SESSION II.
1912.
NEW ZEALAND.

DRAINAGE OPERATIONS IN HAURAKI PLAINS:

REPORT FOR THE YEAR ENDED 31ST MARCH, 1912; TOGETHER WITH STATEMENT OF ACCOUNTS.

Presented to both Houses of the General Assembly pursuant to Section 10 of the Hauraki Plains Act, 1908.

SIR,— Department of Lands, Wellington, 1st June, 1912.

I have the honour to submit herewith the report on the drainage operations in the Hauraki Plains for the past year, in accordance with the provisions of the Hauraki Plains Act, 1908.

The operations for the twelve months have been as successful as previously, and the area of land reclaimed and settled amounts to 27,470 acres. The total area of land surveyed for settlement purposes, or reserved for public purposes, totals 30,159 acres, of which 8,050 acres were surveyed during the year. Valuations of the 30,159 acres disclose an estimated value of £151,383. Areas of Native land aggregating 1,027 acres were acquired during the year, and subdivided in connection with the general scheme of settlement. About 3,500 acres will be available for settlement during the current year.

The area set apart under the Act for drainage and reclamation purposes is 90,000 acres. The cost of operations during the year amounted to £40,084, and the total expenditure under the Act has been as follows:—

	£	s.	d.
For the year ended 31st March, 1908	5,070	0	0
" " 1909	11,672	5	6
" " 1910	22,235	2	11
" " 1911	32,103	14	0
" " 1912	40,084	13	1
Total	£111,165	15	6

A heavy gale in February last, coincident with high spring tides, tested the stop-banks in a very severe manner, but the result was eminently satisfactory, no damage worth mentioning being occasioned.

I must not omit to state that the retirement of Mr. William C. Kensington, I.S.O., Under-Secretary for Lands, at the close of the year, has removed a gentleman whose interest in the drainage and reclamation works has been of the keenest. To him belongs much of the credit that attaches to the Department for the successful carrying-out of the operations. He initiated the scheme, selected the officers who have been in personal charge of operations, periodically inspected the works, and in every way did his utmost to give effect to the wishes and directions of the Government in the matter.

The Land Drainage Engineer, his assistant, and all the members of his staff, have again manifested their great interest in the works under their control. They are deserving of much credit for their efforts.

The report of the Land Drainage Engineer (Mr. J. B. Thompson), attached, sets forth the operations in detail. The works have been very successful and viewed with interest by many visitors during the year.

I hope at an early date to visit and inspect the works in progress, and to satisfy myself as to the continued satisfactory progress.

I have, &c.,
JOHN STRAUCHON,
Under-Secretary for Lands.

The Hon. Thomas Mackenzie, F.R.G.S., Minister of Lands.

STATEMENT OF ACCOUNTS (AS REQUIRED BY SECTION 10 OF THE HAURAKI PLAINS ACT, 1908) FOR THE YEAR ENDED 31ST MARCH, 1912.

Receipts.

1911.		£ s. d.	£ s. d.
April 1.	To Balance—Cash in Public Account	22,665 8 4	
1912.		£ s. d.	
Mar. 31.	To Land-sales ..	52 18 0	
	Rents ..	4,456 16 7	
	Miscellaneous..	150 2 3	
	Sales of cattle, &c. ..	280 18 10	
		4,940 15 8	
	Advances made by the New Zealand State-guaranteed Advances Office.. ..	20,000 0 0	
		£47,606 4 0	

Expenditure.

1912.		£ s. d.
Mar. 31.	By Expenditure—	
	Salaries	238 17 6
	Travelling allowances and expenses, camp allowances, and general expenses of administration	151 18 5
	Purchase and equipment of dredges and launches, maintenance, and working-expenses	3,344 7 7
	Buildings, erection and maintenance of ..	181 13 11
	Cattle, purchase of ..	356 8 6
	Drainage-works: Clearing channels, building stop-banks, tramways, and all expenses incidental thereto	31,388 7 3
	Compensation for lands acquired	1,761 8 0
	Payments on loans—	
	Interest	1,890 6 11
	Repayment of principal	771 5 0
	Balance—Cash in Public Account	7,445 1 9
	Advances in hands of officers of the Government ..	76 9 2
		£47,606 4 0

LOAN ACCOUNT.

1912.		£ s. d.	1911.		£ s. d.
Mar. 31.	To Balance	103,715 19 1	April 1.	By Balance due to Loans to Local Bodies Account (on original loan of £31,000) ..	33,393 6 11
			1912.		
			Mar. 31.	Year's interest at 4 per cent. per annum	1,335 14 8
				Advances made by the New Zealand State-guaranteed Advances Office—	
				No. 1 Loan—Balance ..	4,858 15 0
				No. 2 „ „ ..	4,858 15 0
				No. 3 „ „ ..	4,895 0 0
				No. 4 „ „ ..	9,790 0 0
				No. 5 „ „ ..	24,653 2 6
				No. 6 „ „ ..	9,931 5 0
				No. 7 „ „ ..	10,000 0 0
		£103,715 19 1			£103,715 19 1

REPORT BY LAND DRAINAGE ENGINEER.

I HAVE the honour to report upon the various operations carried on during the past year.

A great deal of varied work has been done by the several branches in connection with development and maintenance of the drainage system, and particular attention has been paid to improving in every reasonable way the existing works. A considerable area of really good land was systematically drained, surveyed, and thrown open for selection under the optional system. Further areas of good land will be made available in each succeeding year as circumstances permit, and, judging by the keen competition for the sections in the past and the general satisfaction of the successful applicants, there will always be hundreds anxiously looking for the opening-up of new areas. Swamp-drainage is necessarily a rather slow process, but notwithstanding this fact some 27,470 acres of previously useless swamp land have been reclaimed and are now occupied by some 176 settlers. It is a matter for congratulation that the settlers on Hauraki Plains are of a very good class and generally very progressive.

In each particular class of work hereafter dealt with totals are given showing the position as at the 31st March, 1912, and details of all classes of work executed during the year under review are shown separately under the heading "Works performed." This form is convenient and necessary, as the existing stage of completeness of works is thus brought out.

PRIESTMAN DREDGES.

Both dredger No. 1 and dredger No. 2 have been very fully employed during the year, having excavated a total of 131,902 cubic yards of clay, &c. Very little time has been lost in connection with repairs. The work done leaves little to be desired, and the dredgemasters are to be congratulated on their efficiency. The automatic steel "chutes" attached to dredges have been an unqualified success. Cost of dredging, 3¼d. per cubic yard.

A total of 66,502 cubic yards were excavated by dredger No. 1, while dredger No. 2 was responsible for the excavation of 65,400 cubic yards. The material was all heavy alluvial clay, with practically heavy timber throughout. In one instance some 12 chains in length of oxidized pumice, over 4 ft. in depth, was excavated for a width of 36 ft. This was the heaviest work done so far, and proves the capacity of the plant to deal with all classes of work likely to be met with during our operations.

The dredgers have been employed in excavation of Waitakaruru-Maukoro Canal, Waikaka Canal, Waitoa Canal, and the widening of Piako River. Various dredging has been done at the mouth of the Waitakaruru River, and berths for steamers have also been dredged.

Puhanga Canal Spillway.

The contracts for the above work which were let in the previous year have now been completed, the amount of material excavated and built into road and stop-banks amounting to 32,002 cubic yards for the past twelve months. This work was very satisfactorily completed. Great relief will now be experienced when freshes occur in the Piako River, as the flood-waters will have passage through the spillway. It may possibly be advisable later on to place a dredger in spillway to deepen same, but this can only be demonstrated by an exceptional flood. The length of spillway is 145 chains.

Waitakaruru-Maukoro Canal.

Excavation of this canal was continued by dredger No. 1, and a total length of 189 chains by 42 ft. wide is now completed. This shows a distance of 47 chains completed during year, and equal to 61,502 cubic yards. Very heavy timber was met with throughout, which had to be largely "shot" out. Experience has shown that it pays to first strip the overlying peat from clay and sluice it to sea The dredger was accordingly taken from the canal after having reached the end of previous years "stripping," and while passing through the canal dredged out the accumulated silt, and proceeded to other work.

A contract is now under way for "stripping" the canal ahead, and some 10 chains has so far been done. The material sluiced out consists of generally "woolly" peat, and is being taken out to a width of 42 ft. and a depth of 5 ft., which practically exposes the alluvial clay and timber. Very heavy timber will be found ahead of the operations, and this fact will no doubt cause dredging-work to proceed slowly.

It will pay well to prosecute this work so long as the automatic "chutes" can be worked. Considerable subsistence of the swamp follows as the canal is pushed forward, and fully 50 per cent. less in depth of peat is being maintained than was expected from original borings.

Waikaka Canal.

This canal, of a total length of 65 chains, has now been completed by dredger No. 2, which excavated during year some 39,105 cubic yards of stiff alluvial clay, giving a length of 30 chains by 42 ft. wide. Very heavy timber was met with throughout, but was successfully dealt with. This canal now carries all the river traffic, and steamers from Auckland pass through same. A fall of 20 in. was obtained through making this diversion, and a remarkable lowering of flood level in the locality was effected.

Waitoa Canal.

Near the junction of the Piako River with the Waitoa River the latter takes a very sudden bend southwards, and a great congestion of water has always occurred in the past during freshes. A canal, therefore, was cut between the two rivers, the length being 12 chains, thus reducing the old course by 50 chains. The width is 36 ft., and would average 6 ft. in depth. Some 9,250 cubic yards of material was excavated, the greater portion of which consisted of a very hard strata of oxodized pumice, and considerable difficulty was experienced in breaking it up. However, once it was penetrated, the clay below was readily excavated.

Very satisfactory results have followed the completion of this work, and considerable fall has been gained, the flooding conditions being greatly minimized in this particular locality.

Piako River Improvements.

Dredger No. 2 has been employed for the last three months of the year in effecting various improvements.

A large sandbank had formed at the mouth of the Teko Stream, and some 600 cubic yards of sand silt was excavated by the above dredge. After this was done the widening of the Piako River between Ngarua Stream and Puhanga Spillway was placed in hand. This particular stretch is locally known as "the Narrows" and has a very restricted waterway, which always bottled up the flood-waters, very often causing a complete submersion of the adjacent country. A universal riverway of 66 ft. is being aimed at, and so far some 37 chains in length has thus been widened during the year. The amount of spoil excavated is 16,455 cubic yards, and this has been dumped in position for future stop-banks which will require building when drainage operations on adjacent lands are put in hand.

Widening operations will be carried on to the junction with Awaiti Stream.

Dredger No. 1 has excavated a berth at Shelly Beach, where it is intended to erect a small service jetty. Some 5,000 cubic yards of clay was excavated from channel leading to wharf-site. The various improvements now in hand and projected will greatly increase the efficiency of the Piako River, which will discharge its flood-waters at a much faster rate than formerly, and the navigation of river will be correspondingly facilitated. The latter consideration is very important, as undoubtedly the Piako River is the chief medium of carriage to the Hauraki Plains, and all roads are laid out to take advantage of this waterway.

Stop-banks.

The total length of stop-banks now completed is 27 miles 42 chains, some 40 chains of new bank having been built during past year.

The "green" banks have stood remarkably well, only a few portions being damaged where situated in exposed positions. This was on the foreshore, when, in February last, the remarkably high spring tides, driven up by a heavy gale, breached the bank to some extent in several places. The actual breaching was caused by logs, which had broken away from a sawmiller's raft, pounding against the bank. By timbering, grassing, and protecting by small groynes the difficulty of protecting exposed portions of bank will be overcome. The stop-banks have been considerably strengthened during the year for the greater portion of their length, and except in a few places are now substantial and high enough to withstand any reasonable flood. All weak points will be duly strengthened during the coming year, and grassing on all banks is being proceeded with. A great deal of close flax-planting has been done along foot of banks subject to erosion, and this work will be carried out wherever possible.

Formed Roads.

The total length of formed clay cart-roads—*i.e.*, drains on both sides of road and formation to full width, or one drain only with finished formation—is now 39 miles 16 chains, of which amount some 20 miles 13 chains was converted from road-bank tracks during past year.

Some 5½ miles of the above roads give access to the most southerly sections selected, and these have been blinded with sand, drays and scoops having been used with great success. The necessity of metalling all formed roads is manifest, and must sooner or later be faced out of special grants and loans other than moneys raised under the provisions of the Hauraki Plains Act, 1908, which did not provide for metalling.

Road-banks.

The total length of road-banks—*i.e.*, spoil from road-drains removed 4 ft. from edge thereof and spread 12 ft. in width—is 13 miles 10 chains. As circumstances permit these banks will be converted into formed roads. Some 7 miles 70 chains of above has now a drain on each side, but no clay is available from drains for road-formation, and other arrangements are being made to provide the necessary spoil.

Drains in Operation.

The total mileage of drains in operation is now 258 miles, and includes stop-bank drains, road-drains, subdivisional drains, service-drains, and outfalls of all descriptions. This is an increase of 46 miles 11 chains during past year.

Snagging Piako and Waitoa Rivers.

Two special votes are being satisfactorily expended upon the snagging of the above rivers, and excellent results have so far been obtained from the operations.

The Piako River has now been snagged for a total of 7 miles 24 chains from Junction southwards, bullock teams being mainly used; while the Waitoa River has also been snagged for a total distance of 9 miles 30 chains from Junction southwards. A special snagging-plant on pontoon has been used for the latter work, as willows had to be dragged from the bed of the river.

The respective distances snagged during the year are 5 miles 34 chains and 6 miles 30 chains, and much more would have been done had it not been for the very wet season experienced.

Wharves.

The total number of wharves in position is ten, and several more are projected. Improvements will be effected in several directions, and those without small sheds and low-level stages will be provided with same. Piles have, as usual, been rather difficult to obtain.

Three new wharves were erected and two wharves rebuilt during the year. A few small service jetties will be provided in place of making certain roads along river-frontage, this being more economical.

Flood-gates.

There is now a total of fifty-two flood-gates in position, the simpler class of gate being still erected for the reasons mentioned in last year's annual report. Reinforced-concrete gates will eventually be required.

The number of new gates built during the year was seventeen, besides which certain alterations in addition to usual maintenance were effected.

Sill Bridges and Culverts.

The total number of small sill bridges to date is seventy-three; culverts, four; small bridges on piles, six; and one two-span bridge across Puhanga Spillway.

Private Telephone-line to Works.

During the year the Post and Telegraph Department obtained permission to place a wire upon the poles of some 14 miles of the works telephone-line, and several offices are now established upon the plains, resulting in great convenience to settlers.

Buildings.

The total number of buildings of all descriptions used in connection with works is thirty-three, and are in occupation by workman, &c., or are being used as stores. Additions were made to Engineer's and Foreman's quarters during the year.

Floating Plant.

This consists of two Priestman dredgers, one steamer, five oil-launches, three pontoons, and sundry small punts. All are in good order and in constant use.

Artesian Boring Plant.

The total number of artesian bores sunk to date is thirty-one, of which number twenty-seven have been sunk for settlers. Arrangements have been made for time repayment of actual cost of bores sunk for settlers. Flows have been obtained ranging from 3,000 gallons per day to 115,000 gallons per day. The water still continues to be mineralized, but the settlers are more than satisfied with it as a supply for stock. It will probably be necessary to purchase another plant shortly, as the demands are too great upon one plant. Schedules of each bore (twenty-two) sunk during year are attached hereto, and are of interest geologically.

Light Railway.

In order to economically deal with the formation of roads in peat country where sufficient spoil could not be won from the drains, authority was obtained for the purchase of necessary plant to enable a light railway-line of 2 ft. gauge being laid down. One 12 B.H.P. Universal oil-locomotive and ten steel side-tipping wagons are now under order, and should shortly arrive in the Dominion. A supply of 50 tons of light rails is to hand, and a further quantity of 20 tons is on order. Many miles of access-roads leading to the Piako River will be formed by this plant, as spoil must be brought from the foot-hills for purpose of making roads in deep peat country.

It is intended to also utilize spoil from Waitakaruru-Maukoro Canal for road purposes. When the metalling of roads is taken in hand the plant will be invaluable.

Works performed.

The following works have during the last year been executed by co-operative, piecework, and special contracts: Excavation Puhanga Canal, 32,002 cubic yards; combined new drain and road formation, 21 miles 43 chains; forming township roads (Pipiroa), 37 chains; road-formation (Waitoa), 7 chains; spreading spoil, 18 chains; combined road, drain, and bank, 36 chains; new road-drains, 7 miles 55 chains; deepening and widening road-drains, 17 miles 28 chains; clearing bush and scrub on road-lines, 5 miles 61 chains; cleaning road-drains, 16 miles 11 chains; new subdivisional and outlet drains, 8 miles 41 chains; deepening and widening subdivisional and outlet drains, 32 miles 14 chains; Waitoa main outfalls, 1 mile 46 chains; cleaning subdivisional drains, 44 chains; moving timber from drains, 2 miles 37 chains; combined drain and stop-bank, 40 chains; deepening stop-bank drain, 2 miles 46 chains; cleaning stop-bank drain, 69 chains; clearing Waitakaruru Stream, 2 miles 75 chains; sluicing peat, Waitakaruru Canal, 10 chains; clearing bush on section lines, 3 miles 41 chains; snagging Piako River, 5 miles 34 chains; fencing, 34 chains; cutting and supplying 600 bundles fascines.

The following works were performed by day-labour: Snagging Waitoa River, 6 miles 30 chains; road-formation, 6 miles 10 chains; new road-drains, 2 miles 7 chains; deepening road-drains, 8 miles 27 chains; cleaning road-drains, 7 miles 55 chains; clearing scrub on road-lines, 40 chains; deepening and widening Whakahoro Drain, 3 miles 5 chains; deepening and widening subdivisional drains, 4 miles 7 chains; strengthening stop-banks, 15 miles 74 chains; fencing, 78 chains; flood-gates erected, 17; one motor-launch built; wharves erected, 5; bridges and culverts built, 54; supply of poles for protection-works, 1,830 poles; supply of fascines for protection-works, 3,520 bundles; artesian bores sunk for settlers, 22; sheds erected, 7; spoil excavated by dredgers, 131,902 cubic yards.

Many other works too numerous to mention have been performed by day-labour. A daily average of about a hundred men have been employed upon day-work, and a daily average of about 145 men upon co-operative and piecework, &c. Experience on this class of work has shown that day-labour is entirely satisfactory. A great deal of work has been given to settlers, both as regards day-labour and general contracts.

Cattle.

A total of sixty-nine head of mixed young cattle are now on the ground. During the year some hundred and fifty head of cattle were purchased at a cost of £350 11s., and subsequently eighty-one head were sold at suitable times, realizing a net sum of £262 1s. 6d., so that the sixty-nine head mentioned above stand at a cost of £88 9s. 6d., but should eventually realize about £200, thus showing a good profit upon the transaction, as grazing costs nothing.

Grass-seed for Settlers.

In accordance with the recommendations of the Lands Committee, assistance is being granted settlers in procuring grass-seed to replace that lost through ravages of crickets last season. Orders for grass-seed are now issuing, and repayment will be made by promissory notes.

Flax-areas.

No dealings have occurred in connection with the above, as flax is very low.

Fires.

No fires of any importance occurred in the swamp during the past year.

Surveys.

Two survey parties have been actively engaged during the past year in connection with section and engineering surveys. Up to date the total area of lands surveyed into rural farms, town and suburban sections, and reserves is 30,159 acres, of which plans have all been completed. Of the above, 8,050 acres were surveyed during the past year. Surveys of various blocks of Native lands and roads were also effected. Further areas are now being surveyed into sections.

Valuations.

Up to date, valuations of some 28,005 acres that have been subdivided into farm sections, different reserves, and town and suburban lots amount to £142,383. The balance of surveyed land—viz., 2,154 acres—has not yet been valued, but will approximate £9,000.

Expenditure during Year.

Special, co-operative, and piecework contracts absorbed the sum of £19,287 15s. 11d., while on account of day-labour of all descriptions, on short or on floating plants, the sum of £13,307 4s. 2d. was paid out.

Principal Works proposed.

The principal works to be carried out during the current financial year are as follows:—

(1.) Improvements to Piako River.
(2.) Laying down of light railway-line.
(3.) Continuance of road-formation.
(4.) Completion of wharves, flood-gates, and bridges.
(5.) Drainage development of new areas for settlement.

Acquisition of Native Lands.

During the year some 1,027 acres of Native land was acquired, and was duly subdivided in connection with other areas of Crown lands on plains. A considerable consolidation of interests has thereby resulted. It is proposed to acquire a small area of 70 acres that affects one of the sections not yet offered. Sundry small pieces of land will be acquired for road-access to Piako River.

Land proposed to be opened.

It is estimated that about 3,500 acres of good swamp land in the vicinity of Waikaka, Waitakaruru, and Kerepeehi will be available for settlement during the current year.

An area of Crown and land-for-settlement lands, known as the Waitakaruru Blocks, and amounting to about 12,100 acres, is now being surveyed into sections, and will be duly roaded. As these particular lands are not, strictly speaking, portion of Hauraki Plains, but yet are a natural adjunct to same, arrangements have been made for road-construction by way of special votes and loans amounting to £5,000, as no moneys are available out of Hauraki Plains Settlement Account for the purpose. It is hoped to have some of this block available during the current year, as roadworks will be started very shortly.

Office.

Both clerical and drafting staffs have had a very busy year. The drafting branch completed all plans of general-section, road-proclamation, and other surveys. Various photo.-lithographic tracings were made in addition to engineering plans and general work. The clerical branch has many calls of a varied nature, especially at pay-time.

The local Imprest discharged liabilities of contracts, workmen's and survey parties, and other charges, &c., amounting to £33,861 11s. Some 1,126 vouchers were certified for payment through local Imprest and Treasury. The number of co-operative and general contracts in operation amounted to 228.

General.

The attached plan shows clearly all operations up to end of year, and it will be noticed that a large scope of country is being dealt with. Every possible effort is being made to give effect to the Department's wishes that readily available land should be brought into profitable occupation at an early date.

Mr. R. G. Macmorran was during last year appointed Assistant Drainage Engineer, and has been untiring in his efforts to facilitate works, the latter remark applying equally to all of my staff, who have shown the utmost loyalty and attention in carrying out the desires of the Department.

I have, &c.,
J. B. Thompson,
Land Drainage Engineer.

ARTESIAN BORE NO. 10: SECTIONS 36 AND 37 (A. E. PALMER AND H. SCHWARZ).

Depth in Feet.	Details.	Depth in Feet.	Details.
50	50 ft. shell and clay.	142	4 ft. peat.
53	3 ft. pumice.	143	1 ft. peat.
54	1 ft. clay.	153	10 ft. pumice.
59	5 ft. sand.	157	4 ft. blue clay.
65	6 ft. peaty clay.	166	9 ft. blue clay.
85	20 ft. sand.	169	3 ft. pumice.
100	15 ft. sandy pumice.	171	2 ft. sandy clay.
126	26 ft. sandy clay.	179	8 ft. sandy clay.
130	4 ft. pumice.	181	2 ft. hard sand.
132	2 ft. peat.	186	5 ft. sandy clay.
138	6 ft. sand.		

Total depth, 186 ft. Flow, 2,000 gals. per day.

ARTESIAN BORE NO. 11: SECTION 12 (W. H. SCOTT).

Depth in Feet.	Details.	Depth in Feet.	Details.
46	46 ft. clay and shell.	145	6 ft. clay.
52	6 ft. clay.	154	9 ft. sand.
54	2 ft. white clay and sand.	161	7 ft. sand.
61	7 ft. sand.	164	3 ft. peaty clay.
76	15 ft. sandy pumice.	168	4 ft. sandy clay.
84	8 ft. sand.	178	10 ft. sandy clay.
85	1 ft. peaty swamp.	180	2 ft. sand.
92	7 ft. sandy clay.	193	13 ft. sandy clay.
94	2 ft. sand.	194	1 ft. sand.
98	4 ft. peaty clay.	196	2 ft. clay.
105	7 ft. sand.	197	1 ft. sand.
108	3 ft. clay.	199	12 ft. clay.
110	2 ft. peaty clay.	203	4 ft. clay.
114	4 ft. sand.	208	5 ft. clay.
123	9 ft. clay.	209	1 ft. rock.
125	2 ft. clay.	219	10 ft. papa sand.
139	14 ft. sandy clay.	245	26 ft. papa clay.

Total depth, 245 ft. Flow, 10,000 gals. per day.

ARTESIAN BORE NO. 12: SECTION 13 (H. M. KEATING).

Depth in Feet.	Details.	Depth in Feet.	Details.
51	51 ft. clay with shell bars.	182	3 ft. clay.
71	20 ft. sandy clay.	184	2 ft. sandy pumice.
82	11 ft. sand.	195	11 ft. clay.
87	5 ft. clay.	199	4 ft. clay.
96	9 ft. peaty clay.	210	11 ft. sand.
102	6 ft. clay.	221	11 ft. sand.
114	12 ft. clay.	223	2 ft. peat.
117	3 ft. sand.	226	3 ft. sandy clay.
147	30 ft. sand.	237	11 ft. sand.
158	11 ft. sand.	242	5 ft. clay.
160	2 ft. peat.	253	11 ft. sandy pumice.
163	3 ft. sandy peat.	258	5 ft. peaty clay.
165	2 ft. peat.	267	9 ft. sand.
167	2 ft. sand.	278	11 ft. sand with clay seams.
168	1 ft. peat.	282	4 ft. peaty clay.
179	11 ft. pumice sand.	292	10 ft. sand.

Total depth, 292 ft. Flow, 6,700 gals. per day.

ARTESIAN BORE NO. 13: SECTION 14 (B. BUCHANAN).

Depth in Feet.	Details.	Depth in Feet.	Details.
54	54 ft. blue mud.	147	2 ft. clay.
70	16 ft. clay.	159	12 ft. sandy clay.
90	20 ft. sand.	161	2 ft. clay.
99	9 ft. clay.	172	11 ft. sand.
100	1 ft. peat.	173	1 ft. clay.
101	1 ft. clay.	174	1 ft. sand.
110	9 ft. sandy clay.	176	2 ft. clay.
113	3 ft. peat clay.	182	6 ft. pumice sand
145	32 ft. pumice sand.	184	2 ft. peaty clay.

ARTESIAN BORE NO. 13: SECTION 14 (B. BUCHANAN)—*continued.*

Depth in Feet.	Details.	Depth in Feet.	Details.
185	1 ft. sand.	348	8 in. clay.
192	7 ft. clay.	350	2 ft. pumice.
194	2 ft. peat.	352	2 ft. peat.
220	16 ft. clay and bars.	355	3 ft. clay.
235	15 ft. clay.	357	2 ft. pumice sand.
247	12 ft. pumice sand.	361	4 ft. peat.
251	4 ft. sand and clay.	363	2 ft. pumice sand.
252	1 ft. hard sand bars.	372	9 ft. peat.
263	11 ft. peaty clay.	377	5 ft. sandy clay.
265	2 ft. pumice.	387	10 ft. hard sand.
271	6 ft. pumice sand.	390	3 ft. clay.
272	1 ft. peat.	392	2 ft. sand stone.
283	11 ft. pumice sand.	402	10 ft. sandy clay.
287	4 ft. peat.	406	4 ft. sand.
299	12 ft. pumice sand.	442	38 ft. soft papa.
301	2 ft. clay and sand.	445	3 ft. hard papa.
303	2 ft. peat.	456	11 ft. soft papa.
308	5 ft. pumice.	456½	½ ft. hard sand bar.
308⅓	4 in. hard sandstone.	471½	15 ft. soft papa.
313⅓	5 ft. sand.	477½	6 ft. hard papa.
323⅓	10 peat and rotten wood.	507½	30 ft. soft papa.
342⅓	19 ft. pumice sand.	509½	2 ft. hard sandstone
343⅓	1 ft. clay.	520⅝	11 ft. 4 in. soft papa.
347⅓	4 ft. pumice.		

Total depth, 520⅝ ft. Flow, 3,671 gals. per day.

ARTESIAN BORE NO. 14: SECTION 15 (E. C. MARSHAL).

Depth in Feet.	Details.	Depth in Feet.	Details.
46	46 ft. blue clay.	300	7 ft. pumice.
49	3 ft. sand.	301	1 ft. clay.
61	12 ft. clay.	306	5 ft. pumice.
83	22 ft. sand.	307	1 ft. clay.
92	9 ft. peat.	313	6 ft. pumice.
97	5 ft. sand.	314	1 ft. clay.
100	3 ft. peat.	319	5 ft. pumice.
121	21 ft. white clay.	322	3 ft. clay.
124	3 ft. pumice.	328	6 ft. pumice.
134	10 ft. peat.	329	1 ft. clay.
139	5 ft. pumice sand.	336	7 ft. pumice.
148	9 ft. peat.	339	3 ft. peat.
153	5 ft. white sand.	354	15 ft. hard sand.
177	24 ft. pumice.	357	3 ft. peat.
178	1 ft. peat.	360	3 ft. sand.
181	3 ft. pumice sand.	362	2 ft. peat.
182	1 ft. peat.	365	3 ft. sand.
185	3 ft. pumice sand.	372	7 ft. peat.
198	13 ft. pumice.	386	14 ft. hard sand.
201	3 ft. clay.	387	1 ft. clay.
212	11 ft. pumice sand.	395	8 ft. hard sand.
218	6 ft. clay.	396	1 ft. clay
227	9 ft. pumice.	407	11 ft. hard sand.
233	6 ft. peat.	409	2 ft. clay.
236	3 ft. pumice.	414	5 ft. hard sand.
238	2 ft. peat.	417	3 ft. peat.
242	4 ft. pumice.	419	2 ft. sand.
245	3 ft. peat.	422	3 ft. peat.
250	5 ft. pumice.	424	2 ft. pumice.
253	3 ft. peat.	428	4 ft. peat.
255	2 ft. pumice.	430	2 ft. sand.
263	8 ft. clay.	438	8 ft. clay.
266	3 ft. pumice.	441	3 ft. hard sand.
277	11 ft. peat.	443	2 ft. clay.
283	6 ft. pumice.	450	7 ft. hard sand.
284	1 ft. clay.	454	4 ft. clay.
287	3 ft. pumice.	458	4 ft. hard sand.
288	1 ft. peat.	461	3 ft. clay.
292	4 ft. pumice.	466	5 ft. hard sand.
293	1 ft. clay.	519	53 ft. clay.

Total depth, 519 ft. Flow, 2,000 gals. per day.

ARTESIAN BORE NO. 15: WELL NO. 2, NORTH-WEST: SECTION NO. 14 (B. BUCHANAN).

Depth in Feet.	Details.	Depth in Feet.	Details.
50	50 ft. blue clay.	229	2 ft. clay.
63	13 ft. sand.	245	6 ft. sand.
67	4 ft. clay.	248	3 ft. peat.
71	4 ft. sand.	258	10 ft. sand.
80	9 ft. clay.	261	3 ft. peat.
82	2 ft. black sand.	265	4 ft. sand.
85	3 ft. clay.	267	2 ft. clay.
86	1 ft. sand.	278	11 ft. sand.
88	2 ft. clay.	281	3 ft. peat.
89	1 ft. pumice.	283	2 ft. sand.
91	2 ft. clay.	285	2 ft. peat.
93	2 ft. sand.	285½	½ ft. hard sand bar.
98	5 ft. white clay.	289	3½ ft. pumice sand.
126	28 ft. white sand.	297	8 ft. hard sand.
141	15 ft. pumice.	299	2 ft. peat.
142	1 ft. peat.	309	10 ft. sand.
149	7 ft. sand.	311	2 ft. peat.
150	1 ft. shingle.	317	6 ft. pumice sand.
153	3 ft. pumice (small flow).	319	2 ft. peat.
154	1 ft. peat.	321	2 ft. pumice sand.
167	13 ft. sand.	327	6 ft. peat.
168	1 ft. clay.	337	10 ft. pumice sand.
172	4 ft. pumice sand.	338	1 ft. clay.
173	1 ft. clay.	340	2 ft. pumice sand.
178	5 ft. pumice sand.	342	2 ft. clay.
180	2 ft. clay.	345	3 ft. pumice sand.
184	4 ft. sand.	347	2 ft. clay.
185	1 ft. clay.	351	4 ft. pumice sand.
190	5 ft. sand.	352	1 ft. clay.
191	1 ft. clay.	353	1 ft. sand.
194	3 ft. sand.	354	1 ft. clay.
195	1 ft. clay.	358	4 ft. sand.
199	4 ft. sand.	361	3 ft. peat.
204	5 ft. clay.	363	2 ft. sandy pumice.
206	2 ft. sand.	365	2 ft. peat.
207	1 ft. clay.	367	2 ft. pumice sand.
209	2 ft. sand.	369	2 ft. clay.
214	5 ft. clay.	371	2 ft. sand.
216	2 ft. sand.	375	4 ft. peat and rotten timber.
221	5 ft. clay.	379	4 ft. pumice sand.
223	2 ft. peat.	381	2 ft. clay.
225	2 ft. clay.	427	46 ft. black sand.
237	12 ft. pumice sand.	444	17 ft. sandy clay.

Total depth, 444 ft. Flow, 12,960 gals. per day.

ARTESIAN BORE NO. 16: SECTION 11 (S. S. KNOX).

Depth in Feet.	Details.	Depth in Feet.	Details.
54	54 ft. blue clay.	175	2 ft. peat.
75	21 ft. pumice sand.	180	5 ft. pumice sand.
77	2 ft. peat.	182	2 ft. peat.
83	6 ft. pumice sand.	191	9 ft. pumice.
84	1 ft. peat.	192	1 ft. clay.
91	7 ft. pumice sand.	206	14 ft. pumice.
92	1 ft. peat.	207	1 ft. peat.
101	9 ft. clay.	219	12 ft. pumice.
109	8 ft. pumice sand.	220	1 ft. peat.
110	1 ft. peat.	224	4 ft. pumice.
115	5 ft. pumice sand.	226	2 ft. peat.
116	1 ft. peat.	236	10 ft. pumice.
120	4 ft. pumice sand.	238	2 ft. rotten timber.
121	1 ft. peat.	242	4 ft. pumice.
123	2 ft. clay.	244	2 ft. clay.
127	4 ft. pumice sand.	247	3 ft. pumice.
128	1 ft. peat.	249	2 ft. clay.
134	6 ft. pumice sand.	254	5 ft. pumice.
135	1 ft. peat.	255	1 ft. clay.
165	30 ft. pumice sand.	257	2 ft. pumice.
169	4 ft. peat.	350	93 ft. blue clay.
173	4 ft. pumice sand.	364	14 ft. pink clay.

Total depth, 364 ft. No flow obtained.

ARTESIAN BORE No. 17: SECTIONS 9 AND 9A (PORTER AND FINNERTY).

Depth in Feet.	Details.	Depth in Feet.	Details.
70	70 ft. blue clay.	198	1 ft. pumice sand.
73	3 ft. blue clay.	225	27 ft. blue clay.
75	2 ft. pumice.	227	2 ft. rotten timber.
77	2 ft. clay.	236	9 ft. blue clay.
95	18 ft. pumice sand.	237	1 ft. pumice sand.
97	2 ft. clay.	239	2 ft. rotten timber.
100	3 ft. pumice sand.	242	3 ft. clay.
102	2 ft. clay.	254	12 ft. pumice sand.
122	20 ft. drift sand.	255	1 ft. rotten timber.
131	9 ft. clay.	265	10 ft. pumice sand.
132	1 ft. sandy pumice.	275	10 ft. clay.
141	9 ft. clay.	283	8 ft. pumice sand.
145	4 ft. pumice sand.	284	1 ft. flow (22,840 gals. per day).
148	3 ft. clay.	297	13 ft. pumice sand.
150	2 ft. pumice sand.	298	1 ft. clay.
153	3 ft. clay.	305	7 ft. pumice sand.
154	1 ft. sand.	307	2 ft. clay.
167	13 ft. clay.	314	7 ft. pumice sand.
168	1 ft. pumice sand.	322	8 ft. clay.
197	29 ft. blue clay.		

Total depth, 322 ft. Flow, 22,840 gals. per day.

ARTESIAN BORE No. 18: SECTION 7 (PENZHOLTZ).

Depth in Feet.	Details.	Depth in Feet.	Details.
66	66 ft. blue clay.	239	7 ft. pumice sand.
76	10 ft. pumice.	240	1 ft. clay.
78	2 ft. pumice sand.	245	5 ft. pumice sand.
79	1 ft. clay.	247	2 ft. clay.
92	13 ft. pumice sand.	252	5 ft. pumice sand.
93	1 ft. rotten timber.	272	20 ft. clay.
108	15 ft. drift sand.	274	2 ft. pumice sand.
109	1 ft. rotten timber.	281	7 ft. clay.
116	7 ft. pumice sand.	289	8 ft. pumice sand.
118	2 ft. clay.	291	2 ft. flow.
123	5 ft. pumice sand.	293	2 ft. pumice sand.
186	63 ft. blue clay.	294	1 ft. rotten timber.
188	2 ft. rotten timber.	296	2 ft. pumice sand.
211	23 ft. pumice sand.	297	1 ft. clay.
231	20 ft. clay.	316	19 ft. pumice sand.
232	1 ft. rotten timber.		

Total depth, 316 ft. Flow, 8,640 gals. per day.

ARTESIAN BORE No. 19: SECTIONS 5 AND 6 (E. KEANE AND G. L. WALLIS).

Depth in Feet.	Details.	Depth in Feet.	Details.
52	52 ft. clay.	185	1 ft. pumice sand.
80	28 ft. pumice sand.	188	3 ft. clay.
82	2 ft. clay.	192	4 ft. pumice sand.
86	4 ft. pumice sand.	194	2 ft. rotten timber.
88	2 ft. rotten timber.	203	9 ft. pumice sand.
92	4 ft. pumice sand.	217	14 ft. clay.
94	2 ft. clay.	236	19 ft. pumice sand.
112	18 ft. pumice sand.	271	35 ft. clay.
113	1 ft. rotten timber.	280	9 ft. pumice sand.
119	6 ft. pumice sand.	283	3 ft. clay.
121	2 ft. clay.	306	23 ft. pumice sand.
122	1 ft. pumice sand.	318	12 ft. drifty sand.
124	2 ft. clay.	328	10 ft. shingle.
128	4 ft. pumice sand.	336	8 ft. clay.
173	45 ft. clay.	343	7 ft. pumice sand.
180	7 ft. pumice sand.	347	4 ft. clay.
181	1 ft. rotten timber.	355	8 ft. pumice sand.
183	2 ft. pumice sand.	356	1 ft. flow (running 7,300 gals.).
184	1 ft. clay.	388	32 ft. pumice sand.

Total depth, 388 ft. Flow, 7,300 gals. per day.

ARTESIAN BORE NO. 20: SECTION 11 (S. S. KNOX).

Depth in Feet.	Details.	Depth in Feet.	Details.
40	40 ft. clay.	203	1 ft. clay.
77	37 ft. pumice sand.	207	4 ft. pumice sand.
79	2 ft. clay.	209	2 ft. clay.
85	6 ft. pumice sand.	212	3 ft. pumice sand.
86	1 ft. rotten timber.	213	1 ft. clay.
100	14 ft. pumice sand.	220	7 ft. pumice sand.
101	1 ft. clay.	222	2 ft. clay.
118	17 ft. pumice sand.	223	1 ft. pumice.
119	1 ft. clay.	225	2 ft. clay.
147	28 ft. pumice sand.	229	4 ft. pumice sand.
148	1 ft. clay.	263	34 ft. clay.
150	2 ft. pumice sand.	271	8 ft. pumice sand.
151	1 ft. clay.	281	10 ft. clay.
174	23 ft. pumice sand.	285	4 ft. quartz.
175	1 ft. clay.	330	45 ft. clay.
182	7 ft. pumice sand.	406	76 ft. sandy clay.
184	2 ft. clay.	408	2 ft. sandstone.
196	12 ft. pumice sand.	429	21 ft. sandy clay.
197	1 ft. clay.	438	9 ft. shingle.
202	5 ft. pumice sand.		

Total depth, 438 ft. Flow, 5,760 gals. per day.

ARTESIAN BORE NO. 21: SECTION 27 (R. PAUL).

Depth in Feet.	Details.	Depth in Feet.	Details.
53	53 ft. clay.	93	3 ft. pumice.
55	2 ft. peat.	94	1 ft. rotten timber.
56	1 ft. pumice.	109	15 ft. drift sand.
57	1 ft. clay.	139	30 ft. clay.
70	13 ft. pumice sand.	150	11 ft. drift sand.
77	7 ft. pumice.	151	1 ft. flow (running 240 gals. per hour).
78	1 ft. clay.	175	24 ft. sand.
88	10 ft. pumice sand.	176	1 ft. rotten timber.
90	2 ft. clay.	184	8 ft. pumice sand.

Total depth, 184 ft. Flow, 240 gals. per hour.

ARTESIAN BORE NO. 22: SECTION 31 (J. SILKE).

Depth in Feet.	Details.	Depth in Feet.	Details.
54	54 ft. clay.	130	3 ft. drift sand.
55	1 ft. peat.	168	38 ft. clay.
79	24 ft. pumice sand.	181	13 ft. pumice sand.
81	2 ft. clay.	182	1 ft. flow.
86	5 ft. pumice.	192	10 ft. pumice sand.
87	1 ft. peat.	194	2 ft. clay.
89	2 ft. pumice.	196	2 ft. pumice sand.
90	1 ft. clay.	197	1 ft. rotten timber.
92	2 ft. pumice.	200	3 ft. pumice sand.
94	2 ft. clay.	207	7 ft. pumice sand.
97	3 ft. pumice sand.	208	1 ft. clay.
99	2 ft. clay.	215	7 ft. pumice sand.
103	4 ft. black sand.	216	1 ft. flow (200 gals. per hour).
104	1 ft. rotten timber.	290	74 ft. drift sand.
111	7 ft. black sand.	328	38 ft. clay.
116	5 ft. clay.	331	3 ft. drift sand.
126	10 ft. drift sand.	347	16 ft. clay.
127	1 ft. sound timber.	369	22 ft. drift sand (black).

Total depth, 369 ft. Flow, 600 gals. per hour.

ARTESIAN BORE NO. 23: SECTION 9 (A. E. DIPROSE).

Depth in Feet.	Details.	Depth in Feet.	Details.
54	54 ft. clay.	154	6 ft. pumice sand.
83	29 ft. pumice sand.	155	1 ft. clay.
84	1 ft. flow.	176	21 ft. pumice sand.
94	10 ft. pumice sand.	193	17 ft. clay.
95	1 ft. clay.	202	9 ft. pumice sand.
98	3 ft. pumice sand.	204	2 ft. peat.
100	2 ft. clay.	208	4 ft. pumice sand.
102	2 ft. pumice sand.	210	2 ft. rotten timber.
103	1 ft. clay.	221	11 ft. pumice sand.
124	21 ft. drift sand.	222	1 ft. flow (10,000 gals. per day).
125	1 ft. sound timber.	223	1 ft. pumice sand.
130	5 ft. clay.	224	1 ft. rotten timber.
132	2 pumice sand.	243	19 ft. pumice sand.
148	16 ft. clay.	246	3 ft. clay.

Total depth, 246 ft. Flow, 12,000 gals. per day.

ARTESIAN BORE NO. 24: SECTION 10 (T. QUILTY).

Depth in Feet.	Details.	Depth in Feet.	Details.
62	62 ft. clay.	192	35 ft. pumice sand.
82	20 ft. pumice sand.	195	3 ft. clay.
84	2 ft. clay.	196	1 ft. pumice sand.
91	7 ft. pumice sand.	202	6 ft. clay.
93	2 ft. clay.	205	3 ft. pumice sand.
98	5 ft. pumice sand.	206	1 ft. rotten timber.
101	3 ft. clay.	210	4 ft. pumice sand.
106	5 ft. pumice sand.	211	1 ft. rotten timber.
109	3 ft. clay.	218	7 ft. pumice sand.
128	19 ft. drift sand.	220	2 ft. clay.
139	11 ft. clay.	225	5 ft. pumice sand.
144	5 ft. pumice sand.	227	2 ft. clay.
146	2 ft. clay.	230	3 ft. pumice sand.
151	5 ft. pumice sand.	231	1 ft. flow.
157	6 ft. clay.	247	16 ft. pumice sand.

Total depth, 247 ft. Flow, 7,200 gals. per day.

ARTESIAN BORE NO. 25: SECTION 29 (H. IRWIN).

Depth in Feet.	Details.	Depth in Feet.	Details.
51	51 ft. clay.	124	5 ft. pumice sand.
55	4 ft. peat.	125	1 ft. clay.
74	19 ft. pumice sand.	132	7 ft. pumice clay.
80	6 ft. clay.	136	4 ft. clay.
86	6 ft. pumice sand.	137	1 ft. pumice sand.
90	4 ft. clay.	142	5 ft. clay.
110	20 ft. drift sand, pumice.	145	3 ft. pumice.
117	7 ft. clay.	146	1 ft. flow (17,280 gals. per day).
118	1 ft. pumice sand.	155	9 ft. pumice sand.
119	1 ft. clay.		

Total depth, 155 ft. Flow, 17,280 gals. per day.

ARTESIAN BORE NO. 26: SECTION 30 (SUTTON).

Depth in Feet.	Details.	Depth in Feet.	Details.
57	57 ft. clay.	101	23 ft. drift sand, pumice.
59	2 ft. pumice sand.	110	9 ft. clay.
60	1 ft. peat.	111	1 ft. peat.
72	12 ft. pumice sand.	114	3 ft. pumice sand.
76	4 ft. clay.	115	1 ft. flow (4,420 gals. per day).
78	2 ft. pumice.	140	25 ft. pumice sand.

Total depth, 140 ft. Flow, 4,420 gals. per day.

ARTESIAN BORE No. 27: SECTION 26 (E. LENNARD).

Depth in Feet.	Details.	Depth in Feet.	Details.
55	55 ft. clay.	139	1 ft. clay.
56	1 ft. rotten timber.	146	7 ft. drift sand.
76	20 ft. pumice sand.	171	25 ft. clay.
77	1 ft. clay.	173	2 ft. pumice sand.
81	4 ft. pumice sand.	181	8 ft. clay.
83	2 ft. clay.	186	5 ft. drift sand.
87	4 ft. pumice sand.	188	2 ft. clay.
88	1 ft. clay.	199	11 ft. pumice sand.
91	3 ft. pumice sand.	201	2 ft. clay.
93	2 ft. clay.	214	13 ft. pumice sand.
106	13 ft. pumice sand.	215	1 ft. clay.
113	7 ft. clay.	217	2 ft. pumice sand.
115	2 ft. pumice sand.	218	1 ft. flow.
116	1 ft. rotten timber.	225	7 ft. pumice sand.
119	3 ft. clay.	226	1 ft. rotten timber.
138	19 ft. drift sand, pumice.	247	21 ft. pumice sand.

Total depth, 247 ft. Flow, 14,400 gals. per day.

ARTESIAN BORE No. 28: SECTION 4 (PARKER AND RAU).

Depth in Feet.	Details.	Depth in Feet.	Details.
66	66 ft. clay.	277	2 ft. clay.
74	8 ft. pumice sand.	284	7 ft. pumice sand.
76	2 ft. rotten timber.	290	6 ft. sandy clay.
77	1 ft. pumice sand.	304	14 ft. clay.
83	6 ft. clay.	305	1 ft. rotten timber.
87	4 ft. pumice sand.	307	2 ft. pumice sand.
103	16 ft. clay.	311	4 ft. clay.
108	5 ft. pumice sand.	332	21 ft. pumice sand.
110	2 ft. clay.	341	9 ft. clay.
116	6 ft. pumice sand.	349	8 ft. pumice sand.
118	2 ft. peat.	352	3 ft. clay.
120	2 ft. clay.	361	9 ft. pumice sand.
124	4 ft. pumice sand.	363	2 ft. clay.
126	2 ft. clay.	378	15 ft. pumice sand.
133	7 ft. pumice sand.	379	1 ft. clay.
137	4 ft. clay.	385	6 ft. pumice sand.
140	3 ft. pumice sand.	387	2 ft. clay.
150	10 ft. sandy clay.	392	5 ft. pumice sand.
151	1 ft. peat.	393	1 ft. clay.
153	2 ft. pumice sand.	417	24 ft. pumice sand.
154	1 ft. peat.	418	1 ft. peat.
157	3 ft. pumice sand.	423	5 ft. pumice.
158	1 ft. peat.	424	1 ft. peat.
162	4 ft. clay.	446	22 ft. pumice.
196	34 ft. pumice sand.	449	3 ft. clay.
197	1 ft. clay.	537	88 ft. soft sandstone.
234	37 ft. pumice sand.	564	27 ft. sandy clay.
238	4 ft. clay.	566	2 ft. rotten timber.
262	24 ft. pumice.	589	23 ft. sandy clay.
271	9 ft. shingle.	593	4 ft. sandstone.
272	1 ft. peat.	602	9 ft. clay.
275	3 ft. pumice sand.		

Total depth, 602 ft. Flow, 16,000 gals. per day.

ARTESIAN BORE No. 29: SECTION 6 (MCCABE BROTHERS).

Depth in Feet.	Details.	Depth in Feet.	Details.
52	52 ft. clay.	162	30 ft. clay.
53	1 ft. rotten timber.	186	24 ft. pumice sand.
78	25 ft. clay.	208	22 ft. black sand.
82	4 ft. pumice sand.	226	18 ft. pumice.
83	1 ft. peat.	227	1 ft. peat.
85	2 ft. clay.	230	3 ft. pumice.
87	2 ft. pumice sand.	236	6 ft. clay.
89	2 ft. clay.	252	16 ft. pumice.
105	16 ft. pumice sand.	278	26 ft. shingle.
108	3 ft. clay.	279	1 ft. flow (500 gals. an hour).
131	23 ft. sandy clay.	286	7 pumice.
132	1 ft. pumice sand.	305	19 ft. clay.

Total depth, 305 ft. Flow, 500 gals. per hour.

ARTESIAN BORE No. 30: SECTION 20 (W. ALDRED).

Depth in Feet.	Details.	Depth in Feet.	Details.
58	58 ft. clay.	183	1 ft. rotten timber.
65	7 ft. pumice sand.	188	5 ft. clay.
84	19 ft. clay.	210	22 ft. pumice.
87	3 ft. pumice sand.	212	2 ft. clay.
88	1 ft. rotten timber.	253	41 ft. pumice sand.
91	3 ft. clay.	255	2 ft. clay.
98	7 ft. brown clay.	256	1 ft. pumice.
124	26 ft. pumice sand.	257	1 ft. clay.
125	1 ft. clay.	260	3 ft. pumice.
139	14 ft. pumice.	261	1 ft. clay.
141	2 ft. clay.	283	22 ft. pumice.
142	1 ft. pumice sand.	284	1 ft. rotten timber.
145	3 ft. clay.	295	11 ft. pumice.
149	4 ft. pumice.	296	1 ft. rock.
150	1 ft. clay.	323	27 ft. pumice sand.
153	3 ft. pumice.	324	1 ft. rotten timber.
155	2 ft. clay.	342	18 ft. pumice sand.
169	14 ft. pumice.	344	2 ft. rotten timber.
172	3 ft. clay.	378	34 ft. pumice sand.
176	4 ft. pumice.	382	4 ft. clay.
182	6 ft. clay.		

Total depth, 382 ft. Flow, 200 gals. per hour.

ARTESIAN BORE No. 31: SECTION 10 (BUCKLEY).

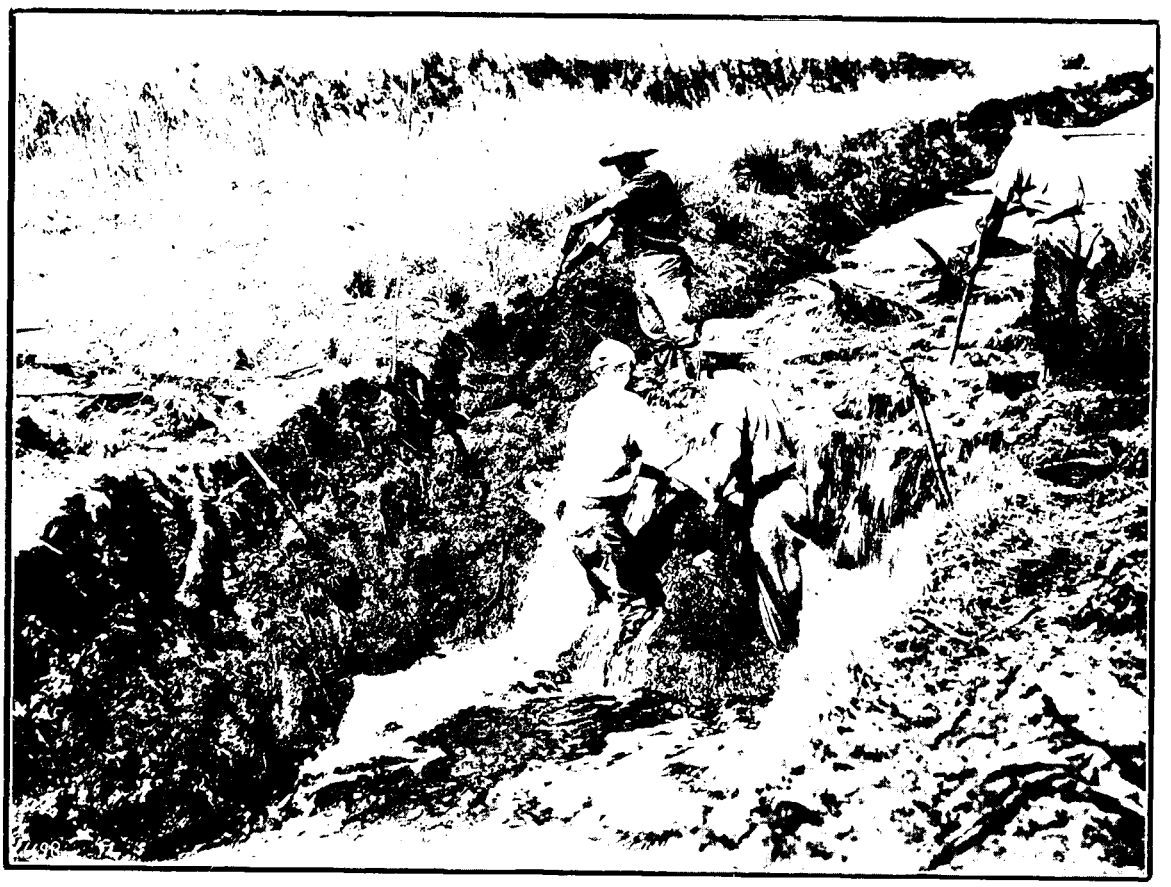
Depth in Feet.	Details.	Depth in Feet.	Details.
85	85 ft. clay.	252	31 ft. pumice sand.
120	35 ft. sandy clay.	253	1 ft. peat.
122	2 ft. peat.	260	7 ft. pumice sand.
144	22 ft. pumice sand.	263	3 ft. sandy clay.
145	1 ft. shingle.	265	2 ft. peat.
155	10 ft. brown clay.	269	4 ft. pumice sand.
182	27 ft. pumice sand.	279	10 ft. sandy clay.
198	16 ft. shingle.	301	22 ft. pumice sand.
206	8 ft. pumice sand.	306	5 ft. clay.
207	1 ft. rotten timber.	327	21 ft. pumice sand.
214	7 ft. pumice sand.	332	5 ft. sandy clay.
216	2 ft. rotten timber.	334	2 ft. rotten timber.
221	5 ft. sandy clay.	398	64 ft. pumice sand.

Total depth, 398 ft. Flow, 14,400 gals. per day.

Approximate Cost of Paper.— Preparation, not given; printing (1,800 copies, including plan and illustrations), £46.

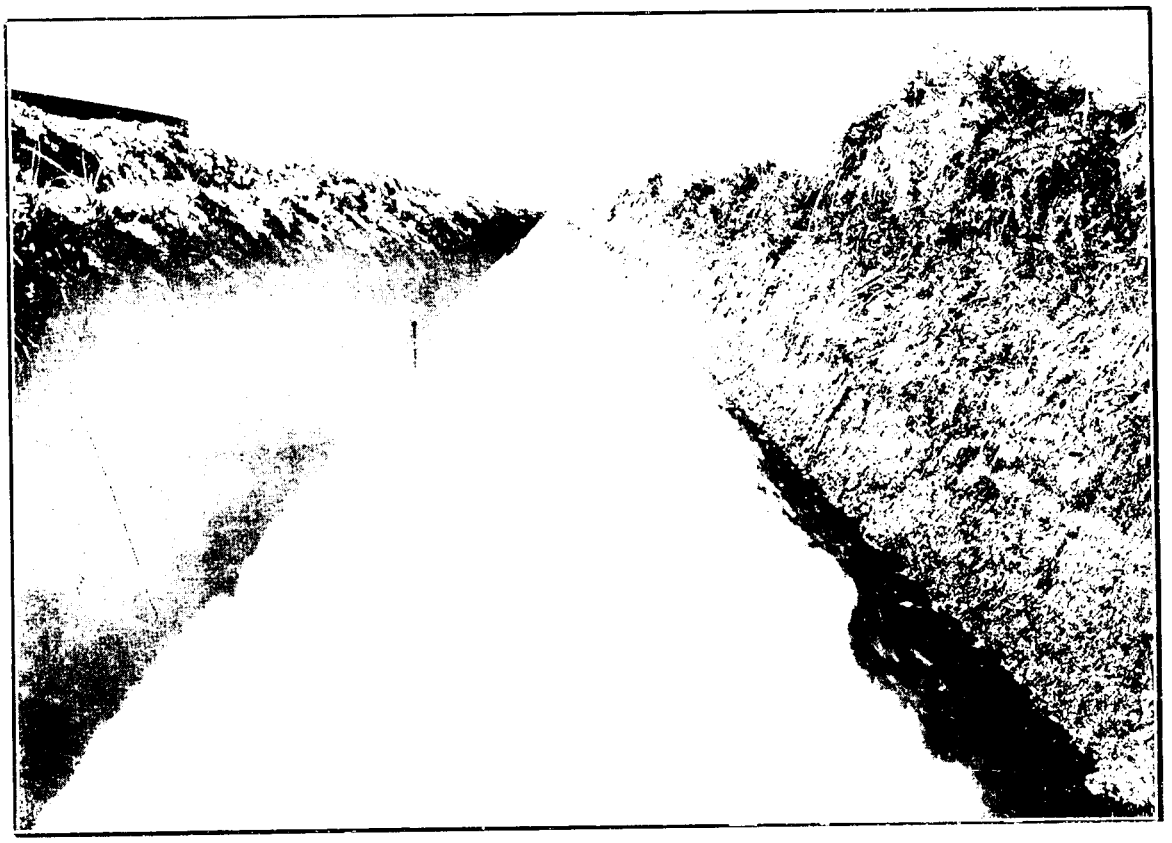
By Authority: JOHN MACKAY, Government Printer, Wellington. 1912.

Price 1s.

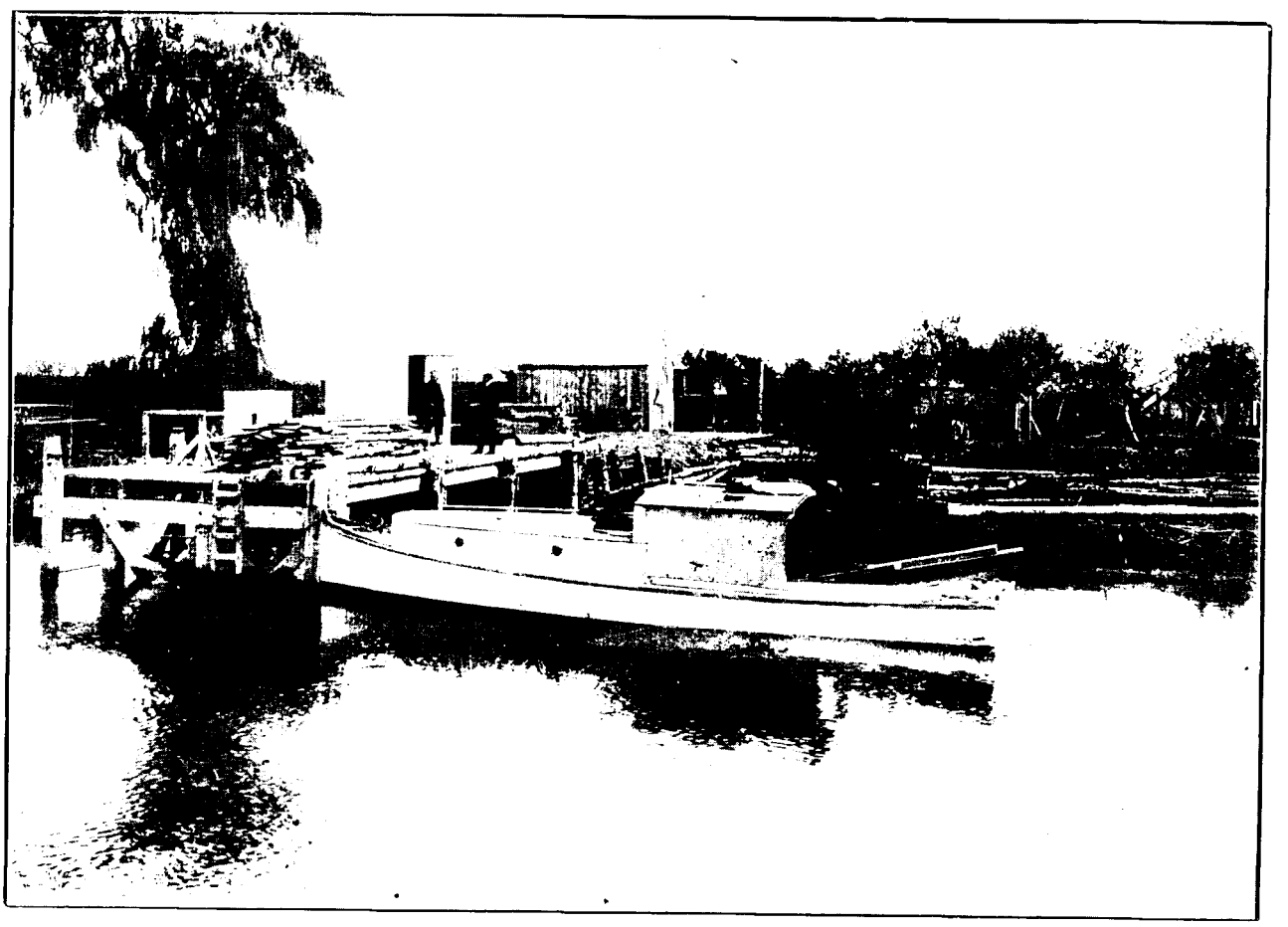


Deepening Drain.

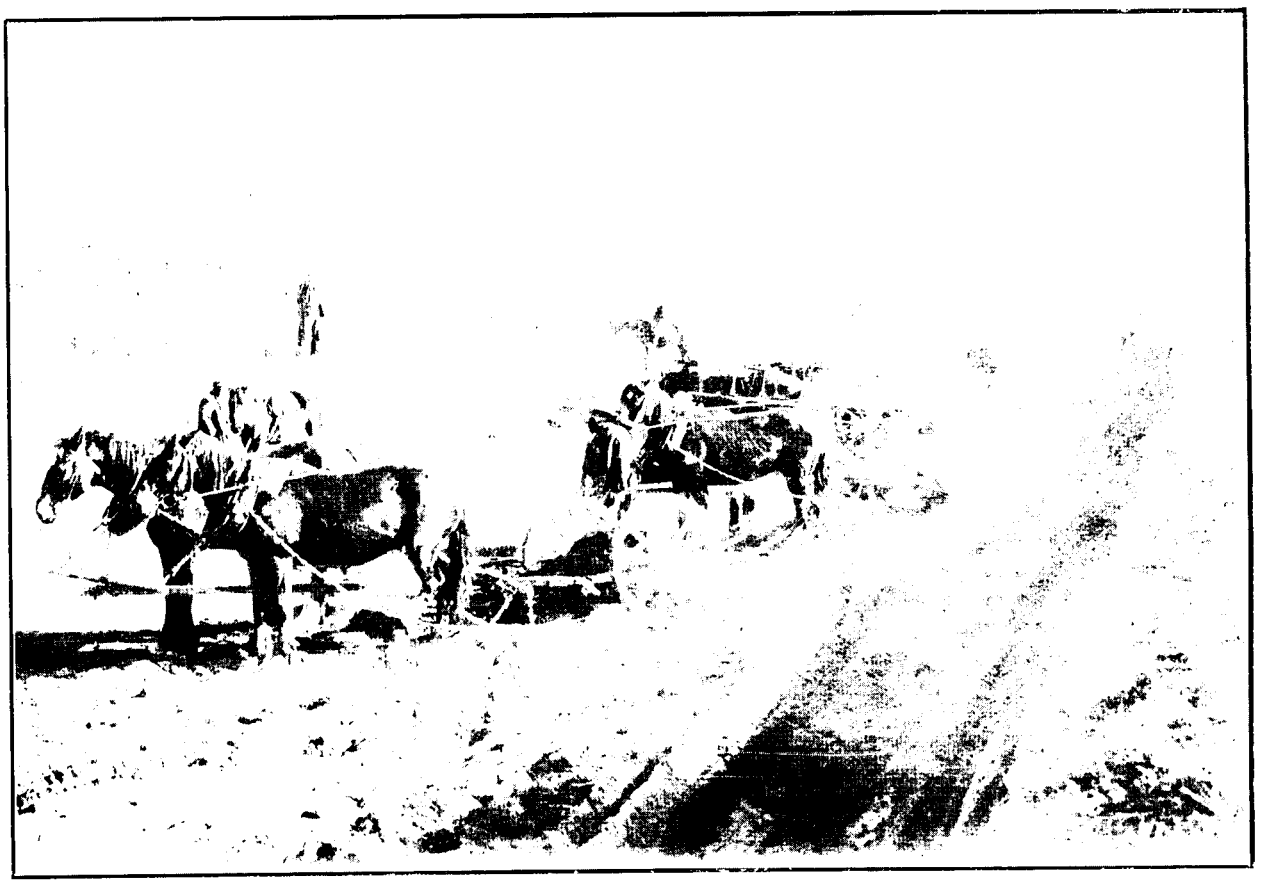
Stop bank, E. Drain, above Kerepeehi.



Collecting Stock Fish

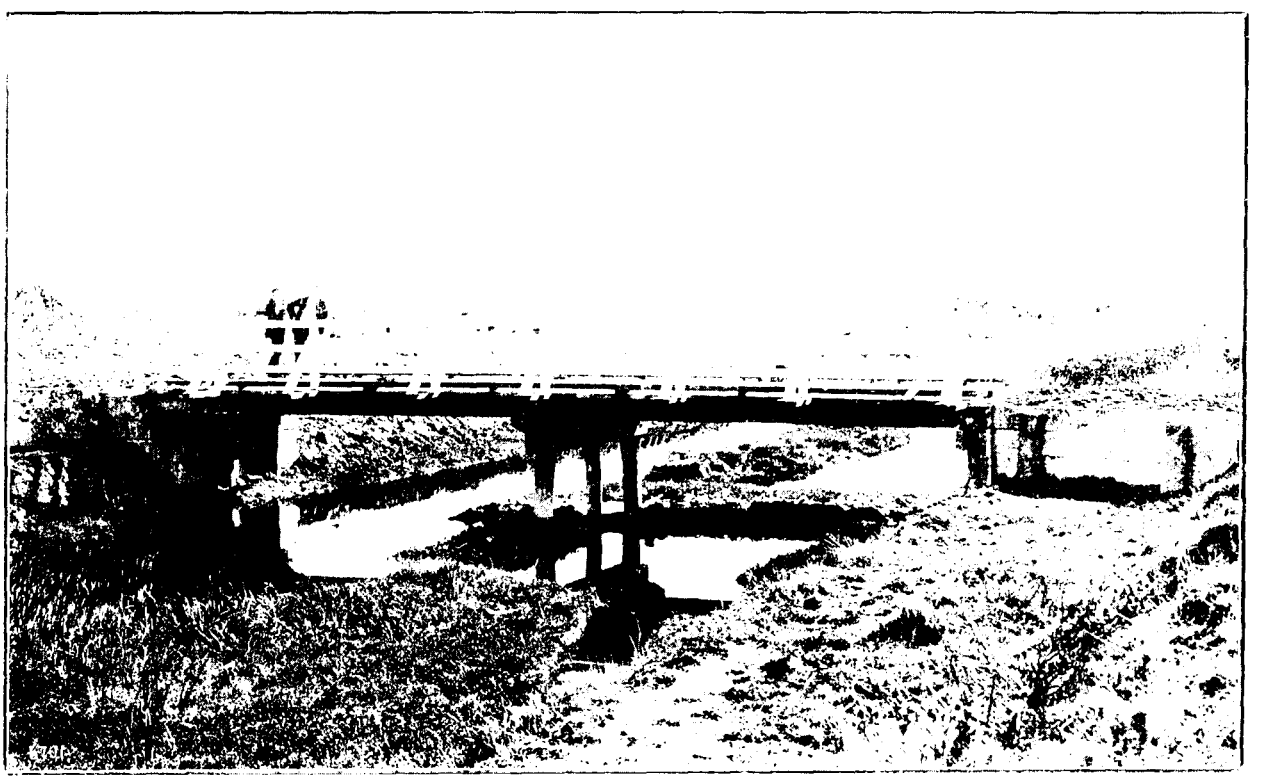


Orchard Wharf

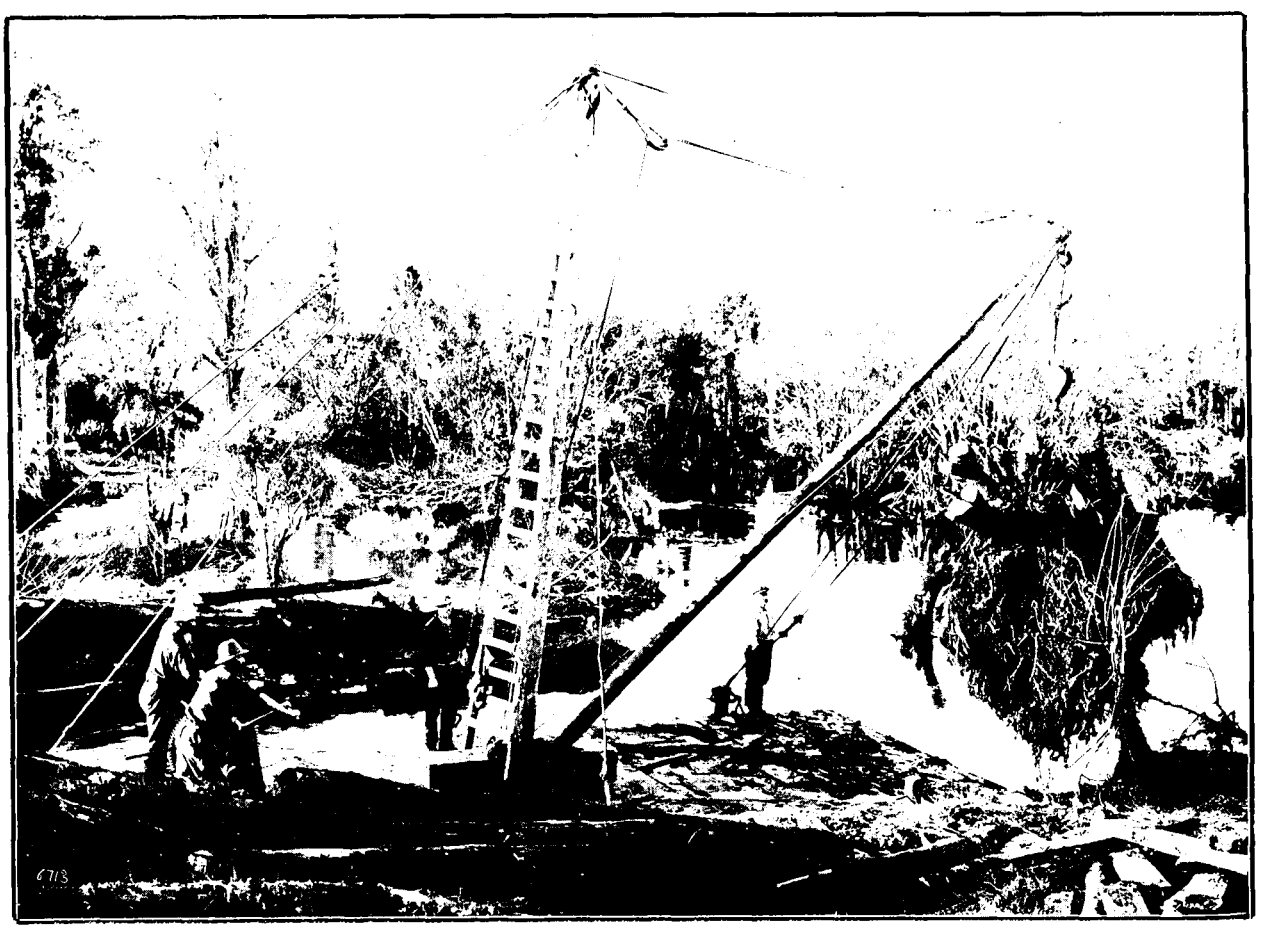


Drays and Scoops on Road formation, Walloo Block.

Upper Reaches, Piako River.



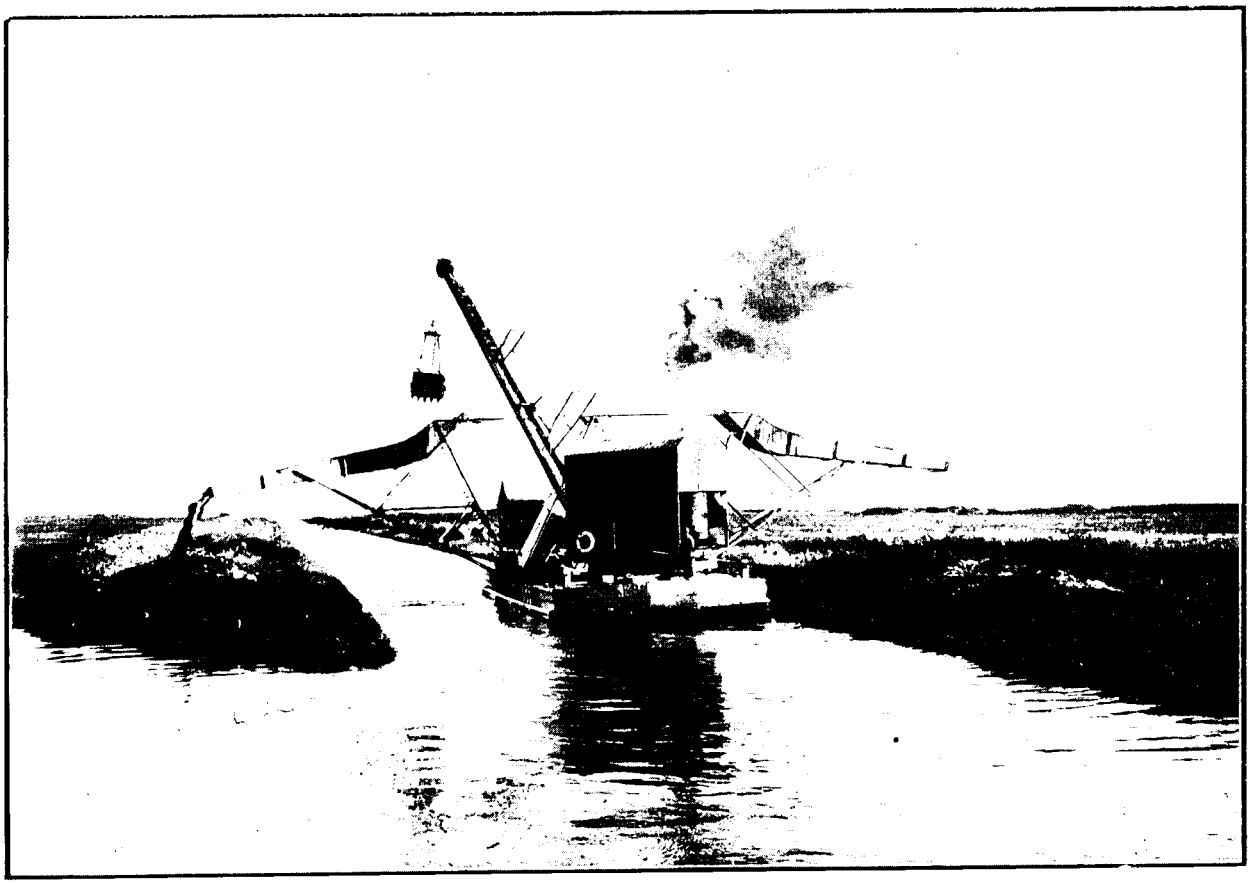
Upper Watton River snagged (above Otway St.



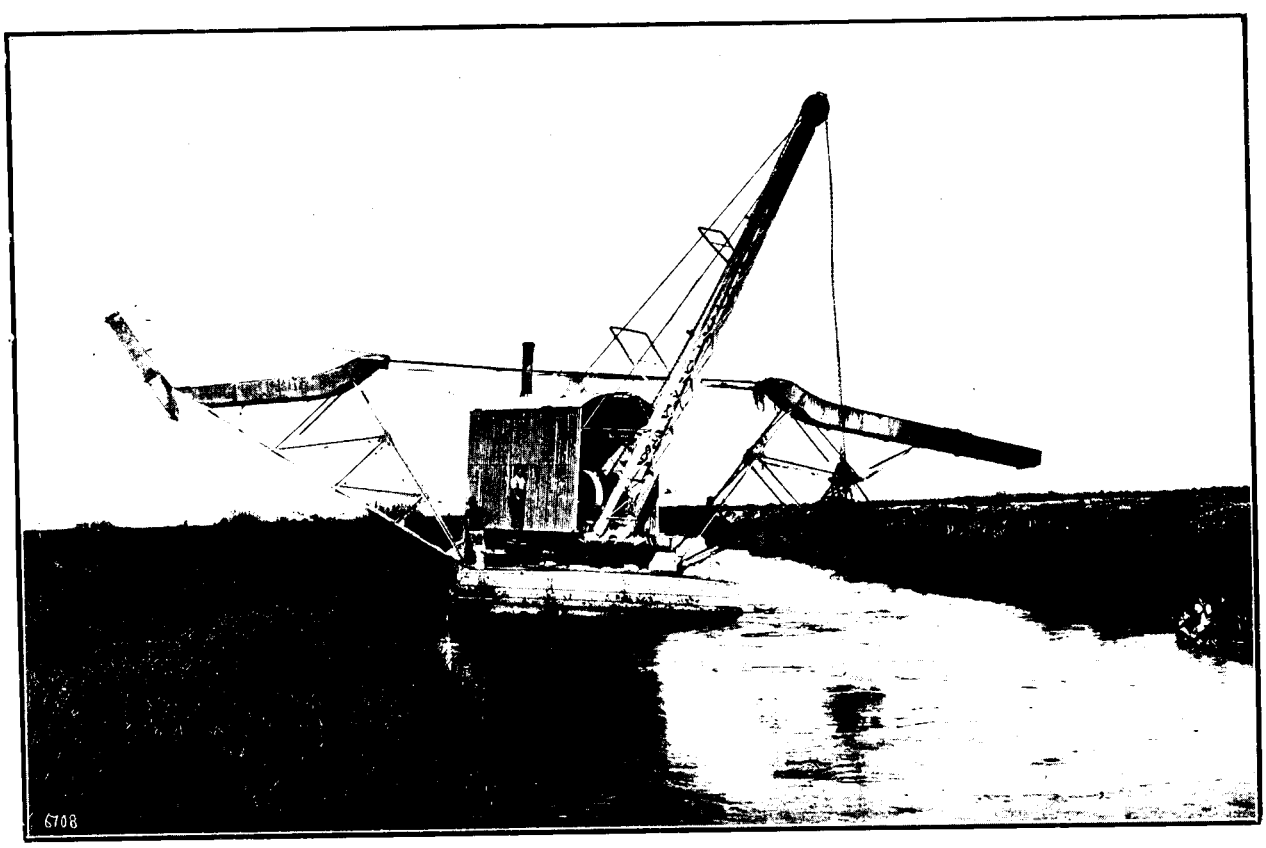
Snagging Plant on Watton River.

JUNCTION OF PIAKO RIVER AND AWATEA STREAM, THE LATTER NOW BEING DREDGED AND WIDENED.

S.S. "HAUIAKI" ON PIAKO RIVER.

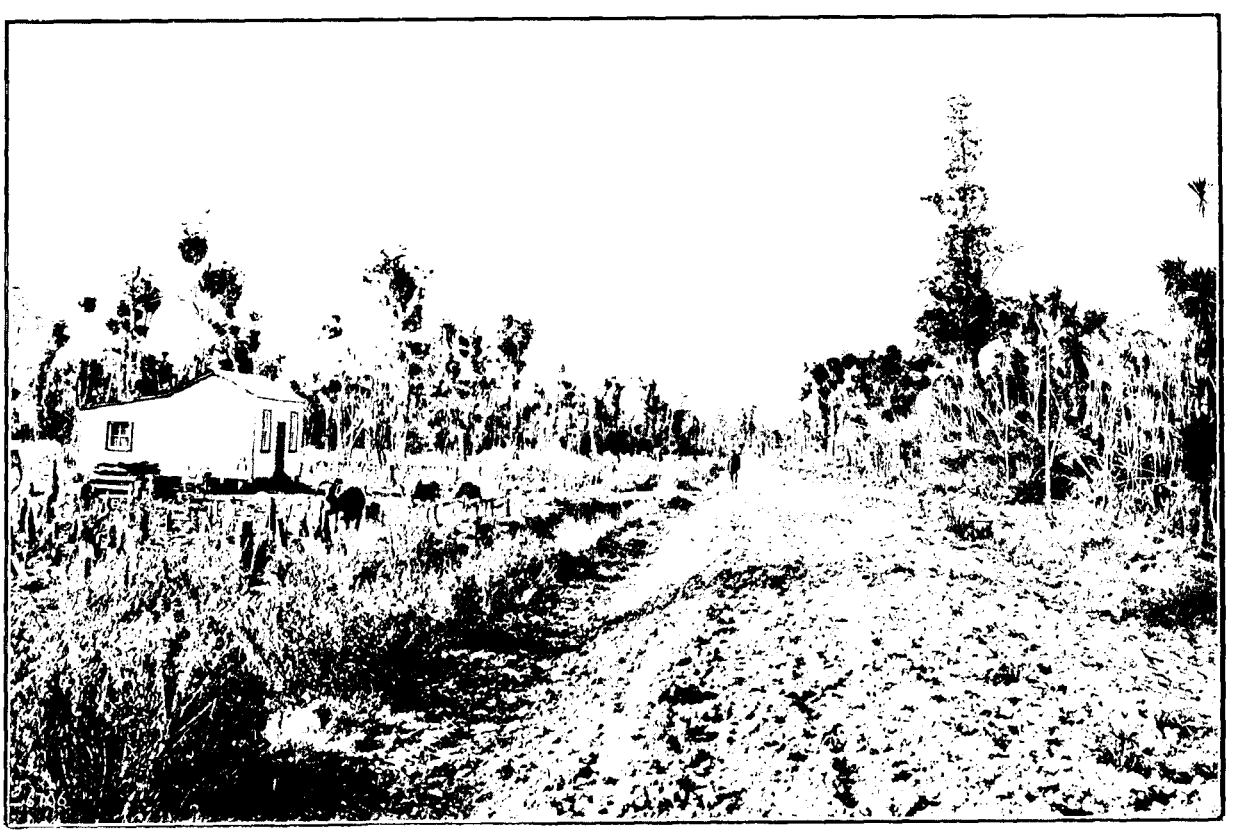


No. 2 Dredge completing Waikaka Canal.

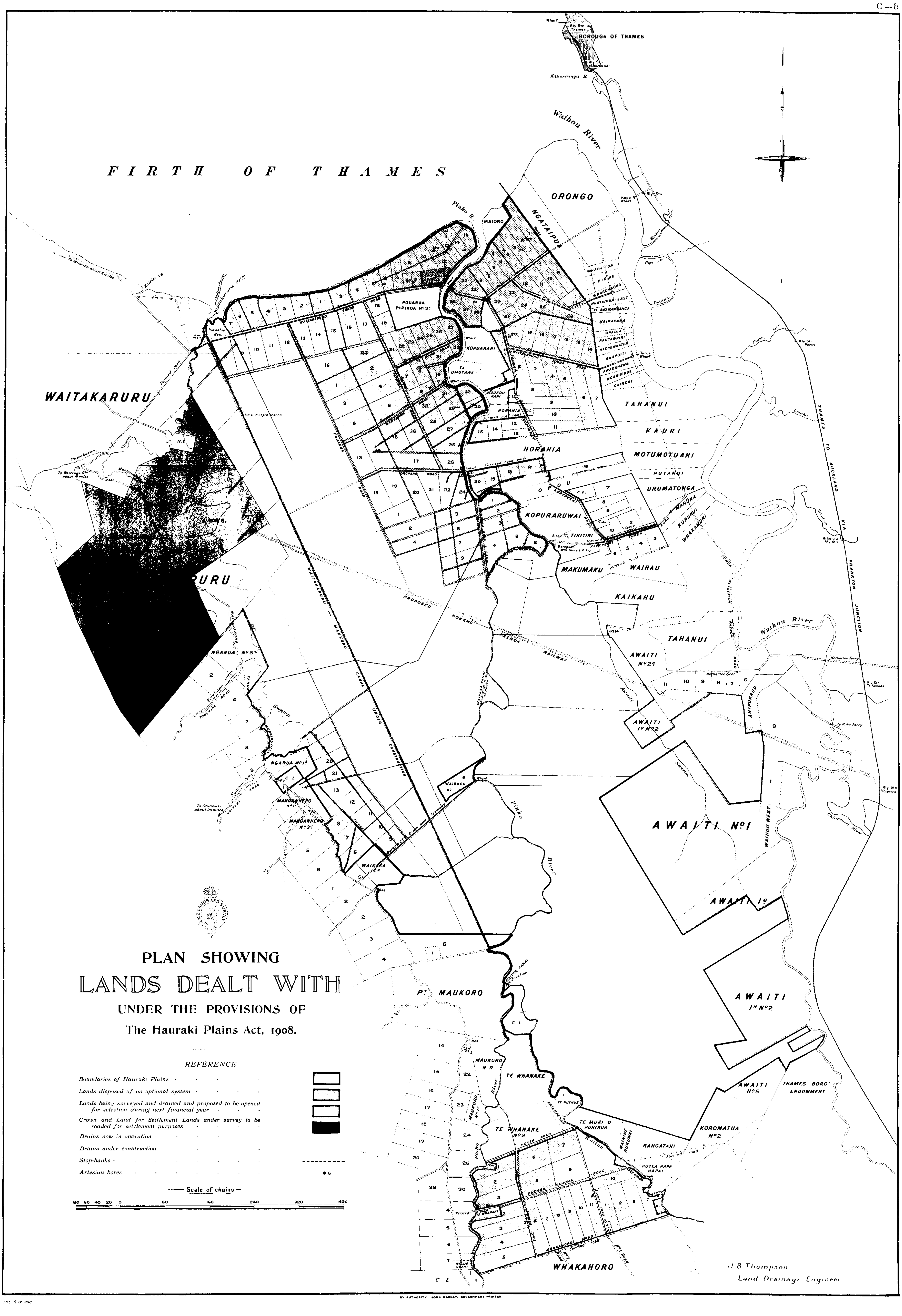


No. 1 Dredge improving Piako River.

At Kerepehi: The Awaiti Steamer.



The Koputaroa-Kerepehi Road.



By Authority: John Mackay, Government Printer.