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ALFRED GREENFIELD, Provincial Secretary.

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Superintendent's Office,
Nelson, 10th February, 1869.

THE SUPERINTENDENT directs the publication of the following report for general information.

ALFRED GREENFIELD,
Provincial Secretary.

MR. BALFOUR'S REPORT ON THE BULLER RIVER.

January 28, 1869.

SIR,—I have the honor to acknowledge receipt of your letter requesting me to report with as little delay as possible on the works which I would recommend for the accommodation of shipping, and the protection of the town of Westport from the encroachments of the floods, and enclosing for my information copy of Mr. Blackett's report, and sundry illustrative tracings. I have also received a plan and report on the Buller from the Chief Marine Surveyor, prepared, I understand, at your request; and am consequently as well prepared to report on the subject as is possible without a personal visit to the locality, if not a more extended residence on the spot.

My duties to the Colonial Government have prevented an earlier reply, and even now I am unable to go into the matter so much in detail as could be wished; but understanding that time is of consequence, I shall shortly state the opinions I have been able to form, and shall be glad to enlarge upon this

preliminary report when I return from Auckland, should it seem necessary; or should any further ideas occur when the subject is studied more at leisure.

There would appear to be two general views as to the best method of controlling the Buller River, and two ideas as to the best manner of carrying out these views.

Mr. Blackett on the one hand recommends the protection of the banks of the river as they are, while another party seems in favor of turning the bulk of the water down the channel behind Garden Island as a necessary preliminary to works of protection or improvement.

Again, Mr. Blackett is in favor of constructing the principal protective works of stone mainly, if not entirely, while others are in favor of timber work.

With regard to the channel behind Garden Island, I am certainly of opinion that it would be desirable to cause it to return to its old condition of an efficient *flood water outlet*, if that can be done at any moderate outlay; but it seems equally clear that it would be unwise to attempt to throw the main stream, or even to turn a large portion of the water, down that channel. Rivers carrying heavy boulders, like the Buller, are notoriously capricious, and it might not improbably prove that the result of such works, if successful at all, would be to cause the whole of the water to take the south channel and to desert the present course, leaving it much in the condition of the present backwater behind the Island.

If, however, an expenditure of £2000, or less, should prove sufficient to remove the snags and so

much of the shingle at the upper end of the South Channel as would practically restore it to its old condition, and make it an efficient flood-water outlet for the river, I have no hesitation in saying that the money would be well expended.

As to the question of whether timber or stone protective works should be undertaken, I am decidedly of Mr. Blackett's opinion. The tremendous force of the flood currents of the Buller renders it impossible to be certain that *any* works for controlling the stream and protecting the banks would be permanent; and it becomes consequently true wisdom to construct them in such a manner that they can be easily repaired. If timber spurs are damaged either by snags or by being undermined, they are almost certain either to be carried away *en masse*, or to be so injured and shaken that it would be cheaper to make new ones altogether than to attempt to repair the old; on the other hand stone spurs would only be partially damaged at the very worst, and could always be easily and comparatively economically repaired by tipping in more stone on the top of the old work. When the permanence of the work (irrespective of the action of floods) is further taken into account, the argument in favor of stone becomes still stronger, as even the best timber to be found on the West Coast is far from durable when alternately wet and dry.

Mr. Blackett has explained to me what he is at present doing for the protection of the lower part of the banks from the ocean swell, and I quite agree with him that it ought to answer the purpose, if not undermined by floods.

It will, therefore, be observed that I thoroughly agree with the tenor of the Provincial Engineer's report in every respect, but that I should further recommend an expenditure of, say, £2000 in clearing the upper end of the south channel. This, I believe, would prove a valuable addition to the works recommended by Mr. Blackett, as all such flood water channels have a very important action in reducing the *velocity* of the current, even although they do not, in many cases, materially reduce the height to which the floods rise. As it is the velocity of the Buller which gives it such enormous scouring power during floods, it must be obvious to everyone that any work which will tend to moderate the velocity of the flood water of the river must have a beneficial effect.

I have the honor to be,
Sir,

Your most obedient servant,
JAMES M. BALFOUR, M.S.C.E.,
Colonial Marine Engineer.

The Provincial Secretary, Nelson.