

be $0.034 \times 576 \times 8 \times 3\frac{1}{2} = 587$ gallons per minute. The actual horse-power required to lift the former quantity of water from a depth of 640ft. would be about 152, but to this would have to be added three-tenths to overcome friction: then the actual power required would be $152 \times 45.6 = 197.6$ horse-power. To lift the lesser quantity of water from a depth of 500ft. the horse-power would only be 71, or, adding three-tenths to overcome friction, the actual power required is about 113.6. The pump was working to a depth of 500ft. during three months of last year, as stated by the manager in his report to the Drainage Board at the last annual meeting in January last, and for nine months at the 400ft. level, which would only require 81.3 horse-power to lift the water to this height. The expenses in connection with working the pump during the year was £3,956 0s. 8d., which is about £329 13s. 5d. a month; the fuel and cartage alone coming to £2,324 16s. 9d. per annum, or about £193 14s. 9d. per month. This shows that the cost of the fuel alone is equal to about 1s. 5d. per day for every horse-power required to lift the water.

Assuming that there is not a large increase in the quantity of water at the deep levels—that it possibly would not exceed 800 gallons per minute—the horse-power required to lift this quantity from a depth of 2,000ft. would be $\frac{800 \times 10 \times 2}{33} = \frac{16,000}{33}$ = say, 485 horse-power, and three-tenths added for friction = $485 \times 145.5 = 630.5$ actual horse-power required. If steam power were employed to do the work, and engines could be procured which would use 25 per cent. less fuel per horse-power than the present engine, then the cost of fuel per annum would be about £11,972; and assuming that two pumps were used to lift the 800 gallons per minute as referred to, then the diameter of the pump would be $\sqrt{\frac{400}{8 \times 5 \times 0.034}} = 17.15$ in. + $\frac{1}{4}$ area. This shows that it would require two pumps 19in. in diameter; but, if the speed were slightly increased, two pumps 18 $\frac{1}{2}$ in. in diameter would be sufficient. It is not, however, safe to calculate on only a slight increase in the quantity of water in going down, and it would be safer to provide pumps of 20in. in diameter.

It is very evident, when the project comes to be analysed, that it will require a very large amount of capital to sink a shaft to a depth of 2,000ft. on the Thames field, and to construct drives to prospect the ground. The large amount of rates that the few companies have to pay for drainage at the present time falls very heavy on them.

The following is the balance-sheet of the Thames Drainage Board for the year ending the 31st of December, 1892, which shows the amount of each company's contribution and the expenditure for the year:—

ure for the year :-

Receipts.

£ s. d.
336 11 8

Cash balance from last balance-sheet ...

Mining Companies.	Arrears due on Last Year's Balance included in assessment.	Assessment.	Less Rebate.	Amount received.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Saxon .. ..	..	1,052 2 0	350 14 0	701 8 0
Waiootahi .. ..	..	780 0 0	260 0 0	520 0 0
Victoria	40 0 0	506 4 0	155 8 0	350 16 0
New Moanataiari .. ..	..	472 10 0	157 10 0	315 0 0
May Queen .. ..	..	462 0 0	178 10 0	283 10 0
Cambria .. ..	..	403 4 0	134 8 0	268 16 0
Hazelbank .. ..	..	403 4 0	151 4 0	252 0 0
New Manukau	96 0 0	240 0 0	48 0 0	192 0 0
Trenton	116 0 0	221 0 0	10 10 0	210 10 0
Caledonian	64 0 0	114 8 0	24 8 0	90 0 0
Kuranui No. 2	30 0 0	124 10 0	31 10 0	93 0 0
Kuranui No. 3	11 0 0	80 6 0	20 4 3	60 1 9
	357 0 0	4,859 8 0	1,522 6 3	3,337 1 9

Total mining companies	...	...	...	...	3,337 1 9
Thames Borough Council	...	...	...	...	240 0 0
Thames County Council	...	...	...	...	235 0 0
Coal, and miscellaneous	...	...	...	...	44 13 5
Craig, deposit	...	...	...	...	75 0 0

£4,268 6 10

Expenditure.

	£	s.	d.
Coal, per Smith	1,024	11	9
Coal, per Craig	943	6	1
Coal, per Dickey and Verran...	93	19	6
Coal, per Nicol	70	1	0
Wages	866	19	7
Foundry work and ironmongery	262	17	1
Cartage	192	18	5
Water supply, timber, and gas	116	10	9
Board fees and travelling-expenses	195	10	0
Salaries, insurance, advertising, &c.	142	1	6
Miscellaneous accounts	43	5	0
Balance	312	6	2

£4,268 6 10