

Any works undertaken here should not only be designed for the protection of the town, but for giving at the same time good wharf accommodation to the shipping likely to frequent the Buller, should it be determined to connect it with the coal fields by railway. Taking for granted that such will be the case, endeavours should be made to carry out works of such a design as to deepen the water at the entrance of the river, and if possible give the navigation a more fixed character, preventing the frequent changes constantly occurring at the mouth, and which renders it both difficult and dangerous to enter.

A serious drawback to the construction of harbour works here is the absence of good stone in the neighbourhood, Westport being situated on a delta of the river, or on land formed by alluvial deposit. Granite is to be obtained at the Buller Gorge, some six miles distant, the only means to transport which is by boat on the river, an expensive and very slow process. About five miles north of the town I examined the terraces, the surface of which is covered, for a depth of about 20 feet, with loose blocks of quartzose sandstone, very hard and durable in quality, and well suited for these works. These blocks are many of them very large and angular, and being loosely packed together, could be quarried without blasting. The projected line of railway to the Ngakawau would pass within a mile of these terraces; the country between being open flat land, a branch line could reach them with little expense. There are other points on this line of railway where I believe good stone will be found suitable for such works, but with a longer lead necessary.

The use of timber for protective works I consider out of the question; firstly, because of the impossibility to obtain good durable timber on the West Coast; and, secondly, because in practice it has been found that in this river no dependence can be placed on piles even 60 feet in length, driven 30 feet below the bed. During floods it has been found that the scour round them is so great as to entirely release them from their positions. The shingle on the bottom is small and easily acted upon by the current.

I have therefore come to the conclusion that stone must be employed for any works undertaken, the design and position of which only remain to be determined. It will be seen from the plan attached that a shingle spit extends from a point on the north bank to Wakefield Street, forming a natural protection to the banks for some distance below it. It also shelters vessels from the force of the stream, and guards them to a great extent from floating timber. This spit for some years has shown no change beyond a slight increase in length. I recommend that it should not be interfered with, beyond planting the up-stream end with willows where necessary.

A stone protection bank should commence at or near McLeod's Wharf under the shelter of this spit; this would be at the head of the position, available for mooring vessels. It should extend the whole length from that wharf to the point following the present river bank with a gentle and uniform curve. From the point I should continue it for 1000 feet in a more solid form and following the same curve, the effect of which will, I anticipate, be that the deep water channel will follow this wall, and consequently be thrown in a more direct course over the bar, undoubtedly deepening the water and straightening the channel.

In carrying out this work, a commencement should be made at the up-stream end, near McLeod's Wharf, by at first tipping in a rough stone bank, from a little above the level of high water, the outer slope being composed of the largest stone. This bank would of itself form a protection to the town, by keeping off the scouring action of the floods. By degrees this stone would find its proper bearing in the shingle bed; a face wall could then be built up on it from the level of low water, and when completed be backed up by the surplus stone in the bank. The extension of this wall for 1,000 feet seawards would of necessity take a different form. It could however be constructed of the same material, if blocks of sufficient size are procurable. These might be thrown in at random, and gradually extended outwards till the desired effect was produced. Being inside the bar it would not be required to stand against very heavy seas, so that a structure composed of loose stone blocks may be considered amply strong enough for the purpose.

I have provided in my estimate for a further protection to the coast line for a few hundred feet from the point, but consider that should the training wall be constructed there will be no necessity for this, as the shingle from the river will most likely be washed up behind it, where it will be safe from the scouring action of the river, forming a sure protection against further encroachments of the sea. My estimate for the construction of these works has been as carefully formed as it was possible under the circumstances; for at present no accurate information exists as to the probable cost of such work in the locality.

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|--|-----|-----|-----|-----|---------|
| Stone bank from McLeod's Wharf to the Point, 2,700 feet long | ... | ... | ... | ... | £22,500 |
| Building quay wall on above                                  | ... | ... | ... | ... | 5,180   |
| Backing ditto with stone                                     | ... | ... | ... | ... | 900     |
| Earth filling behind wall                                    | ... | ... | ... | ... | 4,000   |
| Stone protection facing sea                                  | ... | ... | ... | ... | 900     |
|  |     |     |     |     | <hr/>   |
|  |     |     |     |     | £33,480 |
| Contingencies  | ... | ... | ... | ... | 6,696   |
|  |     |     |     |     | <hr/>   |
|  |     |     |     |     | £40,176 |
| Sea framing wall extending for 1,000 feet                    | ... | ... | ... | ... | £12,600 |
| Contingencies  | ... | ... | ... | ... | 2,520   |
|  |     |     |     |     | <hr/>   |
|  |     |     |     |     | 15,120  |
|  |     |     |     |     | <hr/>   |
|  |     |     |     |     | £55,296 |

The stone would require to be hauled about five miles by railway, and the means for doing this would consequently depend upon the construction of the latter.

It would take but a few months to construct the line up to the quarries, there being no engineering difficulty to contend against, beyond one or two bridges. Should the utmost despatch