large sand banks, which are not covered with water until nearly half flood, after which the water has not so great an effect in scouring the bottom as at an earlier period of the flow, the like takes place in the ebb. In the Tyne, the sand banks are so numerous and high, that the flood is far advanced before they are covered with water, and, therefore, the current of the tide is sluggish; and, besides, the numerous eddies in the river greatly obstruct the flow. In like manner one-half the ebb is fallen off before the sand banks are dry, and by the time when it should be the greatest, its scouring force is in a great measure gone by, there being little water left in the river. Were these sand banks removed, and the tide had free ingress, it would flow with

more rapidity in the first quarter of the flood; and in like manner it would return with more rapidity in the last quarter of the ebb, so that in both cases it would scour with more force, and make and maintain a greater depth of water. The time for which vessels could navigate the river would likewise be prolonged, and they would sooner get to their berths when inward bound; and in like manner would proceed down the river and get to sea before so much of the ebb was spent. To effect this essential improvement, I propose that the river shall be contracted in its wide places into a narrower channel, and in places where the width is already too small, it shall be enlarged; in doing these the curves must be made as uniform as the nature of the shores will admit, and that wherever there are any abrupt projecting points, which materially obstruct the current, that these points shall be cut off. The lines of contraction laid down by me are not, however, regular, they are always wider where the turns are; and, in general, the river has been laid out of a greater width where the greatest number of vessels generally lie in order that proper room may be afforded for others to pass and repass them. And as vessels, which lie in the river to take on board cargoes, not only occupy considerable space, but also occasion eddies, there is more space required for the tide water to pass them, than in places where vessels do not generally lie. It is possible, however, that experience may prove that these spaces should be still further contracted. The mode of contracting the river, where required, I propose to be the same as that practised in the river Clyde, which, with the addition to the plan suggested by me about eight or ten years ago, has proved so very successful, namely, by building jetties from each shore, and moving the sand and gravel out of the intended channel, by means of dredges, and depositing it in the spaces between the jetties, and when the channel was brought near to the depth it was expected the water would maintain, these jetties have been joined by walls of rubble stone, whereby the channel has been preserved of a regular depth. Without these junction walls this could not have been done,

as the water would have spread between the points of the jetties, and thrown up sand banks which would thus have rendered the channel full of shoals. By the line of jetties laid down by me, the surface of the channel, supposing the tide to be confined within these points, will be reduced to about 896 acres, namely, 448 acres less than it now is at high water. Now the question is, how shall this deficiency of tide water, occasioned by the contraction, be supplied? Towards the supply of this deficiency there are several sand banks in the channel of the river, which are now dry at three quarters ebb, and there are others which are nearly dry at half ebb; of the former, are those at Jarrow Sands, amounting to about 21 acres, and of the latter, are Cock's Crow Sand, and several others, amounting to about 52 acres, making together about 73 acres, which will be reduced to a depth considerably under low water. In addition to this, I have to remark, that the river throughout, I mean the contracted channel, will be very much deepened, and consequently the low water will be depressed in its surface; and as the flood tide will be much less obstructed, it will flow further up the Tyne, and rise higher than it now does. And as it will receive the tide water in the first quarter of flood, and will retain this water until the last quarter of ebb, it will produce a much greater effect in scouring the bar in proportion to its quantity than it now does; and in addition to all these, it is proposed that the height of the jetties shall little exceed the height of half flood, so that a principal part of the space embanked will still remain as a receptacle for tide water. According to this plan, therefore, the scouring effect of the tide will be materially increased, and consequently the depth of water over the bar will be increased to the depth, I apprehend, of at least two feet.

The narrowing the river by means of jetties, is the most economical mode I can devise, and best suited to the circumstances of the case, for that part of the river which lies between Shields and Newcastle, but for the whole length of Shields, and most of Newcastle, I am of opinion the contrac-