Quantity of water discharged by the above pipes at Grahamstown, with 150 feet of
    fall, would be about seven million gallons per 24 hours, the value of which, at 2d.
    per 1,000 gallons, would be £18,248 0 0
Or at one penny per 1,000 gallons 9,124 0 0
Reckoning only 313 working days per annum, or at the lowest rate 20 per cent. on an
    outlay of £50,000.

By Mr. SIMS,
Engineer to Caledonian and Imperial Crown G.M. Companies.
Grahamstown, 6th May, 1872.

MEMORANDUM by J. CARRUTHERS upon Mr. SIMS' Memorandum.

IT has been overlooked in the scheme for using wrought iron pipes 2 feet in diameter, that the whole fall, viz., 150 feet, is expended in actually bringing the water, and that no power is left for the use of the machines.

A 2-foot pipe would deliver, as stated, seven million gallons a day, but would only do so when discharging freely. If the end of the pipe were fixed to a turbine, the flow would be checked to an extent corresponding to the power obtained. The maximum mechanical effect would be got when the discharge was checked till it amounted to 459 cubic feet per minute, or $7\frac{1}{2}$ heads of water. The horse power developed would be only 90 horse power theoretical, or from 60 to 65 horse power real.

It would require a 3' 6" pipe to discharge 40 heads through turbines, and the horse power developed would be about 300 horse power. The pipe would have to be thicker than for a smaller pipe, and I am sure the cost would be not less than £85,000.

In laying the pipes it would be necessary to keep them pretty straight, so as not to lose head; so bridges would be required to cross the creeks. On the whole, I do not see that pipes would be much safer than a well-constructed race, and their cost would be certainly much greater. They would also take longer to construct. A timber race might be built in nine months.

23rd May, 1872.   J. CARRUTHERS.