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DEPARTMENT OF LANDS AND SURVEY:

# SWAMP DRAINAGE.

REPORT FOR THE YEAR ENDED 31st MARCH, 1921, TOGETHER WITH STATEMENT OF ACCOUNTS.

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*Presented to both Houses of the General Assembly pursuant to Section 13 of the Swamp Drainage Act, 1915.*

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SIR,—

Department of Lands and Survey, Wellington, 10th June, 1921.

In pursuance of section 13 of the Swamp Drainage Act, 1915, I forward herewith the report of the Chief Drainage Engineer upon the operations carried out under the above Act for the past year, together with a statement of cash transactions and balance-sheet.

I have, &c.,

The Hon. D. H. Guthrie, Minister of Lands.

T. N. BRODRICK, Under-Secretary.

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## REPORT BY CHIEF DRAINAGE ENGINEER.

SIR,—

I have the honour to submit annual reports on the areas proclaimed under the Swamp Drainage Act, 1915.

### KAITAIA DRAINAGE AREA (39,665 ACRES).

In presenting the above report it is noteworthy to record the progress which the district has made since the inception of work in and around the swamp. Areas which at one period were subject to flood have now become town allotments, others which were lagoons for several months during the year have now become pasture. Large areas have been subdivided into small dairy farms, and the aspect everywhere is one of prosperity and progress. However, the rate of progress of the district is wrapt up in the rapid prosecution of the work, as many areas are at present inundated which with a little extra machinery could be quickly and efficiently reclaimed. In several districts where drains were constructed early in the work considerable subsidence has taken place, and with uncontrolled floods breaking over the effect of the work seems particularly minimized and settlers feel little benefit.

Controlled as the district is by rainfall, it is interesting to note the following figures for last year: The greatest fall occurred during May and August, when the fall was 8.02 in. each month. The heaviest fall on record since the work started was from the 9th to the 13th May, when 5½ in. fell. On this occasion a flood of exceptional severity was experienced, breaking over the Kaitaia banks and inundating low-lying areas. However, the most noticeable fact was the quickness with which the flood-waters disappeared, although in the lake districts it was several weeks before normal conditions were established. The total rainfall for the year was 53.11 in., compared with 31.71 in. for previous year.

Although the weather conditions generally have not favoured work for many months of the year, good work was carried out during the summer months. The operations have been pushed on as far as it is possible, the present position being that until the machine work is pushed ahead very little hard work can be put under way.

*Kaitaia River Spillway.*—Owing to the fact that machinery for the excavation of the river spillway via Whangatane and Kareponia was not in sight, and that the districts around the lake were receiving too much water impounded by floods, it was considered advisable to open up the spillway to half-depth by hand, and take a portion of the flood-waters through the old river-channel. The diversion cuttings made the previous year were deepened, and the lower end through the swamp was taken out 30 ft. wide by means of barrows. Some twelve scoop teams were employed in the heavy

clay cuttings, and good and economical work was done. The opening of this auxiliary channel will enable work to proceed above Kaitaia, which, although urgent, has of necessity been held up till the lower portion of the work has been completed. The diversion of Tarawataroa Stream, snagging of Kaitaia River to Johnston's old store, opening of Showground cut and Church Gully swamp, have all been held up pending the increased capacity of the channels for flood-waters. These are now under way, and should be completed before the worst of the winter sets in. It is gratifying to know that the plant for the construction of the spillway will soon come to hand.

*Kaitaia River.*—Steady progress has been made with the work on the river. The dredge-work has been of an exceptionally difficult nature on account of the heavy timber encountered and large quantities of sand. Moreover, the plant for the greater portion of the year was handicapped owing to the bad repair into which the grab was drifting. Stoppages for repairs and replacement of tines and bridles were frequent, and it was only after the new grab had been put into commission that better progress could be maintained. A further difficulty has been the height of the banks through which the plant is working. For the greater part of the summer the banks have averaged 8 ft. above the deck of the pontoon, the ends of the chutes just clearing the banks. To aid better clearance damming was necessary, but, owing to the sandy nature of the country and abundance of timber, dams were difficult to secure, and burst after freshes on two occasions. Two diversions have been cut through during the year, but the work has been heavy and difficult—two and three drops of the grab being required to loosen sufficient for a load. The total amount of spoil removed during the year was 51,500 cubic yards.

Snagging-work on the river has been carried out behind the dredge, large logs and stumps taken out by the plant having been from time to time pulled clear and stacked. With the second Priestman dredge in sight work on the river should be greatly expedited, and on completion of the lake-channels the two should work well in conjunction on the river between the lake-outlet and Awanui.

Timber for the erection of pontoons for the Priestman and Bay City plants has been ordered, and is being cut at Herekino.

*Drains and Roads.*—Hand-work on the swamp has been continued, and with the exception of a small area all main drains are constructed. In several cases it has been necessary to construct additional drains to those constructed in previous years to cope with the surface water and soakage. One of the most important drains completed during the year is the drain through the kahikatea swamp in O.L.C. 193 and 214. This drain, which is 172 chains in length, opens up some 1,100 acres of raupo and kahikatea swamp which could not efficiently be drained into the river. Several leaders are yet to be constructed from this main.

The opening-up of main-stream outfalls has been continued during the year at Kareponia and Pukepoto. A few main drains are yet to be constructed in the Waipapakauri district, through the gum swamps, to take the sandhill catchments. All Pukepoto streams have been tapped.

The maintenance of work done during previous year has been a considerable item owing to the exceptional growth of weeds and rushes in the channel. Several drains which were cleaned in the early spring required recleaning during the autumn. This has added greatly to the maintenance cost. However, the winter coming on will see all drains in good order.

Clay-and-peat road-formation has been pushed ahead steadily. All main-road drains have been completed from Ahipara to Waipapakauri, with leader from Wireless Road. The rough crowning of these roads was commenced late in the year, and is now almost completed. Being for the greater part through deep peat, considerable decomposition is necessary before the roads will be ready for traffic.

As soon as the scheme of subdivision of Crown land is completed party and boundary drains can be constructed.

*Stop-banks, Lower Awanui.*—The surveys for the erection of stop-banks in the tidal country on the Lower Awanui River, Waipapakauri and Pairatahi districts, were completed early in the year, and construction work commenced. All classes of country were encountered, and lines ranged as direct as possible from point to point with sweeping curves. Considerable trouble was experienced with settlers requiring small points enclosed within the banks which could not be banked except by too great an expense for a general scheme. An area of about 180 acres has so far been reclaimed from mangrove and wiwi. In several cases poor foundation was met with, and the scheme has necessarily been altered to follow sounder country.

There being some 7 ft. range of tide, there is ample room for gravity drainage, and concrete flood-gates have been placed between 5 ft. 6 in. to 6 ft. below high-water mark. All banks have been constructed on the principle of ditch and bank, the ditch being on the inside and taking the drainage to the gates. In mangrove country it was found that shallow ditches on each side with wide berm were better than a deep ditch on the inside. Old creek-crossings have proved difficult, and all will require timbering on the outside before fillings are done, as unless timbering is done it is found that the spew at the toe is very considerable, and all filling must be done on the tide. The problem on the harder country has not been so great, as good clay filling has been obtainable and the banks suffer far less shrinkage. In the mangrove country shrinkage has been as great as 4 in. per foot in bad country. Where small banks were required in grass country it was possible to construct banks with graders, and good work was done in this way, consolidation being hastened by constant tread of teams. All construction work has been done by means of piecework contract, but maintenance is in hands of a day-labour gang.

*Bridges.*—Timber for the erection of bridges over spillway at Kareponia Road, Quarry Road, and Donald's Road has been ordered, and some is on the ground. Piles and stringers have been hard to obtain owing to difficulty in handling long lengths. All timber is, however, in sight, and work at Kareponia is under way.

*Labour and Cost of Works.*—The work during the summer was greatly handicapped owing to the gumfields claiming all surplus labour. High prices paid for gum caused an exodus from labouring-works, and only the poorer classes of labourer were available at the wages offered by the Department. However, several piecework contracts were let, and a small nucleus of contractors kept to put through the different works. As the price of gum fell workmen were available and contracts let more easily, and towards the end of the year everything returned to normal, with plenty of labour offering. Wherever possible work has been done by contract, and a considerable saving has been effected in actual working and oversight expenses.

*Summary of Works.*—Main and outfall drains, 1,217 chains (total drains, 1,506 chains); road-drains, 289 chains; stop-banks, Awanui, 577 chains; road-formation, 340 chains; cleaning and maintenance, 710 chains; spillway, Kareponia, 110 chains; dredge-chainage, 105 chains; dredge, average yardage per chain, 400 yards; river-diversions, two.

*General.*—The year just ended has presented many difficulties as regards supplies of coal and timber, and it is hardly necessary to traverse the reasons leading up to this, as they are so well known. Firewood was used to help out the coal, but necessarily the ratio of dredging effected was lowered. Timber it was almost impossible to obtain, but the Department has secured certain areas for cutting purposes, and has arranged with a local miller to handle same. The chief anxiety is to get sufficient timber together for dredge-hulls in anticipation of arrival of machinery. Two machines, comprising a Priestman grab dredger and a Bay City "dipper" dredger, have been marked for these works.

The local engineer, Mr. R. J. Cornwell, has carried out the year's operations in an energetic and capable manner.

*Surveys.*—During the year two miles and a quarter of road was surveyed, also five miles and three-quarters of spillway, from Kaitaia River to Pairatahi River. Work on the field also comprised eleven miles and three-quarters of river transverse, and commencement of surveys of 4,500 acres of Crown lands, divided into fifty-three sections. The surveyor in charge is Mr. Nelson Clay. Total expenditure, £442 2s. 2d.

*Works Expenditure.*—The total expenditure for the year was £24,173 17s. 4d., including wages, piecework contracts, hire of teams, supplies, and general expenses. Of this amount the sum of £17,941 11s. 11d. was paid out of Kaitaia Imprest Account for wages, piecework contracts, &c. The principal payments were—day labour, £5,690 10s. 2d.; piecework contracts, £11,246 13s.; hire of teams, £1,418 18s. 8d.

#### HIKURANGI DRAINAGE AREA (50,000 ACRES).

All the preliminary works, surveys, plans, &c., in connection with the Wairua River portion of this work have been completed. Plans and specifications for the major work—the river-diversion—were completed, and tenders called for, it being hoped to let this work by contract. Unfortunately, no tenders were received, presumably owing to the uncertainty of labour at that time and the dearth of suitable machinery in New Zealand. The estimated quantities of excavation for this particular portion of the work are 61,570 cubic yards of earth and 114,110 cubic yards of rock.

As there appeared in the circumstances no option but for the Department to undertake the work itself, instructions were cabled to America for the purchase of necessary plant. Accordingly three combination steam-shovels (convertible to drag-line excavators), two petrol-locomotives, and complete sets of rock-drilling plant were acquired, and are shortly due in the Dominion. These will be got on to site of works this coming summer. Initial preparations are under way for undertaking the operations, erection of huts, and so forth. Engineering and land surveys have been already completed.

Expenditure for the year was £441 2s. 4d., exclusive of machinery, which has not come to charge as yet.

#### POUKAWA DRAINAGE AREA (13,567 ACRES).

No work has been done in this area during the past year, as the difficulties with regard to the Native owners have not yet been removed. The question of commencing work is now under consideration.

The plant on the area is in good order. The buildings comprise office, workhouse, workmen's quarters, and toolhouse, all of which are in good order. These are in charge of a caretaker, who takes readings of the daily rise or fall in the lake-level.

Rainfall for the year was 21.31 in., the average for the past four years being 29.62 in.

Expenditure for the year amounted to £91 5s.

#### WAIHI DRAINAGE AREA (22,720 ACRES).

The dredging of the Wharere Canal through the middle of the Crown portion of this swamp has been the only work of any magnitude carried out during the year. The dredging of 82 chains of this canal cost £2,054 13s. 9d., some 63,495 cubic yards of spoil being excavated at an average cost of 7.77d. per yard. This canal has been constructed now to such a point that the subsidiary drains can be commenced, and several contracts have been prepared, and this hand-work should be commenced at an early date.

In conjunction with the laying-out of these drains the survey of portion of the Crown area has been undertaken. As the land is all first class, sections containing 50 acres each are being surveyed, with a few smaller ones near the Pongakawa Railway-station.

In anticipation of further development-work of this area, and the arrival of at least one of the new American dredges on this work, a four-roomed cottage has been erected alongside the Pongakawa Station so as to provide accommodation.

The only other works carried out were the clearing of 120 chains of drain, and the removal of timber from 75 chains of the Kaikokopu Stream. The total cost of the works mentioned above for the year, including surveys, was £3,127 2s. 6d.

The following table shows the amount of spoil dredged and costs per cubic yard for the last four years :—

	Cubic Yards.	Cost per Cubic Yard.
1917-18 .. .. .	55,538	4-57d.
1918-19 .. .. .	20,780	7-67d.
1919-20 .. .. .	44,250	9-29d.
1920-21 .. .. .	63,495	7-77d.

The officer in charge is Mr. R. G. Macmorran, Land Drainage Engineer, a capable and energetic engineer, whose work is noted for its soundness and reliability.

I have, &c.,

The Under-Secretary for Lands, Wellington.

J. B. THOMPSON,

Chief Drainage Engineer.

### SWAMP LAND DRAINAGE ACCOUNT.

*Statement of Transactions during the Year ended 31st March, 1921.*

<i>Receipts.</i>			<i>Payments.</i>			
	£	s. d.		£	s. d.	
Cash in hand at 1st April, 1920 ..	1,722	11 7	Kaitaia Drainage District—			
Debentures issued under Swamp Land Drainage Act .. .. .	55,000	0 0	Drainage-works, &c. ..	17,748	5 9	
			Live-stock .. .. .	100	0 0	
			Loose tools .. .. .	58	9 11	
			Stores and fuel .. .. .	2,489	7 8	
			Management and engineering expenses .. .. .	1,168	3 1	
				<u>21,564</u>	<u>6 5</u>	
			Waihi Drainage District—			
			Drainage-works, &c. ..	1,675	3 3	
			Loose tools .. .. .	4	6 8	
			Stores and fuel .. .. .	797	7 4	
			Management and engineering expenses .. .. .	485	0 0	
				<u>2,961</u>	<u>17 3</u>	
			Poukawa Drainage District—			
			Drainage-works, &c. ..		91 5 0	
			Hikurangi Drainage District—			
			Drainage works, &c. ..	137	7 3	
			Loose tools .. .. .	1	2 6	
			Stores and fuel .. .. .	9	5 0	
			Management and engineering expenses .. .. .	294	8 7	
				<u>442</u>	<u>3 4</u>	
			Machinery and plant .. .. .		2,605 18 8	
			Cash in hand at 31st March, 1921 .. .. .	29,057	0 10	
				<u>£56,722</u>	<u>11 7</u>	
					<u>£56,722</u>	<u>11 7</u>

### BALANCE-SHEET.

<i>Liabilities.</i>			<i>Assets.</i>				
	£	s. d.		£	s. d.	£	s. d.
Debentures issued under the Act ..	128,000	0 0	Kaitaia Drainage District—				
Public Works Fund—Land Improvement Vote .. .. .	4,563	19 7	Drainage-works .. .. .	74,623	6 4		
Consolidated Fund—Interest paid ..	6,576	19 11	Interest Account (proportion chargeable to district) .. .. .	6,532	4 1		
Interest accrued but unpaid .. .. .	2,074	8 0				<u>81,155</u>	<u>10 5</u>
			Waihi Drainage District—				
			Drainage-works .. .. .	16,610	18 5		
			Interest Account (proportion chargeable to district) .. .. .	1,701	14 0		
				<u>18,312</u>	<u>12 5</u>		
			Poukawa Drainage District—				
			Drainage-works .. .. .	2,147	15 8		
			Interest Account (proportion chargeable to district) .. .. .	324	18 8		
				<u>2,472</u>	<u>14 4</u>		
			Hikurangi Drainage District—				
			Drainage-works .. .. .	1,275	12 8		
			Interest Account (proportion chargeable to district) .. .. .	93	5 2		
				<u>1,368</u>	<u>17 10</u>		
			Plant and machinery .. .. .		7,289	5 6	
			Sundry debtors .. .. .		687	16 0	
			Loose tools .. .. .		231	9 7	
			Buildings .. .. .		280	0 0	
			Stores on hand .. .. .		260	0 0	
			Live-stock .. .. .		100	0 0	
			Cash in hand .. .. .		29,057	0 11	
				<u>£141,215</u>	<u>7 6</u>		
						<u>£141,215</u>	<u>7 6</u>

J. H. O'DONNELL, Chief Accountant.

*Approximate Cost of Paper.*—Preparation, not given; printing (650 copies), £8.