

FURTHER PAPERS RELATING TO WATER SUPPLY UPON THE GOLD FIELDS.

AUCKLAND.

No. 1.

THAMES WATER SUPPLY.

Mr. H. P. HIGGINSON to Mr. CARRUTHERS.

Sir,—

Auckland, 4th July, 1872.

On the 24th ultimo I went with Mr. J. O'Neill to the Thames and examined the route for proposed Water Race to within four miles of the head; the River Kauwaeranga being so swollen from heavy rain, I found it impossible to go far up the valley. I however saw and examined the greater part of the line, which has enabled me to form an opinion as to the practicability of the scheme, and report on the estimate previously made for its construction.

Commencing from Moanataiari Creek, the first two miles contour round the spurs of the hills, which are very steep—too much so to render ditching possible. As the soil is very treacherous and liable to slip, this would have to be boxed. Of the next two miles up to the first mile on the section, ditching is possible throughout, except where creeks and hollows are crossed.

The soil consists of a stiff yellow clay, which resists well the action of the water, and is not inclined to slip when the surface slopes moderately—say not quicker than 8 to 1.

The next mile (up to mile two) is very irregular, the line crossing a series of spurs; but were the line modified, a certain portion may be ditched. From there to mile three, two-thirds could be made in cutting, and the rest, where crossing creeks, would have to be flumed. Up to the fourth mile, there is but a very small space where a ditch could be cut, the line running for nearly the whole distance on very side-lying ground, in many places nearly perpendicular. The same description applies up to the fifth mile; and from there to the head of the race, at eight and a half miles, not more than half a mile of ground will admit of ditching.

At the head of the race it is evident that a considerable modification is needed, as the line has been run up the bed of the river under a nearly perpendicular bank, and consequently for some distance would be under flood level.

By shortening the race a quarter, and raising the water about five feet by a rough stone dam, the bed of the river can be diverged from at once, and the race kept away from the action of floods. As no plan exists of the river at the head of the race, I have asked Mr. O'Neill to get one made, with cross sections, showing the highest flood levels, so soon as the weather permits. Until this is done, there is no possibility of a plan of head works being laid down. It will, however, be a matter of no great expense to construct, as material for constructing a dry stone dam is there in profusion.

With regard to the construction of the boxing, I append three estimates. No. 1 is for a wooden trough, as previously designed, except where ditching is substituted; but I should recommend that it be constructed of a pattern approaching a semicircle, except where passing through the outskirts of Shortland. A square trough will best suit that portion, as it will be cheaper to cover in, if necessary.

There is no difference in the cost of the two patterns.

I have added to the estimate a sum of £2,000 to cover the cost of head works, and £800 for short flumes to act as feeders from the different creeks passed over to make up for loss of leakage.

Estimate No. 2 differs from the previous in only one respect—namely, substituting a sheet-iron trough for a wooden one. Its cost would be one quarter more, but it would have the advantage of being permanent if kept well painted outside, and would entirely prevent loss from leakage, which will be a serious matter in a wooden flume of such a length during the dry weather when water will be scarce, even at the head. The pattern I recommend is semicircular in form, supported in a wooden frame at intervals, constructed of sheet-iron $\frac{1}{8}$ inch in thickness.

In this form it could be carried across the creeks considerably easier than if of wood, and much cheaper, as the supports would be further apart. In many places, if trussed or suspended by wire rope, supports could be done away with to a great extent.

For instance, by placing timber on each side to stiffen it, and rivetting a cross-tie at intervals, I estimate half the supports needed for a timber trough would only be required, and have framed my estimate accordingly.

Estimate No. 3 is for a similar mode of construction as the last, except that I propose using galvanized sheet iron, No. 16 Birmingham wire gauge, or one-sixteenth of an inch thick. The description of iron not corrugated but in continuous rolls would be the best, as it would entail less rivetting. The supports of this would be as frequent as for a wooden trough; it would, however, require no painting, the joints only being laid with white-lead.

The line as at present laid out will suit very well; but on obtaining possession of the land, a deviation of at least 100 feet on each side ought to be allowed, if necessary. For instance, where cutting is possible, the line must be moved up the hill in order to bring the whole ditch in cutting; in such places more careful contouring will be required, which can be done as the work proceeds.

The timber boxing, though much cheaper than iron, will be far from efficient, as the least shrinking of the timber will entail serious loss of water until caulked.

The repairs will be a heavy annual expense even during the first three or four years, after which the planks will gradually require renewal.