

1917.
NEW ZEALAND.

DRAINAGE OF LAKE WAIATARUA (ST. JOHN'S LAKE)

(REPORT ON), BY J. B. THOMPSON, CHIEF DRAINAGE ENGINEER.

Laid on the Table of the House of Representatives by Leave.

Re Lake Waiatarua (St. John's Lake).

The Under-Secretary for Lands, Wellington.

Auckland, 15th August, 1917.

IN accordance with instructions contained in your wire of the 10th ultimo and a further wire from the Hon. Minister, I herewith beg to report upon the drainage of the above-named lake.

PROPOSALS OF WAIATARUA DRAINAGE BOARD.

1. The main object of this Board is to entirely drain the lake-basin per medium of a tunnel, which is now driven from Orakei Creek through the ridge to Lake Waiatarua. This tunnel is not yet lined, but it was intended to place therein concrete pipes of 3 ft. in diameter. However, this intention has been lately altered, and the new proposal is to enlarge tunnel and line it in concrete.

2. By entirely draining the lake-basin the following lands would be unwatered :—

	A.	R.	P.	
(a.)	171	1	0	Swamp and inundated lands adjacent to Lake Waiatarua.
(b.)	55	0	20	Lake-bed.

226 1 20

3. (c.) It is proposed to vest in the Auckland City Council by Mr. R. H. Abbott, as a free gift, 100 acres as a park.

(d.) The trustees of the Church of England to provide a 100 ft. road, equalling 33 acres 1 rood 20 perches.

(e.) That endeavours be made to vest in the Auckland City, by aid of a local Bill, the lake-bed, consisting of 55 acres and 20 perches, which is to be drained and formed into a park.

Should the proposals as above go through, then Auckland City contributes £2,500 towards increasing the size of the tunnel, and, further, is to construct the proposed new road or drive.

The accompanying plans show the above proposals.

4. I am instructed to report—

(f.) Whether it would be practicable to remove the surface waters and drain the marsh lands about Lake Waiatarua without materially injuring the lake itself, and whether larger powers would be required to be given to the Board to enable it to carry out such operations, and at the same time preserve the lake.

(g.) To report the probable effect of drainage of lake on the Onehunga water-supply.

As regards (f), I have gone to considerable trouble in obtaining soundings of the lake, and these are clearly shown on Plan 5 accompanying this report. It will be noticed that the flood-level is now considerably above summer level, probably some 4 ft. 6 in. The lake-basin is practically of frying-pan shape, and deepens quickly from margin of lake. The whole of marshy and other lands were inundated at time of my inspection, and, generally speaking, these lands are now submerged from 4 ft. to 5 ft. 6 in. in average deepest portions.

Plan 5 shows all particulars and gives contours representing the effects of lowering lake to several levels. In red and green respectively are shown alternate levels to which lake could be lowered.

(h.) I am of the opinion that the proposal (my own) to lower lake to 81.50 ft. would adequately drain all the marsh lands surrounding the lake. This would enable a main drain to traverse swamp with a fall of 4 ft. per mile (1 in 1,320), such drain to start 2 ft. deep at commencement. Fall is very ample, and could be flattened if necessary. This scheme would leave a lake area of 46 acres with 4 ft. 9 in. of water in deepest portions.

(j.) The alternative proposal, shown in green, would lower the lake 1 ft. more and leave 40 acres of water with 3 ft. 6 in. of water in deepest parts.

Of the two schemes I recommend (h), as there would be less fear of creating marshy conditions in the lake.

The existing tunnel can be utilized by constructing a shaft with the necessary inverts to control level of lake.

At Ellerslie end of the lake, where rock was suspected, I have caused steel rods to be forced down, and show on plan the localities where rock was found.

I am quite satisfied that the marshy lands can be adequately drained without causing the complete draining of the lake as an aid thereto.

With regard to (g)—the effect the entire draining of the lake would have upon the Onehunga water-supply—I may say at once that this aspect of the case is most complex, and it is impossible to be dogmatic in this connection.

Plan 6 represents the locality of Lake Waiaatarua and surrounding country, and I have endeavoured to make the position as clear as possible. Geologically is shown by colours yellow and neutral tint the clay and volcanic formation respectively.

Without doubt the present lake was once an ordinary valley composed of clay lying on Waitemata marl series. Later on volcanic disturbances caused a lava-flow from Mount Wellington to close up the lower end of valley, and a lake resulted. During such eruption volcanic ash, &c., fell on the clay ridges and spurs, and was subsequently washed therefrom into the new lake-bed, and this no doubt accounts for a lot of the soft mud at the bottom of the lake. This mud runs down some 7 ft. to 9 ft. ere the bottom becomes hard and gritty: this grit is probably light fine scoria. The intervening years have seen the annual denudation of slopes of debris and soil.

Throughout the lava-flow can be seen signs of ancient channels leading from the lake-end at Ellerslie towards the Manukau Harbour, and there is no doubt that the only overflow from lake is at this end. Signs of water in motion are noticeable immediately on the Panmure Road close to Rock Cottage, on either side of which escapes are apparent. One escape—probably the largest—can be traced from Rock Cottage to Martin's, and thence to near Dr. Dickson's house at Penrose, thence to rifle range on foreshore. The other escape takes place on Ellerslie side of Rock Cottage. Various broken channels can be seen leading in direction of Onehunga, but it would be impossible to definitely affirm one way or the other that the water from Lake Waiaatarua finds its way thereby to Onehunga Springs. The present flood-level of lake is 92.50 ft. above ordinary high-water mark, so there is a decided fall. It goes without saying that the water escapes to Manukau Harbour, but exactly where it is hard to say, and therefore the whole matter is problematical. It should be noted that the water disappears into ground in places, apparently finding underground channels.

The locality plan shows sundry local floodings that take place in very wet weather, but such places are low basins or depressions. Caves of varying sizes can be found throughout the whole volcanic area extending from Mount Albert to Mount Wellington, so that it is hard to say what direct percolation there is to Onehunga Springs and pumping-station. Probably when the lake reaches its summer level there is very little percolation, as then the lake would become practically a tight reservoir by reason of the plugging of fissures by silt-deposits. Quite independently of Lake Waiaatarua supplying the Onehunga Springs there is a very large tract of volcanic country extending from Three Kings Mount to Mount Wellington, which no doubt provides the main supply of water towards these springs.

Much of the water appearing in Ellerslie and Penrose is due to natural conditions of drainage of storm-waters from slopes of One Tree Hill and Remuera and Ellerslie slopes. In the vicinity of Remuera, Greenlane, and Ellerslie Stations the Railway Department actually discharge storm-water into caves, and this must reach the lower levels and cause temporary flooding. The furthest any one could go would be to say that it was possible that Lake Waiaatarua contributed a portion of the water reaching Onehunga Springs.

If the lake is not entirely drained out, then there could not be the same objection. I therefore find it impossible to be dogmatic as regards the question of water-supply being affected.

I have prepared the following figures as regards the capacity of Lake Waiaatarua under varying conditions:—

At summer level (approximately 88.50 ft.)	124½ million gallons.
If reduced to 81.50 ft.	35 "
If reduced to 80.50 ft.	23½ "

Assuming that the lake is reduced to 81.50 ft., it would have a wet area of 46 acres. The direct rainfall on to this lake would be 43.3 in. annually, and allowing for an evaporation of 20 in. we would have approximately 24 million gallons to keep lake up to invert level. There would also be the run-off from watershed (1,100 acres) in addition thereto, which I estimate at about 540 million gallons annually.

Onehunga Water-supply.—From data received I find as follows:—

Population of district supplied, 8,500.	
Annual pumping	208 million gallons.
Less used by abattoirs	25 "

For domestic and other supply	183 "
Daily consumption per head, 59 gallons.	

Probably springs have watershed of 2,500 acres in addition to lake watershed.

Rainfall run-off likely to be 1,100 million gallons annually, but this will not all centre around Onehunga Springs.

J. B. THOMPSON,
Chief Drainage Engineer.

Wellington, 29th August, 1917.

Memorandum for the Under-Secretary for Lands, Wellington.

Re Lake Waiatarua (St. John's Lake).

On my return to Auckland last week I proceeded to examine one point of the adjoining swamp land that I had not been able to closely look into before. This particular point is abreast of Mr. Dingle's property, and towards the old slaughterhouse.

A canoe was obtained and several soundings taken, resulting in the old channel being located. Depths ranging from 7 ft. 7 in. to 5 ft. 6 in. were found in channel. From channel towards the hard, depths from the aforementioned ones to 4 ft. 5 in. were found. Generally speaking, an average depth of 5 ft. 6 in. would give the ordinary run of inundated land in locality. The grade-line shown in red on my report of 15th instant will just pick up the bottom of low channel.

To ensure a further lowering of proposed drain at Dingle's the grade could be flattened to 3 ft. to one mile from lake, or else the old channel that exists (but now blocked) could be opened up again and improved to take the local drainage at Dingle's towards Penrose, &c.

I cannot get any reliable and authoritative evidence regarding the deposit of dyes into stream near slaughterhouse and the reappearance of same at Onehunga Springs. There is plenty of hearsay evidence to this effect in Onehunga, but the date of occurrence is forty years ago.

It is also stated that water discoloured with blood was seen at Captain Spring, its genesis being the slaughterhouse before mentioned. Mention is also made of "fats" appearing in Onehunga Springs and supposed to have been carried underground from Westfield works. Probably some evidence may be offered the Local Bills Committee *re* the alleged coloured water, &c.

The flood-level now stands at 95.87 ft. The water that lately lay on Lawry Settlement to some feet in depth has now disappeared, showing that the lake did not occasion same, for the reason that the flood-level of lake has steadily risen since the water at Lawry Settlement was most in evidence.

J. B. THOMPSON,

Chief Drainage Engineer.

Approximate Cost of Paper.—Preparation, not given; printing (650 copies, including plans), £35 10s.

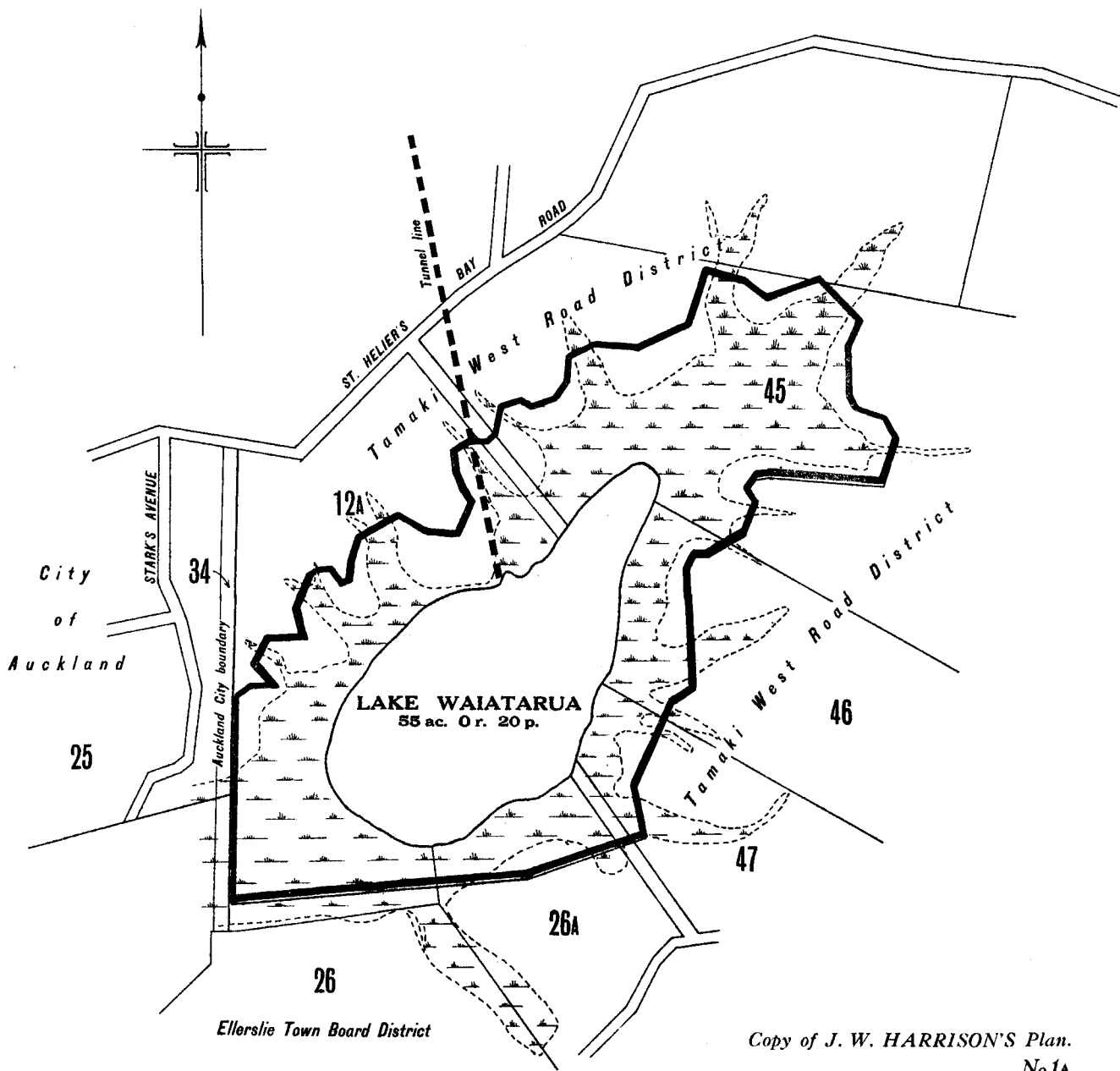
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Price 1s. 3d.]

Plan No. 1.
LAKE WAIATARUA
and proposed
PARK AND DRIVE

*Part of Sec. 12, Subs. of Auckland, Parish of Waitemata,
Tamaki West Road District, Eden County.*

Scale: 15 chains to an inch.



*Copy of J. W. HARRISON'S Plan.
No. 1A.*

	Ac.	r.	p.
Area of Park (exclusive of Lake)	133	1	20
Area of Lake	55	0	20
Total area	188	2	0

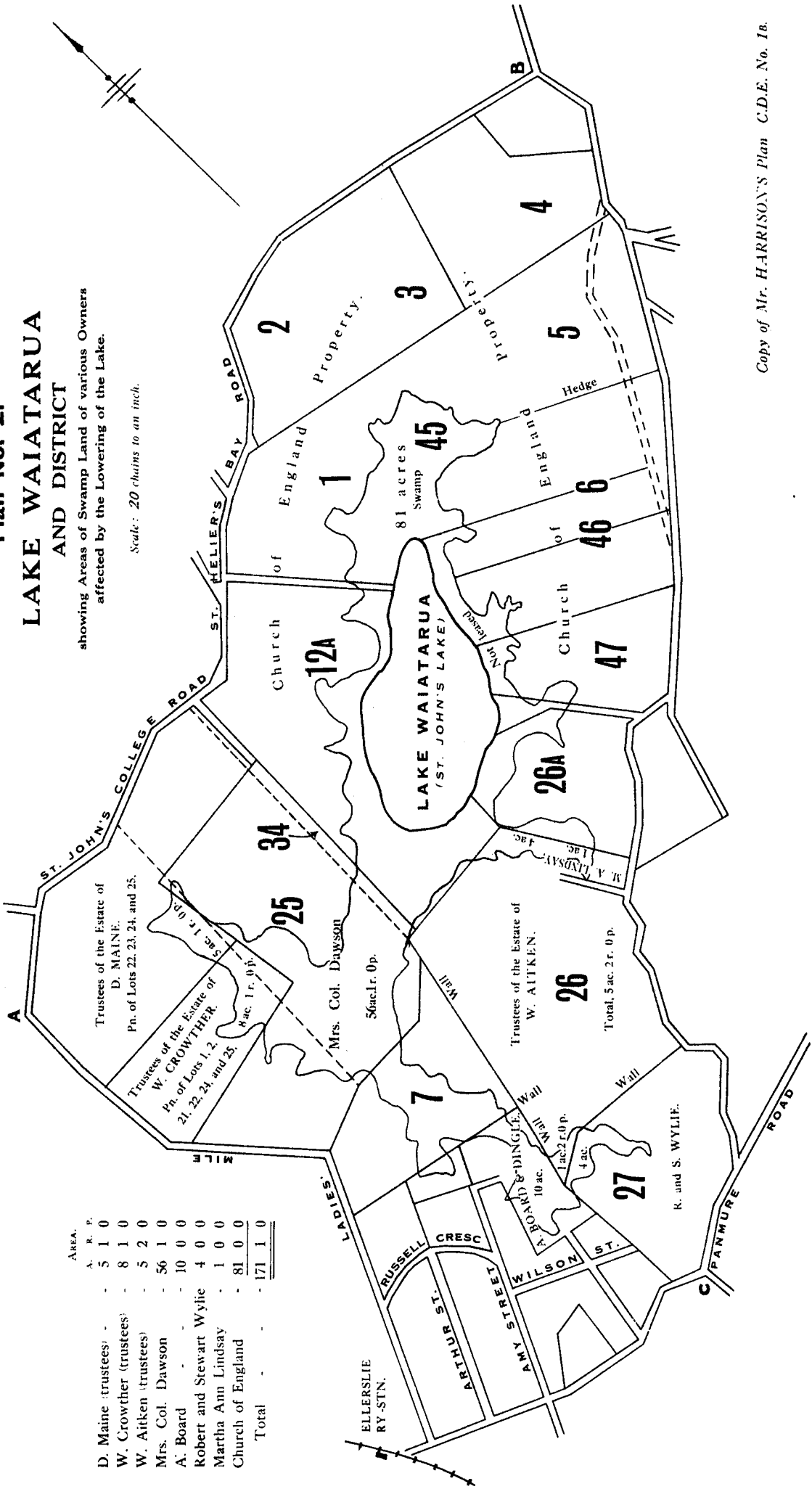


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Plan No. 2.
LAKE WAIATARUA
AND DISTRICT

showing Areas of Swamp Land of various Owners
affected by the Lowering of the Lake.

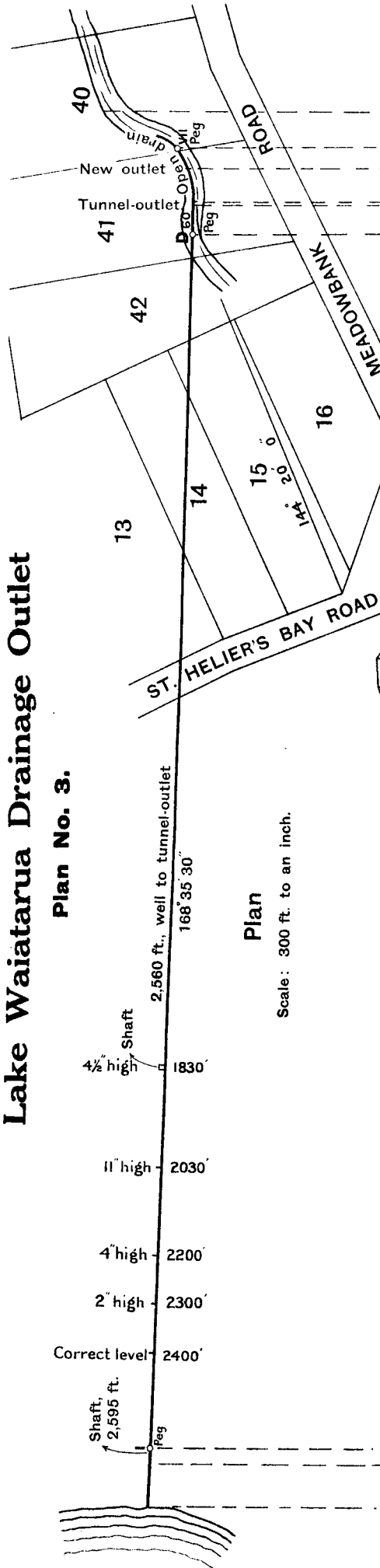
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Copy of Mr. HARRISON'S Plan C.D.E. No. 1a.

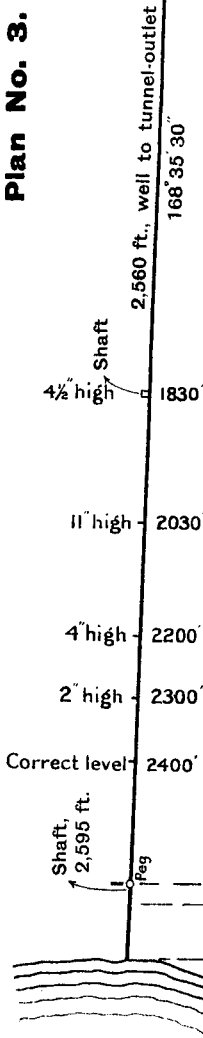
Lake Waatarua Drainage Outlet

Plan No. 3.



Plan

Scale: 300 ft. to an inch.



Longitudinal section on line of drain

Longitudinal scale: 300 ft. to an inch. Vertical scale: 60 ft. to an inch.

Shaft, 2,595 ft. from outlet

91.77 = water-level
20th July, 1917

Summer level 89.5
Open drain
185 level

Correct level
2500

Correct level
2400

Correct level
2300

Correct level
2200

Correct level
2100

Correct level
2000

Correct level
1900

Correct level
1800

Correct level
1700

Correct level
1600

Correct level
1500

Correct level
1400

Correct level
1300

Correct level
1200

No. 1 bore
No. 2 bore
No. 3 bore
No. 4 bore

Level 4 1/2" high
1830' from
Outlet

Level 11" high
2030'

Level 4" high
2200'

Level 2" high
2300'

Level 1" high
2400'

Level 1/2" high
2500'

Level 1/4" high
2600'

Level 1/8" high
2700'

Level 1/16" high
2800'

Level 1/32" high
2900'

Level 1/64" high
3000'

Level 1/128" high
3100'

Level 1/256" high
3200'

Level 1/512" high
3300'

North side Remuera Road
South " " "

2,560 ft., well to tunnel-outlet

Fall

1 in

7 high

400

600

126.3

2216

106.5

2364

155.4

1935

157.3

1794

No. 4 bore

No. 3 bore

No. 2 bore

No. 1 bore

Level 4 1/2" high
1830' from
Outlet

Level 11" high
2030'

Level 4" high
2200'

Level 2" high
2300'

Level 1" high
2400'

Level 1/2" high
2500'

Level 1/4" high
2600'

Level 1/8" high
2700'

Level 1/16" high
2800'

Level 1/32" high
2900'

Level 1/64" high
3000'

Present outlet

New outlet

Tunnel-outlet

Open drain

Reg

Reg

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MEADOWBANK ROAD

ST. HELIER'S BAY ROAD

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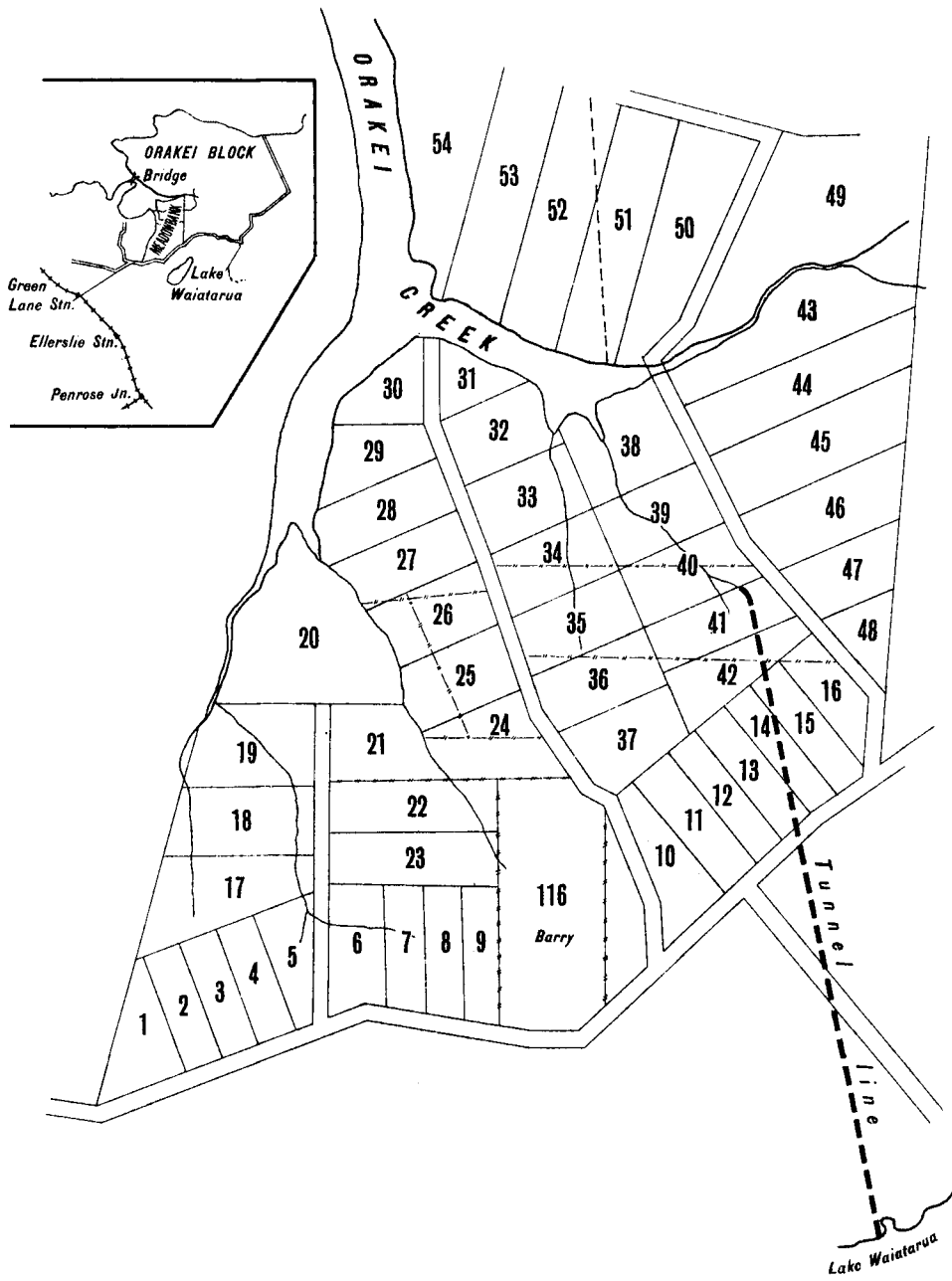
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Plan No. 4.

**Plan of Subdivision of the
MEADOWBANK ESTATE**
Illustrating tunnel line from
LAKE WAIATARUA.

Scale: 10 chains to an inch.



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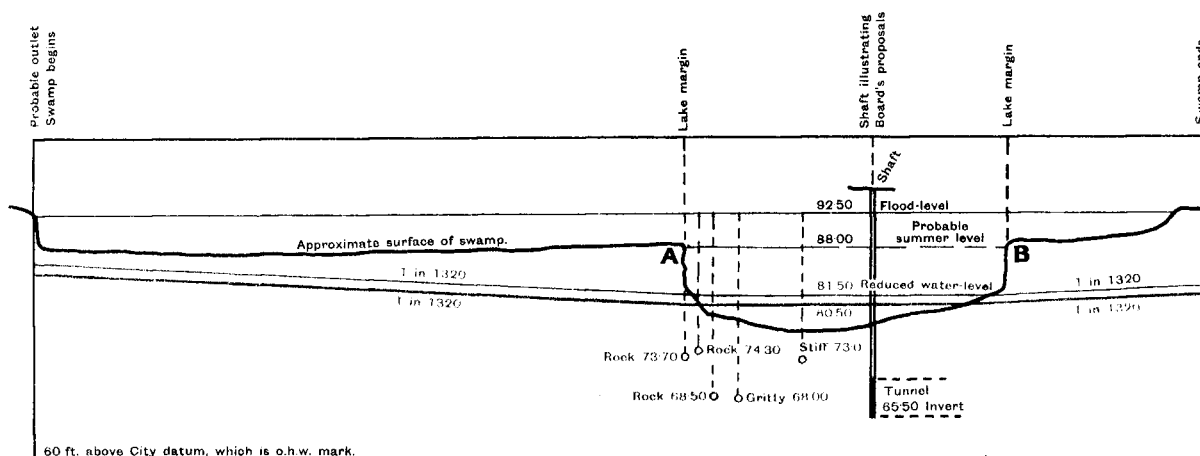
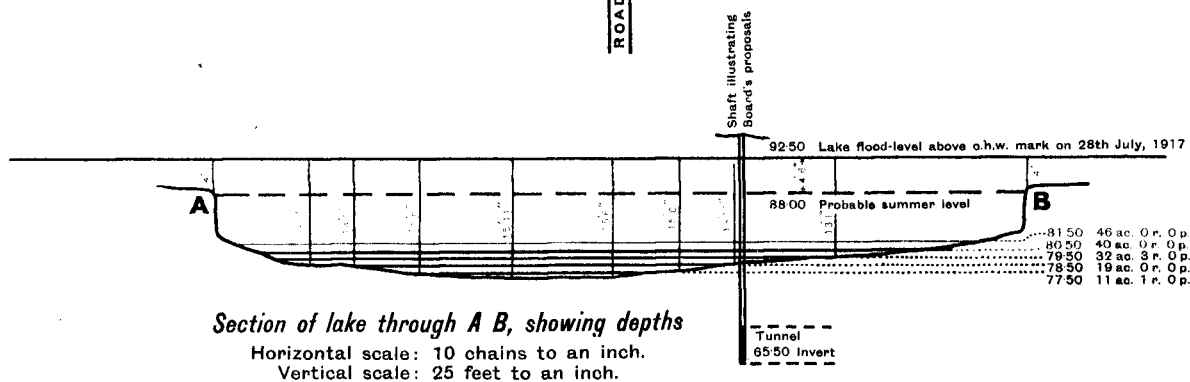
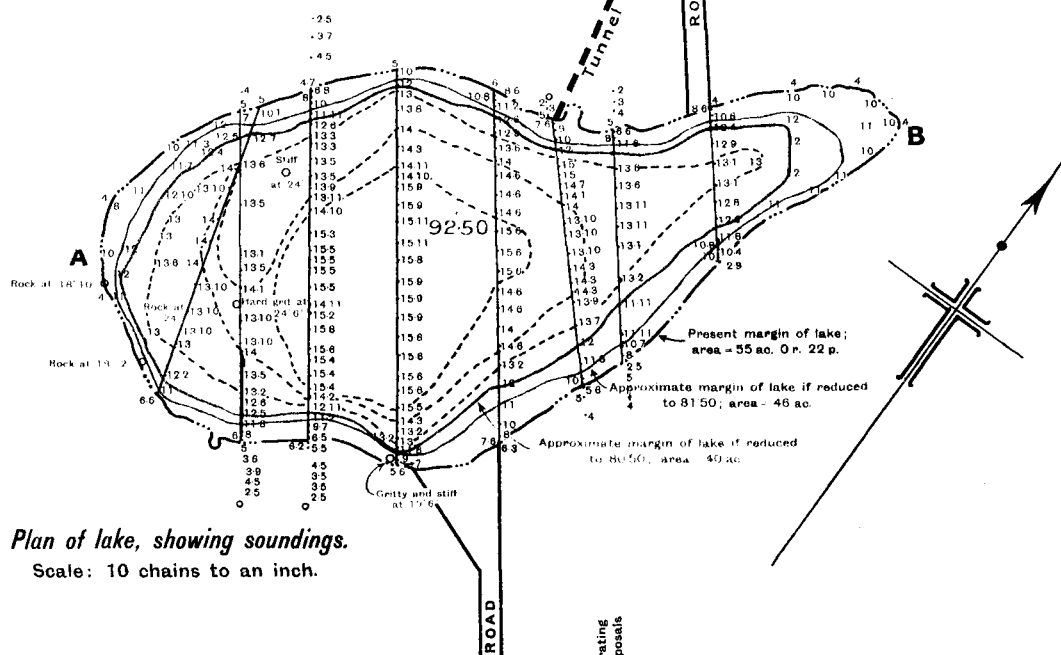
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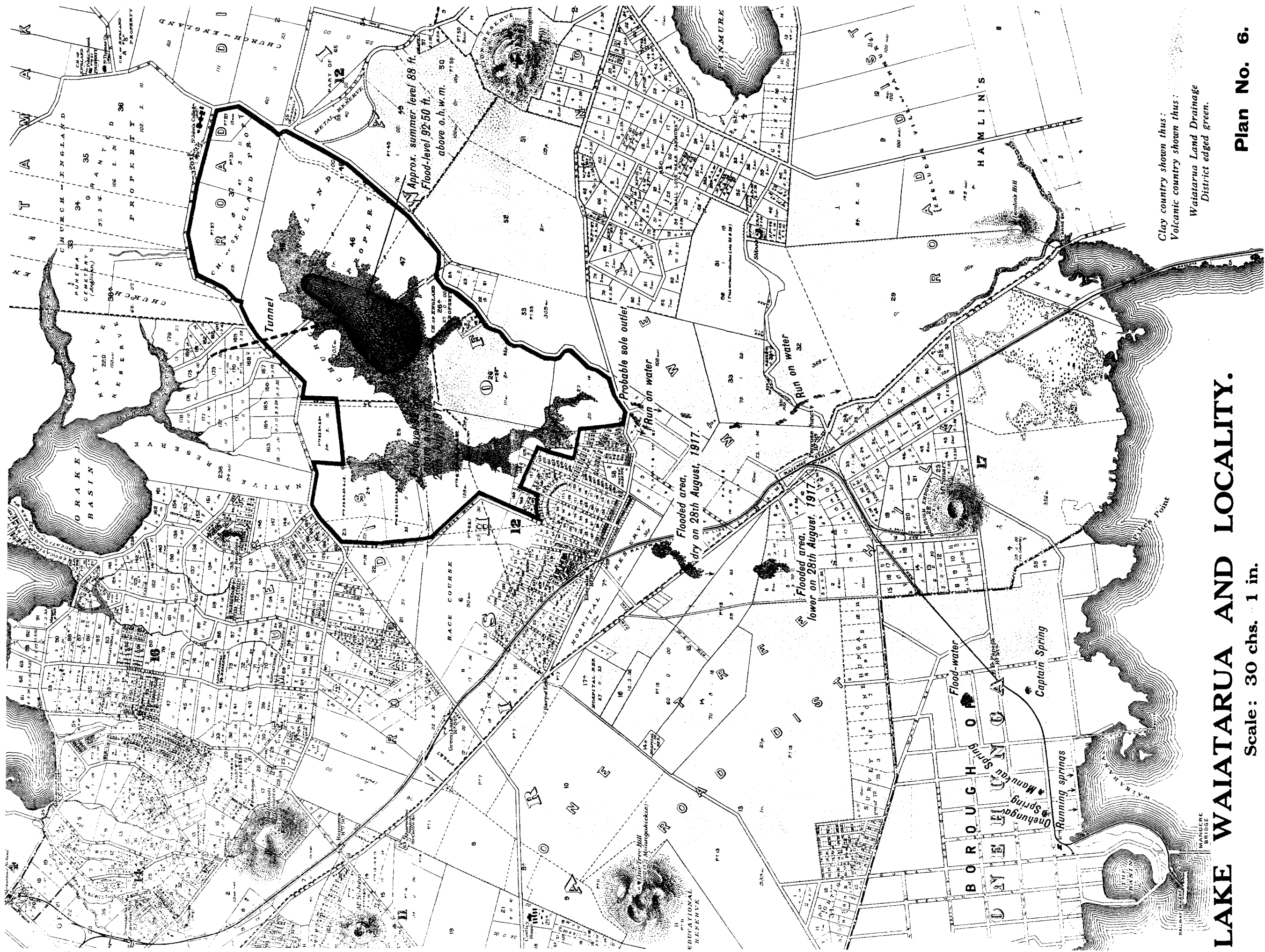
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Plan No. 5.
LAKE WAIATARUA
(St. John's Lake)

Alternative drainage schemes for adjoining swamp lands.



J. B. THOMPSON,
Chief Drainage Engineer.
10th August, 1917.



LAKE WAIAATARUA AND LOCALITY.

Scale: 30 chs. 1 in.

Plan No. 6.

