1916.

NEW ZEALAND.

DRAINAGE OPERATIONS IN HAURAKI PLAINS:

REPORT FOR THE YEAR ENDED 31ST MARCH, 1916; 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 and Survey, Wellington, 1st May, 1916.

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.

No further areas have been opened for selection since the last report, consequently the area in occupation is the same as at the 31st March, 1915—viz., 38,994 acres—subdivided into 294 sections, exclusive of town sections.

The total expenditure under the Act has now 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
,, ,, 1913	26,608	1	3
,, ,, 1914	21,467	18	2
,, ,, 1915	20,399	10	4
,, ,, 1916	18,331	10	10
Total	£197,972	16	1

I have recently made an inspection of the Hauraki Plains, and made myself acquainted with the nature and scope of the operations now in progress under the able direction of the Chief Drainage Engineer and his assistant, and have every reason to feel satisfied with the progress of the drainage and reclamation that has been effected and the further success that should result as the outcome of the works now in hand.

The detailed report of the Chief Drainage Engineer is attached, together with a statement of accounts.

I have, &c.,

T. N. BRODRICK, Under-Secretary.

The Right Hon. W. F. Massey, P.C.,
Minister of Lands, Wellington.

STATEMENT OF ACCOUNTS (AS REQUIRED BY SECTION 10 OF THE HAURAKI PLAINS ACT, 1908) FOR THE YEAR ENDED 31ST MARCH, 1916.

Receipts.

1915—April 1st.	£ s. d.	£ s. d.
To Balance—Cash in Public Account		4,265 19 4
1916—March 31st.		
To New Zealand Loans Act, 1908; Hauraki Plains Act, 1908—Debentures issued		11,000 0 0
Receipts under section 5, Hauraki Plains Act, 1908—		
Rents	9,449 14 10	
Land sales	1,347 0 0	
Miscellaneous	743 8 8	
		11,540 3 6
		£26,806 2 10

Expenditure.

1916—March 31st.	£ s. d.	£ s. d.
By Expenditure—		
Drainage-works, stop-banks, clearing channels, and all expenses incidental thereto	11,594 6 9	
Equipment of dredges, repairs, and maintenance thereof	1,631 16 9	
Travelling-allowances and general expenses	69 19 8	
Office expenses—Thames	271 14 8	
Sinking artesian wells for settlers	701 2 6	
Compensation for land acquired in connection with drainage-works	64 13 6	
		14,333 13 10
Interest recouping the Consolidated Fund		3,997 10 0
New Zealand Loans Act, 1908—Charges and expenses in connection with issue of debentures		0 7 0
Balance—Cash in Public Account		8,474 12 0
		£26,806 2 10

Loan Account.

1916—March 31st.	£ s. d.	1915—April 1st.	£ s. d.
To Balance	160,628 0 0	By Balance due to Local Bodies' Loans Account	40,628 0 0
		Debentures issued under the State-guaranteed Advances Act, 1909, and amendments	95,000 0 0
		Debentures issued under the New Zealand Loans Act, 1908	16,000 0 0
		Debentures issued under the Hauraki Plains Amendment Act, 1913	9,000 0 0
	£160,628 0 0		£160,628 0 0

REPORT BY CHIEF DRAINAGE ENGINEER.

SIR,—

I have the honour, in accordance with the provisions of the Hauraki Plains Act, 1908, to report upon the various operations carried out during the financial year ending the 31st March, 1916.

Owing to the war and the necessity for economy the development of the whole scheme has not progressed as fast as in previous years. The main works have been confined to the improvements in the drainage and the roading of the areas previously thrown open for settlement. This was especially necessary last March (1915), when a large area of land was thrown open before the roads and drains were completed. However, a large number of these works have been completed since that date, and the balance will be undertaken in due course.

Naturally, works were undertaken which benefit lands that cannot be thrown open for years to come, and so there is no immediate gain to the Department. This refers particularly to Waikaka, where long outlets have been and are being constructed, and so far the areas on the upper portions only have been thrown open for selection.

The maintenance of the roads and drains is a big undertaking now, especially since it was proved that a large number of the drains require to be cleared of weeds, &c., twice per year. In most drainage-areas once per year suffices, but with a small fall per mile and a mild climate the weeds flourish so luxuriantly that one clearing is insufficient. As years go by new aquatic weeds make their appearance in the drains, and it is very hard to keep all the drains in an efficient state.

During the year there was a special grant of £2,000 to assist in maintaining the drains, &c., but this did not cover all the expenditure under this heading, the balance being charged up against the Settlement Account.

As was anticipated in my last report, there has not been a ballot for sections on the plains during the past year: therefore the area under occupation is still 38,994 acres, subdivided into 294 sections, exclusive of town sections.

The pursuits followed have been dairying and grazing, cropping being confined to a few patches of maize for autumn feed, and a few patches of turnips at Waikaka and Tahuna.

The season, which was extremely wet in the spring and then became very dry, was not as profitable per cow as the previous season. Home separation is still in vogue; in fact, this is the only method of disposing of the cream, which is collected by launch and taken to the factory at Kopu, or transhipped to Frankton.

During the year a cheese-factory was started at Turua, and is supplied by several settlers on the Turua Estate. At the present moment there is talk of a cheese-factory being erected at Kopuarahi and Ngatea respectively, and if the price for this product maintains its present figure there is nothing surer than that other localities will follow the lead that has been given.

The fattening of cattle is now followed on more sections than was formerly the case, due primarily to the fact that several settlers who were milking have sold out, being replaced by others who consider that grazing is quite satisfactory.

During last April and May there was quite a boom in these lands, several changing hands at between £30 and £45 per acre. This rise in values is phenomenal when it is considered that the same land in many cases, when thrown open in 1910, was valued at £5 per acre.

Priestman Dredgers.

During the year both dredgers have been employed on various works between Kerepeehi and the Patetonga Landing.

The total amount of spoil dredged and deposited on the adjacent banks was 146,905 cubic yards, which work cost £2,048 13s., this giving an average cost of 3·35d. per cubic yard. This cost includes all charges that can be debited against the work—wages, supplies, repairs, &c.—but not depreciation.

During the latter part of 1915 No. 1 dredger was completely dismantled and overhauled, numerous parts being replaced, and now this dredger is in first-class order.

No. 2 dredger had to assist in the dismantling and also the re-erection, and consequently the costs of dredging for both were this year higher than last, although whilst actually working the costs were still about the same.

The works carried out by the dredgers were as follows:—

(1.) Completion of Ngarua Canal.
(2.) Improvement of Patetonga Landing Approach.
(3.) Commencement of Mangawhero Canal.
(4.) Continuation of Awaiti Canal.
(5.) Deepening the Puhanga Canal.

All these works are treated separately under their respective headings.

No. 1 dredger excavated for the year 73,730 cubic yards, at a total cost of £1,138 17s. 7d., thus averaging 3·57d. per cubic yard; whilst No. 2 dredger excavated 73,175 cubic yards, at a cost of £909 15s. 5d., averaging 2·98d. per cubic yard. The costs are higher than during the previous year owing to the overhauls and replacements, and also to the necessity for employing an extra man at intervals on each dredger to punt coal.

As in the past, the dredgemasters have carried out their duties in a most satisfactory manner, and it is to their credit that this work has been carried out so successfully.

Ngarua Canal.

This work, which was commenced in May, 1914, has been completed.

The canal leaves the Piako River about midway between the Waikaka and Puhanga Canals, and runs practically due west for just over two miles. This is as far as the dredger could be worked, owing to the sudden rise in the country.

Throughout this distance the spoil has been deposited on the northern bank so as to form a road, which can easily be done for a very small expenditure.

At the Ngarua Lakes, which are situated near the western end of the canal, a small cut was run for about 15 chains in order to improve the old creek, which is the outlet for a large area of swamp country. In places very heavy timber was experienced, whilst in other places the country was extremely hard. Nevertheless the work was carried on at a satisfactory rate, and will provide the most important outlet between the Piako River and the swamp areas to the west. This canal is navigable for launches at high water, and consequently will in the future provide the settlers in the locality with a cheap and efficient service.

The question of completing canal road will receive attention during the coming year. This work was carried out partly by special grant.

Patetonga Landing.

For about two weeks No. 1 dredger was employed in dredging spoil out of the cut at the above landing, and depositing it on the approach to the wharf. When the cut was first dredged this was impossible owing to the danger of slips, but with a year's drying and subsidence that danger has abated. Formerly there was insufficient spoil for an approach, but now the approach has been widened out for the greater part of the distance.

Mangawhero Canal.

This canal was commenced in March, 1916, and is intended as an outlet for both drainage and road purposes.

At the present time the Mangawhero Creek meanders over the flats in the vicinity, and it is impossible to maintain it so that the creek-waters can be discharged rapidly. Consequently this canal was laid off, and will shorten the channel materially, as the old course has been abandoned for some distance.

The spoil has been deposited on the southern side and will enable a road to be formed later. This road will give access to a large area of first-class peat swamp, and will eventually connect up with the road system on the western foothills.

Awaiti Canal.

Only three months' work has been carried out on this canal, as No. 2 dredger was required urgently to deepen the Puhanga Canal.

During the period 23,540 cubic yards of spoil were dredged, and deposited on the southern side so as to form a combined bank and road.

The total distance dredged is now 125 chains, which leaves a gap of 60 chains to the Awaiti Creek.

During the latter part of 1916–17 it will be possible to continue this work.

Puhanga Canal.

This canal, which cuts off the Kerepeehi Bend in the Piako River, was completed in 1912, but only as a spillway. As stated in the report of that year, it was possible that it would have to be deepened. During the floods of July and August of 1915, of which more is written in another paragraph, it was seen that this deepening was urgently required. Therefore, in July, No. 2 dredger was towed down from the Awaiti Canal to undertake this work.

Since then the work has been progressing slowly, as during part of the time this dredger was being overhauled, as well as assisting in the dismantling and re-erection of No. 1 dredger.

The country traversed is very treacherous, and slips have occurred, and are to be expected practically at any time.

The amount of spoil excavated was 49,635 cubic yards.

The maintenance of this canal in good order will be one of some difficulty, as the raupo is sure to grow rapidly in it, and also, as stated above, slips are liable to occur at any time.

Stop-banks.

The total length of stop-banks on the plains is the same as last year—28 miles 70 chains.

The bank along the Waitakaruru Stream, as mentioned in my last report, was weak, and has been strengthened. With the improvements, however, that have been schemed in this locality this bank will in most places work in very well—in fact, it was laid out with this object in view.

The Piako River banks were subjected to a severe test in the winter: especially was this so round Kerepeehi bend. In this locality the banks, having cracked badly during the summer, did not take up again, and with several feet of water against the bank numerous leaks were found. The remedy for this seepage will be very expensive, but will not be attempted until the effect of deepening the Puhanga Canal has been noticed.

In several places along the coast the banks have been strengthened, and are now fairly satisfactory.

Formed Roads.

The total length of formed cart-roads, in nearly every instance with a drain on each side, is 66 miles 38 chains, the distance of new formation for the year being 8 miles 24 chains, portion of this being due to the conversion of road-banks.

The longest distance of new roadwork was on the Netherton Block, which was thrown open during March, 1915.

On the Waitoa Block repairs were effected to the roads as found necessary, but no extensive works were carried out.

At Waikaka, portion of the Patetonga Road North was fascined and blinded with spoil, as it was found that the road-formation had sunk considerable. This work is now in progress, but will be finished in April, 1916.

The formation of the Waikaka Tramway Road has been raised in places, so as to endeavour to secure a solid formation for the tramway. Owing to the necessity for economy on the works this policy was decided on, instead of widening for vehicular traffic, and where possible the line will be ballasted with gravel from the Waikaka Creek.

A start has been made with the ballasting of the Mangawhero Road, so as to complete the access to the sections selected last year.

Most of the clay roads on the plains were either disked or graded during the spring, so as to improve the surface after the winter traffic.

Road-banks.

At the end of last year the total length of road-banks, spoil only removed about 4 ft. from edge of drains and spread, and also peat roads unsuitable for traffic, was 14 miles 50 chains. Since then 3 miles 5 chains have been converted into roads suitable for all traffic.

The main work included in this total was the reconstruction of the Orchard East Road from the wharf. This bank was graded over, and at the same time a water-table was excavated on the opposite side from the drain.

The balance of the work was situated at Waikaka, where work is still going on.

The Horahia Road is now being converted, and will figure in next year's totals.

Drains in Operation.

The total length of drains now in operation is 334¾ miles, which total includes all classes of drains constructed by the Department.

Some of these drains, however, have been practically discarded: especially is this so in the deep peat country, where the peat has subsided and the drains are for all purposes non-existent.

The total length of new drains completed during the year was 14¼ miles.

PLAN SHOWING
LANDS DEALT WITH
UNDER THE PROVISIONS OF
The Hauraki Plains Act, 1908.

J. B. THOMPSON.
Chief Drainage Engineer.

N.Z. LANDS AND SURVEY

REFERENCE.

- Boundaries of Hauraki Plains
- Boundaries of Hauraki Plains rating area
- Lands disposed of on optional system to date
- Lands being drained
- Grazing-areas under year-to-year lease
- Drains now in operation
- Drains under construction
- Stop-banks
- Artesian bores ●6

Scale of chains

80 60 40 20 0 80 160 240 320 400

FIRTH OF THAMES
BOROUGH OF THAMES
Wharf
Rly. Stn. (Thames)
Rly. Stn. (Shortland)
Kauaeranga R.
Waihou River
ORONGO
Kopu Wharf
Rly. Stn.
Piako R.
MAIORO
NGATAIPUA
Ferry
Ester
Pipi St.
WHARETOA
PIRAU
WHAREMONO
NGATAIPUA EAST
TE AWAMAWHANGA
KAIPAPAKA
OPARIA
RAUTAWHIRI
HAERAWATEA
RAUPOITI
AWAKAMAWAI
NGARUERUE
KAIRERE
Turua Wharf
Tuhitahi
Puriri St.
Rly. Stn. (Puriri)
Omahu
THAMES TO AUCKLAND VIA FRANKTON JUNCTION
Hikutaia St.
Hikutaia Rly. Stn.
Wharepoa Ferry
TAHANUI
KAURI
MOTUMOTUAHI
PUTANUI
URUMATONG
HORAHIA
EAST ROAD
Formed road
KOPUARAHI
TE UMUTAWA
HOUKOURANI
KOPURARUWAI
TIRITIRI
School
formed
MAKUMAKU
WAIRAU
KAIKAHU
WAHANUKA
KURUNUI
WHAKAMURI
POUARUA PIPIROA No 3B
WAITAKARURU
WAITAKARURU No 1
WAITAKARURU No 2
WAITAKARURU No 3
WAITAKARURU No 5
WAITAKARURU No 4
N.L.
C.L.
Waitakaruru Stream
Mangaotaua Stream
Te Wairenga Stm. about 1½ miles
To Miranda about 5 miles
Kauaeranga Canal
Waitakaruru Stm.
Waitakaruru Road
Formed road
Proposed drainage channel
4 Ft. Peat Stumps
CROSS ROAD
NORTH ROAD
SOUTH ROAD
Formation Ends
PROPOSED POKENO - ERROA RAILWAY
POKENO
ERROA
NGARUA No 5A
NGARUA No 5
NGARUA No 1B
NGARUA No 1
NGARUA ROAD CANAL
Waitakaruru Stream
Tokaroa Stm.
TOKAROA ROAD
Ngarua Stm.
KAIRERE ROAD
To Ohinewai about 20 miles
MANGAWHERO No 1A
MANGAWHERO No 3B
WAIKA
PATETONGA VILLAGE
Patetonga Landing
Brkin Road
TOA CANAL Junction
Pt MAUKORO
Res.
MAUKORO N.R.
MAUKORO No 1C
TE WHANAKE
TE WHANAKE No 2
TE HUENUE
KAIKUPENE
TE MURI-O-PUHIRUA
WAIHINE RUKUMAI
RANGATAHI
PUTEA HAPA HAPAI
KOROMATUA No 2
OTWAY SETTLEMENT
WHAKAHORO
Mc Lellis Grant
No 1 Road
Piako River
Waitoa
Waitoa River
Waihou West
Ohinemuri River
Paeroa
Rly. Stn. Paeroa
Netherton Ferry
Netherton Schl.
Rly. Stn. (Te Komata)
Te Puke Bridge
Tirohia Ferry
AWAITI No 1
AWAITI No 2
AWAITI No 2A
AWAITI No 2B
AWAITI No 2C
AWAITI No 5
THAMES BORO' ENDOWMENT
ANIPUKAHU
Awaiti
Stream
Road
WAIHOU
WAITOA
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
XVI

Wharves.

The total number of permanent wharves erected to date still amounts to fifteen, the same as last year.

Owing to the construction of the Orchard Bridge, now being gone on with, it will be necessary to shift the wharf on the eastern side of the river at that point. A site has been laid off about 3 chains below the present site, and the construction will be gone ahead with at an early date. Later on the wharf at the western side will also have to be removed.

Flood-gates.

Two flood-gates were constructed during the year, bringing the total number on the works up to fifty-eight.

As in the past, all these gates have been inspected at intervals, and maintained in fair working-order.

Bridges, Culverts, etc.

The total number of sill-bridges is 99, small bridges on piles 10, three-span bridges 2, two-span bridges 2, and culverts 18.

The most important bridge constructed during the year was across the Hopai Creek.

The totara decking in the Waitakaruru Stream Bridge was replaced by kauri, and at the same time new wheelguards and handrails were erected.

Timber for the Ngarua Lake Bridge is now on order, and this structure will be completed very shortly.

Private Telephone to Works.

This line between Kerepeehi and Waitakaruru, a distance of fourteen miles, has been most useful, as in the past, in carrying out the works. Especially is this so since the postal line has been extended to Patetonga.

Buildings.

The total number of buildings on the works is thirty-seven, the same total as at the end of last year.

Owing to the proposed Orchard Bridge interfering with the foreman's cottage there it was dismantled, and additions were then made to the carpenter's old quarters at Kerepeehi. This alteration has proved most satisfactory in every way.

Floating Plant.

This plant is the same as last year—viz., two Priestman grab dredgers, one steamer, four oil-launches, six pontoons, and several small punts. This plant is being utilized as stated in last annual report, no alterations having been made during the year. As found necessary, and when convenient, the plant has been overhauled, and so maintained in fair working-order.

Artesian Boring Plant.

The total number of bores sunk by the Department's plant is now 123, the year's operations accounting for nineteen. The greatest depth drilled was 511 ft., whilst the least was 165 ft. The largest flow was 34,560 gallons per day, the smallest being 1,200 gallons per day. In two of the bores the water did not rise above the surface of the ground, but in both these instances water was obtained by pumping.

In all cases with the exception of an isolated one at Waikaka the water was mineralized. The bore at Waikaka was sunk as an experiment, and the water obtained, although it did not rise to the ground-level, appeared to be perfectly clean and fresh. If there is fresh, unmineralized water at a reasonable depth below the plains I am certain that a flow would have been obtained by now.

The cost of the work for the year was £735 4s. 3d., bringing the total spent to date to £3,016 19s. 2d., which amount, however, has to be refunded by the settlers.

Schedules of all bores sunk are attached.

Works performed during the Year.

The following works were carried out under either the piecework or co-operative contract systems:—

	M.	ch.
Double drain and road formation	2	55
New drain and road formation	0	2
Deepening and widening road-drains and spreading spoil	7	65
Clearing and grubbing roads	0	70
Cleaning road-drains	28	9
Outlets	8	17
Deepening and widening outlets	17	6
Cleaning outlets	28	69
Cleaning stop-bank drains	14	27
Weeding Waitakaruru Creek	2	20
Road-formation	0	55
Shelling roads	0	73
Distance covered	111	68

Supply of shell for roads, 1,870 cubic yards; supply of shingle for roads, 12,637 cubic yards; supply of sleepers for tram, 1,790 sleepers; supply of fascines for roads, 2,367 bundles.

The following works were carried out by day labour :—	M.	ch.
Deepening and widening road-drains and spreading soil	16	55
Clearing road-lines	3	40
Road-formation	1	67
Widening road-formation	1	40
Resanding roads	0	30
Sanding roads	0	70
Metalling roads	8	40
Cleaning road-drains	44	77
Outlets	0	50
Deepening and widening outlets	22	6
Cleaning outlets	49	15
Deepening stop-bank drain	6	70
Strengthening stop-banks	2	50
Cleaning stop-bank drains	6	42
Disking roads	16	0
Distance covered	182	12

Spoil removed by dredgers, 146,085 cubic yards; artesian bores sunk, 19; construction of flood-gates, 2; construction of culverts, 11; construction of bridges, 5.

As is usual in this class of work, there was a large number of small services carried out too numerous to schedule.

Floods.

The rainfall for the year 1915, as recorded at Kerepeehi, was just 50 in., the heaviest fall since the works were undertaken.

March was the wettest month, but after a dry summer the Piako River rose very little.

The Waihou River rose exceptionally high and, overflowing its banks below Tirohia, soon flooded the Netherton Block. This block was flooded later in the year, and until such time as the Waihou River bank is completed this block will be liable to damage. On opening this block the Department disclaimed all liability for damage due to flooding.

During July and August very heavy rain was experienced in the Piako watershed, and during these months there were three separate floods. The Piako River rose very high, and damage was sustained in consequence by the sections opposite Kerepeehi, between the river and the Puhanga Canal. This provided an opportunity of deepening the Puhanga spillway, which it was always considered would be necessary before long. The deepening of this spillway, although not down to the bottom of the river, will allow the flood-waters to reach the sea much more quickly. However much it was desired to deepen the spillway to the present bottom of the river, this had to be decided against, owing to the liability of this country to slip as soon as spoil was placed along the banks of the spillway.

It is my opinion that in order to relieve the Kerepeehi lands from the danger of big floods it will probably be necessary to widen the Piako River southwards from just above Rawerawe. About this point the river becomes rapidly narrower, and this is what causes the congestion further back.

The Waitakaruru Stream, on the western boundary of the plains, caused damage to private settlers more than to Crown settlers. A rough outline of a scheme has been drawn up, but nothing definite has been arranged, as there are so many interested parties.

The Waitoa River is the most sluggish water on the plains, and this is due solely to the weeds and silt that have accumulated there. As soon as rain falls in the back country this river overflows its banks and floods the neighbouring country. A close inspection was made of this river in 1915, and a scheme of dredging was drawn up, but up to the present nothing has been able to be done, as a dredge was not available for this particular work.

Flax Areas.

During the year no flax has been sold, but it is quite probable that during the coming season the Crown will derive a small revenue from flax royalties. The mill at Patetonga has been working during the summer, deriving its supply from the settlers.

The only other mill on the plains, at Waitakaruru, is just commencing to be worked again as this is written. It is more than likely that if the demand keeps up the Department will be able to sell the flax on the reserve at Waitakaruru.

It is intended to consider the practicability of providing flax-growing areas.

Fires.

In spite of a dry summer there were only two fires that caused damage to settlers' holdings, and in one case it was clearly an advantage, whilst in the other the damage sustained was not very extensive.

The first occurred at Ngarua, on Section 2, Block IX, Waihou Survey District, and spread eastwards into the Crown land, where an area of a grazing lease was burnt. The second fire was at Waitakaruru, where several sections on the Loan Block and on the Hauraki Plains were severely burnt.

These fires will occur always in the newly settled blocks, as the settlers must obtain a burn to get rid of the rubbish before it is possible to sow the seed.

In my opinion there are too many fires due both to carelessness and to thoughtlessness.

Grazing Leases.

In November 16,614 acres of land along and near the Piako River were thrown open by public tender as grazing-areas, under the year-to-year system, and were nearly all taken up. These areas were lying idle, and in a large number of cases were unsuitable for settlement. These areas can be resumed by giving short notice to the lessee, so that settlement will not be retarded through the leasing of the land.

Some of these areas will only be suitable for grazing purposes, and later on a longer tenure should be made possible. The importance of these areas may be gauged from the estimated number of cattle at present grazing there—viz., two thousand.

Surveys.

Owing to the lack of land suitable for settlement no large areas were surveyed during the year. Surveying was confined to the subdivision of small blocks of Native land and engineering works. These latter were all necessary for the prosecution of the drainage of the plains.

Valuation.

As no land was thrown open for settlement during the year under review the total value of land that has been subdivided and thrown open for settlement remains the same as at last March. The total area that had been thrown open was 38,994 acres, which at the time of selection was valued at £243,851. These totals do not include the value of land that has been utilized for road and drainage purposes.

Works Expenditure during War.

Piecework contracts amounting to £4,322 2s. 4d., and day-labour works amounting to £6,434 1s. 5d., were paid from local imprest out of the Hauraki Plains Settlement Account.

Metalling of Roads.

The scheme for metalling the main roads on the plains, which was commenced in 1913, has been pushed on continuously through the year under review, the total distance metalled or shelled being now seventeen miles, eight and a half miles of which was done during year ended 31st March, 1916. In spite of the wet winter and spring the work was carried on without a break, at a slightly increased cost, however. This policy was advisable so as to endeavour to link up the metalling systems between Kerepeehi and the Orchard.

The maintenance of these roads, as well as others on the plains, would be made much easier if settlers would only fall the bush adjoining the road.

As in the previous year, the Kauaeranga River, near Thames, supplied a large quantity of shingle, the total number of cubic yards being 4,854. This quantity was handled by the Department's own steamer and punts. The Auckland Shingle Company also supplied a scow-load per week during the greater part of the year, the total quantity supplied by them being 4,784 cubic yards. In addition Messrs. McCallum Bros. supplied 2,219 cubic yards of coarse beach shingle. The total yardage from these three supplies was 11,857 cubic yards.

The work carried out at Kerepeehi consisted of the metalling of the Kerepeehi–Turua Road east from the Landing for a distance of 2 miles 50 chains to the boundary of the plains, where the county have also metalled to; consequently there is now a metalled road from Kerepeehi to the Thames Railway line.

Work was then commenced on the Kerepeehi–Kopuarahi Road, starting at its junction with the Kerepeehi–Turua Road and working north towards the Orchard. Some 124 chains of this road were completed, after which the plant was shifted to the Orchard.

One hundred chains of metalling were completed of the Orchard and Orchard–Pipiroa Roads, after which the plant was shifted across the river. At the end of March 100 chains of the Orchard East Road had been completed, and every endeavour will be made to link up with the metal on the Kerepeehi–Kopuarahi Road, which will necessitate about a mile and a half of metalling. This section is most important, and the Orchard is the only place on the Piako River where stock are crossed; and, moreover, this is the point where a bridge is to be erected.

The approaches to the wharves at Hopai and Rawerawe were both metalled.

All the metalling described above was carried out by day labour, and the metal transported on the Department's own tram-line. The wisdom of having a tram-line was especially noticeable last spring, when the roads were so soft and would not have stood heavy carting at all.

The trucks are now showing signs of wear, and are gradually being repaired.

The punts used for transporting gravel from the Kauaeranga River to the Piako River are in fair working-order, and will be useful for years to come.

Near the cookhouse at Waitakaruru there was an old beach composed of shell and grit, which in olden times was used as a feasting-ground by the Natives, judging by the remains that are found there. Last winter experiments were made with this shell to take the place of metal on roads, with very satisfactory results. Since then 75 chains of the Waitakaruru–Pipiroa Road, commencing at the Waitakaruru Stream and working eastwards, have been shelled. Unfortunately the supply is limited, but it is estimated that there will be sufficient to shell at least another mile.

A length of about 60 chains of the Ngarua Road was also metalled with gravel from the creek at the western end of the road. This metal is very good, and will provide sufficient metal for all the roads in the immediate neighbourhood.

Following is a schedule showing the roads metalled or shelled during the year:—

	M.	ch.
Kerepeehi–Turua	2	50
Kerepeehi–Kouparahi	1	44
Orchard West	0	40
Pipiroa–Orchard	0	60
Orchard East	1	20
Rawerawe	0	5
Hopai	0	5
Waitakaruru–Pipiroa	0	75
Ngarua	0	60
Distance covered	8	39

Principal Works proposed.

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

(1.) Completion of Puhanga Canal.
(2.) Completion of Awaiti Canal.
(3.) Dredging of Lower Waitoa River.
(4.) Continuance of cart-road development at Waikaka.
(5.) General drainage and road-development.
(6.) Metalling of main roads.
(7.) Maintenance of existing works.
(8.) Dredging of portion of Mangawhero Canal, &c.

Land proposed to be opened.

Efforts will be made this coming year to make available for settlement some 2,700 acres. It should be noted that in past years some 38,994 acres, exclusive of town and suburban lands, have been thrown open for selection, and in the majority of instances these lands were offered somewhat ahead of completed drainage and road operations in deference to popular desire for such lands. Naturally our powers have thereafter been taxed to complete attendant road and drain construction.

It should be understood that a lot of the work carried out during last year and to be done during the coming year will have an effect upon the present undeveloped swamp lands.

It is neither wise nor practicable at present to prosecute extensive and costly work in any particular large swamp area of the Hauraki Plains. Much of the swamp will work out its own partial reclamation much more cheaply than if we forced it, and in a few years permit of our more easily and economically draining it. Our dredgers are now at certain work tending to make the position easier later on, and from time to time will be moved to other positions as circumstances permit.

Our scheme of grazing-areas last year made available, as already stated, some 16,614 acres, capable of running over two thousand head of stock, and we derive an annual income of some £732 from this source. This area will greatly improve and consolidate through grazing, and make our expenditure in the future less than it otherwise would be.

I cannot recommend forcing operations in our deep and soft peat country, and I think that the Department has brought into being a larger area of country so far than most people thought possible. The remaining country is much more difficult to handle than that offered for selection up to date.

General.

Field, office, and draughting staff have been very fully engaged during the past year, and I have to record my appreciation of the whole-hearted services and loyalty of Mr. R. G. Macmorran, Land Drainage Engineer, Mr. H. A. Joyce, Chief Clerk, and other members of my staff, who have not spared themselves in connection with the works.

The attached plan shows position of works to date.

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

The Under-Secretary for Lands, Wellington.

Schedule of Artesian Bores sunk during the Year 1915–16.

Artesian Bore No.	Section.	Block.	Survey District.	Total Depth.	Running Flow: Gallons per Day.	Artesian Bore No.	Section.	Block.	Survey District.	Total Depth.	Running Flow: Gallons per Day.
				Ft.						Ft.	
105	10	X	Wharekawa ..	273	9,120	115	8	I	Waihou ..	332	6,000
106	14	VI	Piako ..	227	3,840	116	24	X	Thames ..	388	11,520
107	6	X	Wharekawa ..	319	34,560	117	25	X	,, ..	390	21,600
108	4	X	,, ..	165	1,920	118	31	X	,, ..	173	2,400
109	11	..	Pipiroa (Town)	270	Nil.	119	26	X	,, ..	258	5,760
110	19	X	Wharekawa ..	384	8,640	120	26	X	,, ..	441	14,400
111	21	X	Thames ..	413	1,200	121	4	I	Waihou ..	260	4,800
112	22	X	,, ..	317	6,000	122	16	I	,, ..	244	7,200
113	7	I	Waihou ..	297	21,600	123	13	XIII	,, ..	511	Nil.
114	8	I	,, ..	286	4,320						

Approximate Cost of Paper.—**Preparation, not given; printing** (950 copies), including plan, £20 10s.

By Authority: Marcus F. Marks, Government Printer, Wellington.—1916.

Price 9d.]