Arahura River) on to the terraces above Fox's, Goldsborough, and Stafford, in the County of Westland. On representations being made that there was a large area of auriferous-drift terraces, that would support a large population for a number of years if a sufficient water-supply were obtained by which they could be worked by hydraulic sluicing, the Government undertook the construction of a water-race having a carrying capacity of forty sluice-heads of water. It may be well to mention that by a sluice-head of water in this colony is meant an orifice or stream capable of discharging 60 cubic feet of water per minute. The system adopted here for measuring water is by a box 12ft. long, set level, and 20in. wide, having a bar of 2in. in depth and 1in. in thickness nailed on the bottom at the discharge end; then an opening left for the number of sluice-heads required to be discharged, having always a pressure-board fixed above the opening to give a head of at least 6in. from the centre of orifice. But in supplying a large number of sluice-heads it is found in practice that the height of the pressure-board should not be less than the depth of the opening, to counteract the wavy motion there is on the surface of all running streams. A box 20in. wide, with an orifice of 20in. by 2in., with a pressure-board 5in. deep, is accurate enough to supply one sluice-head; but, in measuring a number of sluice-heads from one orifice, the size of the opening has to be regulated in accordance with the $\sqrt{2g.h.}$, the cubic contents, and area of the opening, which gives a varying coefficient of discharge. From a number of experiments that I have made with the discharge of water in orifices, I have formulated the following formula: The quantity of water discharged from a rectangular orifice per second $=0{\cdot}62+(\cdot0008a)A\sqrt{2g.h.}$, where g=gravity, h=the height of water in feet above the centre of the orifice, a= the area of orifice in inches, A= the area of orifice in feet. This is not absolutely correct, but so near that it is sufficiently accurate for all practical purposes. The works in connection with the Waimea water-supply consist of a weir constructed across the Kawahaka Creek—which acts as a dam or supply-reservoir, constituting the head-works—conduits, aqueducts, tunnels, and cast-iron siphon. The creek from which this supply is taken has not more than about fifteen sluice-heads of water flowing in very dry weather; but in wet weather there is always a good supply. It is simply a mountain-stream with a great fall, confined within a comparatively narrow gorge, which has in times of floods as much as five thousand sluice-heads of water. The head-works consist of a weir built of concrete across the bed of the creek and let into the banks on each side, having a foundation and abutments of solid rock. This weir stands about 12ft. above the bed of the creek, and forms a small reservoir, from which the water is taken into the race by a tunnel constructed through solid rock on one end of the weir, having at the intake end a sluice-gate for regulating the supply. These head-works are 772ft. above sea-level. A water-race is constructed from the head-works along the sides of the terraces, crossing the saddle between the watersheds of the Arahura and Teremakau Rivers, in principally open conduits, and fluming. The conduit is 5ft. 3in. wide in the bottom, and 3ft. 3in. deep, having a batter on the sides of $\frac{1}{4}$ to 1, and the flumes are of the same carrying capacity. For the first 3 miles 5 chains the water-race is constructed on a grade of 1 in 1,320, where it comes to a low saddle; thence there is a cast-iron siphon for 200 chains in length. The pipes are 3ft. in diameter, and the fall between the intake and the discharge end is 83ft., while the maximum depth of the valley through which the siphon is constructed is about 180ft. below the level of the intake end. From the end of the siphon the water is carried in open conduits, tunnels, and flumes, constructed on a grade of 1 in 660. The total length of this water-race is 17 miles 24 chains, and it has cost up to the present time £118,576. It was commenced in 1872, and completed in 1878. The price charged for water is as follows: From 8 a.m. to 4 p.m., £2 per head per week; from 4 p.m. to midnight, £1 10s. per head per week; from midnight to 8 a.m., £1 per head per week; a considerable reduction being made to parties who use water continuously. But as a rule very few use water at night: they simply work during daylight.

Kumara Water-supply.—During the construction of the waterworks for the Waimea District the Kumara goldfield was opened, and strong representations were made to the Government to bring in a large water-supply on this field. At this time a private company had undertaken the construction of a water-race; but the works were not of sufficient magnitude to bring in a supply to meet the demand. This company having obtained the principal water-rights in the immediate neighbourhood, the Government deemed it desirable to purchase these water-rights and enlarge the works, and also connect with the Waimea supply. A supply-race was constructed from the Kawahaka Creek, a little below the head-works of the Waimea Water-race, and the water in both these races was regulated from the supply-reservoir to meet the requirements of each district. The first scheme was to take the water from Kapitea Creek, where a weir of timber was constructed across its bed so as to form an embankment for a dam; but the quantity available in this creek was totally inadequate to meet the requirements of the field; this led to the construction of the supply-race and a second reservoir. The length of the supply-race is 4 miles 60 chains, and the main race is about 2 miles 40 chains, the latter portion having a carrying capacity of a hundred sluice-heads of water. In conjunction with this supply a large sludge-channel or tail-race was constructed to enable the miners to deposit the tailings on a common tailings-site near the Teremakau River. A tunnel was constructed for about 80 chains in length, having a sluice-box in the centre 3ft. 6in. wide and about 3ft. 6in. deep, with tramways at each side for the first 40 chains, and on one side only for the upper 40 chains, for working small trucks to bring in material to keep the channel in repair. This channel is paved in the bottom with stone pitchers 14in. in depth, and is constructed on a uniform grade of 1 in 26 It is found in practice that this channel carries away tailings and water to the extent of what fifty sluice-heads of water is capable of sending into it by the ordinary process of hydraulic sluicing. This enables twenty-one claims to be worked, each party tailing into it four hours per day. The miners on this field find that they cannot use the water in their claims for more than four hours per day advantageously, as the ground is so full of large stones which require to be broken up by blasting; they therefore employ the remaining four hours each day in breaking the stones and getting ready again for the water. The charge made for the use of this channel is 10s. per man per week of four hours per day; while the price of