1 rood 20 perches, or 39,825 cubic yards, was worked out during the year, yielding 247 oz. 17 dwt. 15 gr., valued at £959 13s. There is 11 miles of water-races in connection with this claim, with 40 chains of 15 in. and 20 chains of 11 in. piping. Value of water-races and plant, £15,000. Twelve men were employed.

Ross Flat.

In view of the future development of the deep alluvial leads on Ross Flat, the old workings, on which a depth of 390 ft. had been attained, but which are now under water, the Government, on the 28th October, 1898, obtained from Mr. C. Napier Bell, M.Inst.C.E., the following report dealing with the subject of the drainage of deep levels:—

"Acting on your instructions, I proceeded to Ross and inspected the locality. I also rode over the creeks and up to the Mikonui Gorge to look at all the places from which the necessary water-supply for draining the deep levels and working the mines is intended to be taken and applied, and I also read over all previous correspondence and reports. As you are probably aware, the original mining undertaken at Ross was in sluicing the high gravel terraces. This work indicated that the leads of gold found at various heights above ground dipped underground at steep inclinations, and they were followed down as far as the appliances for drainage would allow. Then a Christchurch company, called the Ross Extended, sank a shaft on the flats, but were unsuccessful; and, the site and plant being purchased by Cassius, the sinking was continued to a depth 300 ft. from the surface. Here some rich deposits were worked, but, the pumping-power being insufficient, Cassius's claim was drowned out by tapping the water accumulated in the abandoned workings of other companies. Stimulated by the known richness of Cassius's claim, the Ross United Company endeavoured to get down to the same or a greater depth, and succeeded in sinking a shaft to a greater depth, and found fairly rich deposits at a depth of 390 ft. from the surface. But their pumping plant did not work satisfactorily, and the Ross United shaft was drowned out by tapping the standing water of Cassius's abandoned workings. This occurred in 1887, and since then all workings of the deep levels have been suspended.

"As to the value or extent of these deep-level deposits, nothing is known with any more certainty than the evidence acquired by Cassius's working and six weeks' working of the Ross United Company. Many reports have been written about the value of the workings by your officers and those of the Ross United Company, and they assume that the deep deposits are both rich and extensive. It is said to be impracticable to test the deposits by boring; so that the knowledge of the depth, extent, or direction of the deep deposits remains uncertain.

"The Ross United Company has purchased or acquired all the most important of the water-rights over creeks that can be brought to the workings, and have made several races to bring in all available water, and altogether they have spent about £70,000 in a great variety of plant necessary to the working of both their surface and deep workings. The surface workings are not now profitable, and the company seeks to reopen the deep levels so long drowned out.

"The quantity of water to be pumped to keep the deep levels dry cannot be ascertained with certainty. It is asserted that when Cassius and the Drainage Company were pumping together they kept their workings dry by removing 708 gallons a minute. The late T. J. Waters, C.E., assumed that with deeper and more extended underground workings much more water would find its way to the workings, and he took 1,900 gallons a minute as the quantity that would have to be pumped, assumed from a certain percentage of the rainfall that would get down below. The company has driven an adit which, coming up from the sea-beach at a sufficient grade, intercepts surface drainage at about 90 ft. below the surface at the shaft, and it was intended to extend this adit in a contour round the foot of the rising terrace, so as to cut off all the surface water it could catch from higher ground and old workings, and at present its does intercept a large quantity of water.

"Although after long pumping the saturated soil under the flats will be drained, and in ordinary circumstances one would expect the quantity to be pumped to diminish, yet I can see no other way of getting an idea of what water will have to be removed than that of Mr. Waters—viz., taking a percentage of the known rainfall, giving 1,900 gallons per minute. The company's manager, Mr. Joseph Grimmond, proposes to erect a catch-tank at 100 ft. below the adit. This is assumed to catch 500 gallons, which has to be lifted 100 ft., and the remaining 1,400 gallons pumped from the bottom has to be lifted 300 ft., all discharged at the level of the adit, which is 90 ft. below the surface. The theoretical power required to lift the water is 143-horse power, which, adding 66 per cent. for efficiency of the machinery, gives 238-horse power required to keep the deep workings dry. There is also power required for winding up the earth to be treated on the surface. I take this at 42-horse power effective. As there is no question of using steam, the above work must be done by water-power.

"The investigations of Messrs. Waters and Wylie having shown that from the existing water-races there was not enough power to be had from the water-supply, the latter recommended that the supply should be taken from the Mikonui Tunnel and Race. This supply would be about 200 ft. higher than the company's water-supply at present in use; it would consequently give the same power with less water. Mr. Wylie states that he measured the supply of water that could be obtained in the driest weather in the Mikonui Race at 5·3 cubic feet a second. The height of this supply above the discharge of the water into the adit is 580 ft., and, deducting 5 ft. for pipe-friction, there is 5·3 cubic feet a second into 575 ft. head, which gives 345 theoretical horse-power, and, taking 66 per cent. of this for efficiency of the machinery, leaves 228 effective horse-power to do the work of pumping. It was shown above that the horse-power required to raise the water was about 238, so that in the driest weather the water-supply would be no more than enough. Dry weather is not very frequent here, and Mr. Wylie states that for nine months in the year the various creeks would