

Description.	Unit.	Quantity.	Rate.	Amount.
				£ s. d.
Paving wide portion of channel	lin. ch.	60	£30	1,800 0 0
Paving narrow portion	...	25	£16	400 0 0
One man to look after channel	day	313	12/	187 10 0
Light (candles)	lb.	8,854	/10	368 18 4
Incidentals, lump sum, say	...	...	...	337 10 0
Total per annum	...	...	...	£3,093 18 4

The cost of maintenance will therefore be about £258 per month, and the receipts, based on seventy-five heads of water being always available, which will employ about 160 men, these working twenty-one days per month, would be £280, or £22 more than the cost of maintenance; but, although it works out in this form, I am a little doubtful of it coming out this way in the actual working of the channel. However, to look at it in any form, the fees charged are not sufficient to clear the cost of maintenance and pay interest on the outlay. There are two important points to bear in mind in dealing with this subject: first, the channel has never been steadily used; and, second, when it has been used it has only been for eight hours per day. In California, where hydraulic operations are carried on largely, they work continuously day and night, and, from all information that can be gathered on the subject, the faces of gravel are much deeper than they are at Kumara, and the gravel somewhat of a similar character; therefore, if the Kumara Sludge-channel were used sixteen hours out of the twenty-four, it would employ equally as many men as it would do if widened, and only working eight hours per day.

Taking into consideration the whole bearings of the case, and that the cost of maintenance has hitherto been twice the amount of fees received from the channel, different paving will have to be used in order to reduce the cost of maintenance, and I think this can be done by solely adopting stone paving; but it will require to be of greater thickness than what is at present being substituted for wooden blocks, viz., 8 inches, inasmuch as when it begins to wear thin it will be difficult to keep it in position with heavy boulders rolling down the channel, which will tend to break it up, and therefore it ought to be used under such conditions as are calculated to give it a fair trial. Whether the channel is widened or not, the paving ought to be about 14 inches in thickness, and this would necessitate the sides of the channel being raised one board higher.

I would therefore recommend that the present channel be raised one board higher on the sides, that the bottom be paved with stones 14 inches in thickness, and that the channel be worked to its fullest carrying capacity for sixteen hours per day. This would allow thirty-two claims to be worked, employing about two hundred men. The channel is only used for four hours by each party of miners per day, as it takes them the remaining four hours to break up and stock the stones that are too large to put into the sluice. By using the channel sixteen hours per day, will employ equally as many men as the channel would do if widened, working only eight hours per day; and I do not see any tangible reason why the channel should not be used continuously (which would employ about three hundred men), the same as the hydraulic mining companies in California work their sluices; the conditions of channels and nature of material sluiced being somewhat similar. I estimate the cost of raising the sides of channel as suggested to be about £550. The paving being required in any case, does not enter into the cost, so as to entail an additional outlay.

Before going into the question of widening the present channel, or increasing in any way the carrying capacity for tailings, it would be well to consider the area of ground that is available for stacking tailings, and the height of the channel above the bed of the Teremakau River, when they get that distance, in order to obtain an approximate idea how long it will take to raise the bed of the river, so as to interfere with the fall of the channels.

From statistics taken from Mr. Lock's book, before referred to, he states that, from surveys made by the State Engineer of California, "The bed of the Yuba River, at Marysville, is now filled up to the level of the streets of that city, where prior to the era of hydraulic mining there was a well-defined channel of clear water 20 to 25 feet in depth, and that the Feather and Sacramento Rivers have shoaled in a lesser degree, but still almost sufficiently to destroy their usefulness as highways of commerce."

Assuming that it will take on an average 22 cubic feet of water to wash and transport 1 cubic foot of gravel, measured in the bank—which is admitted by all American authorities on the subject to be about a correct estimate—or, to put it in round numbers, it takes 600 cubic feet of water to wash away a cubic yard of gravel, then the carrying capacity of the present channel, if used continuously day and night, is capable of transporting about 6,912 cubic yards per day, and the various other sluices that are at work, independent of the Government water-race, may reasonably be expected to wash and transport about 2,088 cubic yards daily—that is, on the assumption that they are used continuously—making a total of 9,000 cubic yards of gravel per day; and taking the average number of working days to be twenty-one days each month, or, say, 250 per annum, then the quantity of tailings transported annually would be about 2,250,000 cubic yards; or, in other words, if the present channels or sluices were working continuously for 250 days per annum, they would transport an area of ground equal to about $23\frac{1}{4}$ acres, averaging 60 feet in depth.

With reference to the question of lighting the tunnel with an electric light, as suggested by Mr. Gow, the Manager of the Waimea-Kumara Water-races, it is a question well worthy of consideration, as the first cost of the plant is almost the only cost, and as the power required to drive a dynamo-electric machine is at the present time running to waste. At the upper end of the sludge-channel there is a shaft about 50 feet in depth, where there is a fall of water steadily going down during the