1916.

NEW ZEALAND.

DEPARTMENT OF LANDS AND SURVEY.

SURVEYS

(ANNUAL REPORT ON).

Presented to both Houses of the General Assembly by Command of His Excellency.

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The SURVEYOR-GENERAL to the Right Hon. the MINISTER OF LANDS.

SIR,— 1st May, 1916.

I have the honour to present herewith the report on survey operations for the year ended 31st March, 1916.

I have, &c.,

E. H. WILMOT, Surveyor-General.

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

REPORT.

As in last year's report, so in this, I shall present only the general position of the work performed during the year and that now on hand, leaving details to be found in the various tables accompanying.

The acreage surveyed is very considerably in excess of that of last year, while the cost per acre is in almost every class of work much lower. This satisfactory position is accounted for partly by the more favourable weather-conditions during last year, and partly by the inclusion in the returns of large areas of pastoral country that were subdivided for settlement in Otago. It is, however, particularly creditable in view of the inconvenience the surveyors were put to by reason of so many survey hands enlisting.

A summary of the survey work executed during the year is given in the following tables:—

TABLE A.

Class of Work.	Area.	Average Cost per Acre.	Total Cost.
	Acres.		£ s. d.
Triangulation, by staff surveyors	178,353	0·97d.	723 4 4
Topographical, by staff surveyors	311,985	1·77d.	2,297 13 10
Rural, by staff surveyors	805,134	0·95s.	38,432 15 2
Rural, by licensed surveyors	57,794	1·33s.	3,845 9 6
Rural, by licensed surveyors (costs not available)	24,245	..	..
Village and suburban, by staff surveyors	1,920	7·12s.	683 17 3
Village and suburban, by licensed surveyors	23·25	17·25s.	20 1 0
Village and suburban, by licensed surveyors (costs not available)	20	..	..
Town, by staff surveyors	618 (in 650 sections)	27·18s.*	883 9 4
Town, by licensed surveyors	160 (in 34 sections)	56·00s.*	95 0 0
Town, by licensed surveyors (paid by applicants)	54	..	..
Native Land Court, by staff surveyors	79,354	14·2d.	4,693 16 11
Native Land Court, by licensed surveyors	302,355	17·09d.	21,531 3 2
Native Land Court, by licensed surveyors (paid by applicants)	18,275	..	..
Maori Land Board, by staff surveyors	4,460	26·37d.	490 1 3
Mining, by staff surveyors	90	3·01s.	13 11 1
Mining, by licensed surveyors (paid by applicants)	2,561	..	..
Roads, by staff surveyors	405 miles	£17·23†	6,985 14 0
Roads, by licensed surveyors	20 ,,	£17·4 †	348 0 5
Roads, by licensed surveyors (costs not available)	105·41 miles	..	..

* Per section. † Per mile.

TABLE B.

Land District.	Rural Surveys.	Native Land Court Surveys.
	Acres.	Acres.
Auckland	159,768	170,333
Hawke's Bay	76,188	143,020
Taranaki	10,652	31,750*
Wellington	23,945	58,383
Nelson	58,413	..
Marlborough	18,022	735
Westland	8,904	..
Canterbury	48,852	63
Otago	469,387	..
Southland	13,042	160
Totals	887,173	404,444

* Includes 4,460 acres Maori Land Board.

TRIANGULATION.

Not much of this class of work has been done during the year. With respect to the secondary triangulation, it was hoped that better progress would have been made this year than heretofore, but at the beginning of the year it was impossible to spare from settlement surveys suitable surveyors for this class of work, and later, owing to the urgent need of the strictest economy during war-time, it was decided to hold this work in abeyance.

The completion of the observations for connecting the Wairarapa base with the initial station (Mount Cook) was nevertheless effected, and this gives data for computing and readjusting the co-ordinate values of a large proportion of the minor triangulation stations in the Wellington District and for connecting several suburban standard surveys with the initial station.

In the Auckland District a few signals were built, but no observations taken. The necessary computations were made in connection with the observations for azimuth completed last year.

In minor triangulation the only work done has been that absolutely necessary for the control of settlement surveys, and it included the revision of portions of old triangulation work which had been found not to be up to the standard of accuracy required in modern surveys.

Standard Surveys.

Only such work as was very urgently required was proceeded with. It comprised the standard surveys of Auckland, Dunedin, Napier and surrounding district, Vogeltown, and Patea. The cost of town standard surveys is partly borne by the local bodies concerned, these surveys forming the basis for municipal building-lines and municipal surveys generally. In the case of Vogeltown the survey was made partly as a preliminary to a revision of the original subdivision survey, which was found to be extremely faulty. I had hoped, as proposed in my report last year, to have given more attention to this class of work by increasing the staff and providing more appliances, but here again the call for economy on account of the war has acted adversely.

Settlement Surveys.

Under the heading of "Rural Surveys," in Table A, 887,163 acres are returned as having been surveyed during the year. Table B shows the apportionment into the various districts. The average cost of this class of survey for the past year is slightly less than 1s. per acre.

Native Surveys.

During the year staff surveyors completed the survey of 83,814 acres, while licensed surveyors accounted for 320,630 acres. Table B shows the allocation of these surveys between the land districts.

Gold-mining Surveys.

Applications were surveyed aggregating 2,651 acres. Nearly the whole of this was in Westland. The cost of these surveys cannot be properly arrived at, the fees being paid by the applicants.

Inspections.

The inspections of field-work made from time to time show generally that a fair standard of work is maintained. I regret to say, however, that in a small percentage of cases the work has been shown to be very bad. Measures are being taken to ensure that the surveyors in fault shall be brought to book.

Proposed Operations, 1916–17.

Triangulation.—Only such minor triangulation as may be required for the control of settlement surveys will be proceeded with. This will be principally in Hawke's Bay District.

Standard Surveys.—Work, which will occupy the year, will be the continuation of the survey of Auckland (Remuera, Grey Lynn, and Arch Hill); survey of Napier and surrounding district (probably Hastings also); rural standard traverse near Feilding, and probably in Canterbury; survey of Dunedin (Mornington and Bay Town). This work is absolutely necessary, and, as already pointed out, the cost will be partly borne by the local bodies concerned.

Settlement Surveys.—At the close of the year there were in the hands of the staff and temporary surveyors 820,543 acres of settlement lands and 83,875 acres of Native lands, while in the hands of private surveyors there were respectively 9,470 acres and 315,624 acres. There were also 13,346 acres of rural lands and 3,970 acres of Native lands on hand, but not allocated to any surveyor. There is also in view the survey of areas totalling about 120,000 acres, mostly in Auckland and Hawke's Bay Districts, which will be put in hand as opportunity offers. The distribution of this is shown in Table 4. The field-work of a large amount of this either has been completed or will be completed before the end of June, and the mapping will be done during July and August, when the surveyors, or as many as it is advisable to call in, will be in office for the winter recess.

Draughting Staff.

The number of officers enlisting has put a heavy strain on the staffs of all the offices, and were it not that in some classes of work there has been a falling-off it would have been impossible with the present staffing to have kept the work up. In the Head Office there has been an unusual amount of work for other Departments, principally in connection with agricultural statistics and census returns, beyond which little more than routine work could be overtaken. The publication of two important maps—that of New Zealand and that of Wellington City and suburbs, both of which are ready for the printer—has been delayed owing to the shortage of paper, but it is hoped that a small edition of the latter will be issued in May or June. For the same reason the publication of Dr. Coleridge Farr's "Magnetic Survey of New Zealand," advanced copies of which were already out, has been stopped, but will proceed shortly. On account of this shortage of paper a number of the usual appendices to this report—*e.g.*, reports of Chief Surveyors, report of Magnetic Observatory, &c.—will not be published herewith, but some will be printed as separate papers at a later date. A map and its description of the "Anzac" portion of Gallipoli Peninsula is, however, included as a piece of historical record.

In order that draughtsmen and computers may feel encouraged to make themselves as proficient as possible it is proposed that certificates of competency shall be issued to those attaining a certain standard of efficiency, and to this end an examination was held during the year. Only three candidates, however, sat, none of whom passed the whole examination. It is considered advisable to amend the syllabus and to provide for separate certificates for draughting and computing. This is now receiving attention.

Of late years it has been found necessary in order to cope with the work to employ a considerable number of temporary men. This not being quite satisfactory it was decided to augment the draughting staff by taking on a number of cadets, so that the Department may have

draughtsmen coming on who have been properly trained, and to ensure that these cadets shall have an aptitude for the work examinations have been held, and a number of applicants who passed have been appointed.

Surveyors' Board.

The Board's examinations were held as usual, a feature of them this year being the sitting of young men who had enlisted and were therefore allowed to take a partial examination prior to the completion of the terms of their articles. At the September examinations twenty-one candidates sat, of whom five passed, and at the March examination ten sat and three passed. The members of the new Board appointed for 1916 are Messrs. Thomas Humphries and R. T. Sadd, Government nominees; Messrs. H. Sladden and J. C. Simmonds, Institute nominees; and myself *ex officio*.

Tidal Survey.

In the absence of the Chief Computer, Dr. C. E. Adams, this work has been carried on by Messrs. T. G. Gillespie and J. J. Hay, and consisted of the prediction of the times of high water for the ports of Wellington and Auckland for 1917. A fresh analysis has been made for the former port, and during the coming year a fresh one will be made for the latter. These will be used for the predictions for 1918.

Magnetic Observatory.

The work of the Observatory has been efficiently carried on by Mr. H. Skey. His full report, with illustrative diagrams and seismic records, will be published as a separate paper instead of an appendix hereto, as has been the custom.

General.

During the year there have been many changes in the personnel and arrangement of the staff caused by deaths, retirements, and enlistments. In last year's report I gave the names of those surveyors, cadets, and draughtsmen who had enlisted. During the year now ended the following have also enlisted: Staff surveyors—C. Kenny, R. F. W. Mackenzie, W. Paora, S. Parkinson; temporary surveyors—A. T. Leeds and C. K. Robinson; survey cadets—M. H. B. Burrell, T. S. McMillan, T. S. Roe, and J. C. Thomson; draughtsmen—R. C. Calman, R. J. Crawford, F. A. A. Field, A. D. Folley, H. D. Henderson, J. A. Montgomerie, R. V. Parker, J. Pegram, F. C. O'Reilly; draughting cadets—J. D. Clapperton, J. C. O'Hara, and T. G. Phillips; temporary draughtsmen—C. C. Best, S. O. Esam, M. W. Haworth, A. P. McConnell, K. J. Miller, W. Rochfort, A. C. M. Siceley, A. Turner.

I regret to have to report that three very promising young surveyors have been killed—viz., V. Blake, G. Pirrit, and W. B. de L. Willis—as also three very efficient draughtsmen—viz., G. J. B. Cairnie, E. A. Ingram, and H. B. Bandrup—and draughting cadet H. L. Wake. The loss of these officers is much felt.

The Department has also lost by death Mr. John Langmuir, Inspector of Surveys, and Mr. Henry Mackay, Chief Draughtsman. Special mention of these highly esteemed officers is made in the general report submitted by the Under-Secretary, as also of other officers who have retired.

Although the lists for the 31st March, 1916, show the strength of the field staff to be eighty-four officers, there will actually be only sixty-two available at the beginning of the incoming year. They comprise two Inspectors, forty-one staff surveyors, two assistants, eleven temporary surveyors, and six cadets; and of these one staff and one temporary surveyor have been granted leave to join the Expeditionary Forces. The position now is that in all districts only the more urgent work can be put through, while less important work, though necessary, must be held in abeyance.

The way in which the work both in the field and in the office has been kept up as well as it has been reflects credit on all the officers, and I am pleased to have the opportunity of bringing this under your notice.

Table 1.—Return of Field-work executed by Head Office Staff.

From 1st April, 1915, to 31st March, 1916.

Land District.	Secondary Triangulation (cost).*	Minor Triangulation.		Town Standard Surveys.		Rural Standard Surveys.		Inspections.		Other Work.
		Area.	Total Cost.	Miles.	Cost per Mile.	Miles.	Cost per Mile.	Number of Surveyors.		
								Staff.	Private.	
	£ s. d.		£		£					£ s. d.
Auckland ..	659 4 11	..	..	13·60	47·30	..	..	..	..	214 0 0
Wellington ..	765 13 10	..	..	51 25	36·62	..	..	..	4	236 3 0
" ..	..	..	..	7·60	31·70	..	..	..	..	301 4 6

* The secondary triangulation work having been stopped, the cost of the year's work to date is inserted here.

Table 2.—Return of Field-work executed by Staff and Contract Surveyors on Lands administered by Lands and Survey Department from 1st April, 1915, to 31st March, 1916.

Land District.	Minor Triangulation.		Topography.		Rural.		Village and Suburban.			Town.			Roads, &c.		Other Work (cost).	Total Cost of completed Work from 1st April, 1915, to 31st March, 1916.
	Acres.	Cost per Acre.	Acres.	Cost per Acre.	Acres.	Cost per Acre.	Acres.	Number of Sections.	Cost per Acre.	Acres.	Number of Sections.	Cost per Section.	Miles.	Cost per Mile.		
		d.		d.		s.			s.			s.		£	£ s. d.	£ s. d.
Auckland	37,863	1·70	106,345	3·00	145,212	2·00	135	31	13·60	478·0	316	31·20	172·25	19·32	1,272 17 6	21,557 14 3
Hawke's Bay	45,000	0·54	5,300	0·28	76,188	1·21	..	..	..	69·5	171	15·95	32·96	19·45	421 13 7	5,934 13 7
Taranaki	..	..	..	..	10,652	2·70	326	85	16·50	46·5	135	31·80	19·00	29·56	238 1 6	2,720 7 3
Wellington	..	..	..	..	23,945	3·10	141	14	16·50	..	..	..	..	..	791 11 9	4,618 18 7
Nelson	53,390	1·06	119,700	0·88	58,413	2·20	24	12	25·39	11·0	32	54·44	31·83	32·36	136 0 11	8,390 14 9
Marlborough	..	..	..	..	8,708	2·24	67	1	4·40	..	..	..	..	..	68 16 11	1,059 1 4
Westland	..	..	8,500	2·60	8,904	3·20	41	4	8·85	..	..	..	1·00	13·00	74 10 0	1,611 9 8
Canterbury	..	..	3,720	1·00	48,125	0·95	43	4	7·00	4·0	15	10·00	33·50	18·31	286 12 6	3,221 3 8
Otago	24,000	0·30	68,420	1·40	469,387	0·21	931	41	2·04	169·0	15	52·60	88·35	5·70	4,341 16 3	10,432 11 1
Southland	18,100	1·00	..	..	12,085	2·50	215	15	4·33	..	..	..	23·97	9·98	547 17 4	2,422 4 1
Means and totals	178,353	0·97	311,985	1·77	861,619	0·98	1,923	207	7·10	778·0	684	28·64	402·86	17·22	8,179 18 3	61,968 18 3
Licensed surveyors (paid by applicants)					14,556	..										
Totals					876,175	..										

Table 3.—Return of Field-work executed by Staff and Contract Surveyors on Lands administered by other Departments from 1st April, 1915, to 31st March, 1916.

Land District.	Rural.		Village and Suburban.			Town.			Roads.		Native-land Survey.			Mining.			Other Work (cost).	Total Cost of completed Work from 1st April, 1915, to 31st March, 1916.
	Acres.	Cost per Acre.	Acres.	Number of Sections.	Cost per Acre.	Acres.	Number of Sections.	Cost per Section.	Miles.	Cost per Mile.	Acres.	Number of Sub-divisions.	Cost per Acre.	Acres.	Number of Sections.	Cost per Acre.		
		s.			s.			s.		£			d.			s.	£ s. d.	£ s. d.
Auckland	..	..	..	..	..	..	..	..	..	..	153,894*	1,296	16·50	..	..	..	2,053 9 3	12,656 11 0
Hawke's Bay	..	..	..	..	..	..	..	..	..	..	143,020*	751	16·91	..	..	..	82 18 7	10,160 7 5
Taranaki	..	..	..	..	..	..	..	..	2·25	21·00	25,454* 4,460†	68 4	10·26 26·37	..	..	..	112 3 2	1,737 17 1
Wellington	..	..	..	..	..	..	..	..	6·10	25·71	58,383*	345	17·85	..	..	..	19 7 3	4,517 13 4
Nelson	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15 16 0	15 16 0
Marlborough	..	..	..	..	..	..	..	..	..	..	735*	6	17·80	..	..	..	22 18 6	77 10 6
Westland	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Canterbury	727	1·94	..	..	..	..	..	..	11·00	15·81	63*	8	96·80	..	..	..	9 1 0	278 18 10
Otago	..	..	..	..	..	..	..	..	3·00‡	5·60	..	..	..	90	1	3·01	18 16 7	49 1 8
Southland	582	1·87	20	1	6·40	..	..	..	..	..	160*	3	51·93	..	..	..	83 15 10	179 7 7
Means and totals	1,309	1·91	20	1	6·40	..	..	..	22·35	18·00	386,169	2,481	16·60	90	1	3·01	2,418 6 2	29,673 3 5
Licensed surveyors (paid by applicants)	9,689	..	20	4	..	54	..	..	105·41	..	18,275	78	..	2,561	14	..	..	..
Totals	10,998	..	40	5	..	54	..	..	127·76	..	404,444	2,559	..	2,651	15	..	..	..

* Native Land Court. † Maori Land Board. ‡ Water-race.

Table 4.—Return showing Surveyors employed and the Work on Hand on 1st April, 1916.

Chief Surveyors.	Surveyors employed.			Work on Hand.					
	Staff.	Temporary.	Contract.	Land District.	Trig.	Settlement.	Town.	Native-land Survey.	Roads.
					Sq. Mls.	Acres.	Acres.	Acres.	Miles.
H. M. Skeet ..	13	5	47	Auckland ..	..	*189,406	44	261,557	337·0
W. H. Skinner ..	6	1	12	Hawke's Bay	..	79,047	..	40,646	9·0
G. H. Bullard ..	3	1	7	Taranaki ..	42	61,160	..	51,199	16·0
G. H. M. McClure	3	..	9	Wellington ..	..	13,138	..	46,097	..
F. A. Thompson ..	4	1	1	Nelson ..	..	62,290	..	..	7·5
H. G. Price ..	..	1	1	Marlborough	..	5,906	..	..	..
W. F. Marsh ..	..	1	1	Westland ..	..	27,684	..	3,970	..
C. R. Pollen ..	2	1	..	Canterbury ..	..	69,698	..	..	29·5
R. T. Sadd ..	5	..	..	Otago ..	..	312,600	..	..	..
H. D. M. Haszard	4	..	..	Southland ..	..	22,630	..	..	..
Total staff surveyors	40	11	78	..	42	843,559	44	403,469	399·0

* Includes 1,500 acres topographical.

Table 5.—Principal Classes of Office-work done from 1st April, 1915, to 31st March, 1916.

District.	Plans placed on Instruments of Title.			Deeds and other Instruments passed.	Plans examined.	Deeds or other Instruments.	Maps drawn.		Lithos published.	Lithos sold.
	Leases and Licenses.	Freehold.	Miscellaneous.				Standard Publications.	Sale Plans.		£ s. d.
Auckland	1,755	3,224	5,374	5,340	1,861	..	..	216	3,500	180 4 7
Hawke's Bay	184	2,529	1,179	844	582	154	2	26	..	33 14 6
Taranaki	302	1,038	268	49	219	267	5	16	18	16 14 7
Wellington	410	4,241	1,289	2,275	446	410	16	94	..	4 5 3
Nelson	643	480	..	185	243	410	..	20	..	27 15 7
Marlborough	219	362	2	..	84	209	..	3	..	5 8 0
Westland	358	110	204	..	69	3	3	..	..	19 9 0
Canterbury	326	3,189	142	2,084	307	..	4	13	..	15 3 3
Otago	343	1,121	..	556	173	343	2	42	530	66 4 2
Southland	279	1,181	1	387	109	469	1	41	..	31 6 2
Totals	4,819	17,475	8,459	11,720	4,093	2,265	33	471	4,048	400 5 1

APPENDIX I.—THE MAGNETIC OBSERVATORY.

The Director states that during the year the Adie magnetographs at the Magnetic Observatory at Christchurch have been kept in continuous operation. From the resulting daily magnetograms there have been calculated an uninterrupted series of actual hourly values of the magnetic declination of every hour of the year. A similar series of hourly values of the horizontal magnetic force has also been calculated, with the exception of the Greenwich hours 10 h. to 15 h. and 17 h. to 23 h. on the 17th June. On this day the greatest magnetic storm of the year occurred, and unfortunately between the hours mentioned the horizontal force diminished so much that it was beyond the range of the instrument.

The mean values of the magnetic declination for the year is 16° 47′ E. of N., and of the horizontal force 0·22387 C.G.S. unit.

Throughout the year the Milne seismograph has been kept in continuous operation, and a large number of valuable records of earthquakes has been obtained. The work of developing records alone has been of considerable magnitude.

The usual daily meteorological readings have been made and published for public information; also the self-recording meteorological instruments have been successfully operated.

Two especially important events in the history of this Observatory have occurred recently. The first is the visit to Lyttelton of the "Carnegie," the ocean magnetic surveying-vessel of the Carnegie Institution of Washington. This vessel, under the command of Captain J. P. Ault, arrived at Lyttelton on the 3rd November, 1915, and sailed for a circumpolar cruise on the 6th December. During the visit an arduous but valuable comparison was made between the Observatory standards and those of the Carnegie Institution, with results not differing greatly from those obtained before during the visit of the "Galilee" in 1908. The "Carnegie" returned

to Lyttelton from her long and very successful cruise on the 1st April, 1916, and her scientific staff immediately set about the necessary redetermination of instrumental constants at the Observatory. At this they were still busily engaged at the end of April. Valuable time-signals have been received from the Hector Observatory through the courtesy of the Department of Telegraphs of especial value to the work of the vessel.

The second event of great importance was the addition of sufficient insulation to the magnetograph-house at the Amberley sub-station, to enable the Eschenhagen magnetographs there to be put into continuous operation. The scientific value of this cannot be overestimated. Continuous records free from disturbances have been obtained from these instruments since the 17th February, 1916, under the care of the assistant in charge, Mr. R. H. Symington. An acknowledgment must also be made of the valuable services of Mr. Thomas Maben, assistant at the Observatory.

The detailed report of the Director, Mr. H. F. Skey, is published separately. It contains the tables of hourly values of the magnetic elements, tables of earthquakes recorded, reproductions of the principal magnetograms and seismograms, and vector and other diagrams of the diurnal magnetic variations for the seasons and months of the year 1915. The publication of the Magnetic Survey of New Zealand by the Department is an event towards which this Observatory has contributed not a little, in spite of its shortness in staff.

In the course of March last Mr. William C. Parkinson, a magnetic observer of the Department of Terrestrial Magnetism, C.I.W., made observations at a number of repeat stations occupied in the course of our magnetic survey. His provisional results yield values of the annual change agreeing very consistently with the values obtained previously by our Department.

HENRY F. SKEY,
Director.

APPENDIX II.—THE MAP OF ANZAC.

Now that the war operations at the Gallipoli Peninsula have been concluded it seems an appropriate time to record in our annual volume a memento, congruous with our function in the Government, in the shape of a map of Anzac, to mark our participation as a Department in the deeds of our soldiers there.

The word "Anzac" (meaning "Australian and New Zealand Army Corps") is now a household word throughout the Empire, and will always be associated with the thought of great deeds done by Australian and New Zealand troops on Gallipoli Peninsula.

The following notes will serve to illustrate the attached plan, which was prepared from information supplied by Private Waldo Thompson, of the Napier staff, who was present at the landing on the 25th April, 1915, and saw four months' service in the ensuing operations.

The portion called "Anzac" is contained by the New Zealand trenches and the Australian trenches as shown, from Fisherman's Hut to Gaba Tepe Point. The area is only about 1,000 acres, and the widest part from the front trenches to the sea is only about 1,100 yards, while the distance along the sea-front is about three miles.

In this area of hills and scrubby gullies the Australians and New-Zealanders held out against greatly superior Turkish forces, which periodically made desperate attempts to dislodge the colonials from their positions and drive them into the sea. The Australians from the 25th April to the 6th August repulsed, with great slaughter to the Turks, all attempts to break the front line, which, had it occurred, would have undoubtedly meant the loss of the whole position. The whole of Anzac lay exposed as a bird's-eye view to the Turks, who held all the higher ground inland, and consequently were able to keep up a relentless bombardment on the heroic defenders.

All the positions shown on the map, such as Steele's Post, Courtney's Post, Quinn's Post, Pope's Post, Walker's Ridge, Plugg's Plateau, &c., were named out of regard to the officers who were instrumental in seizing the positions in the initial rushes from the landing, and who in many cases lost their lives. The Lonesome Pine position was named because of a single tree which marked the spot, and is famous because of the skilful way it was captured from the Turks by the Australians.

The Chessboard is so named from the series of Turkish trenches which seamed the western slopes of Sari Bair ridge. Table Top was the position of the Turkish trenches on the north, and was a low flat ridge. Shrapnel Gully was the main means of communication between the beach and the front trenches, and received its name because of the amount of shrapnel shell thrown into it by the Turkish artillery, which was aware of its importance to our troops. Practically all movement from one place to another had to be done along big cuts or saps, and these provided a degree of safety from the incessant shell and rifle fire. Most movement was done under cover of night.

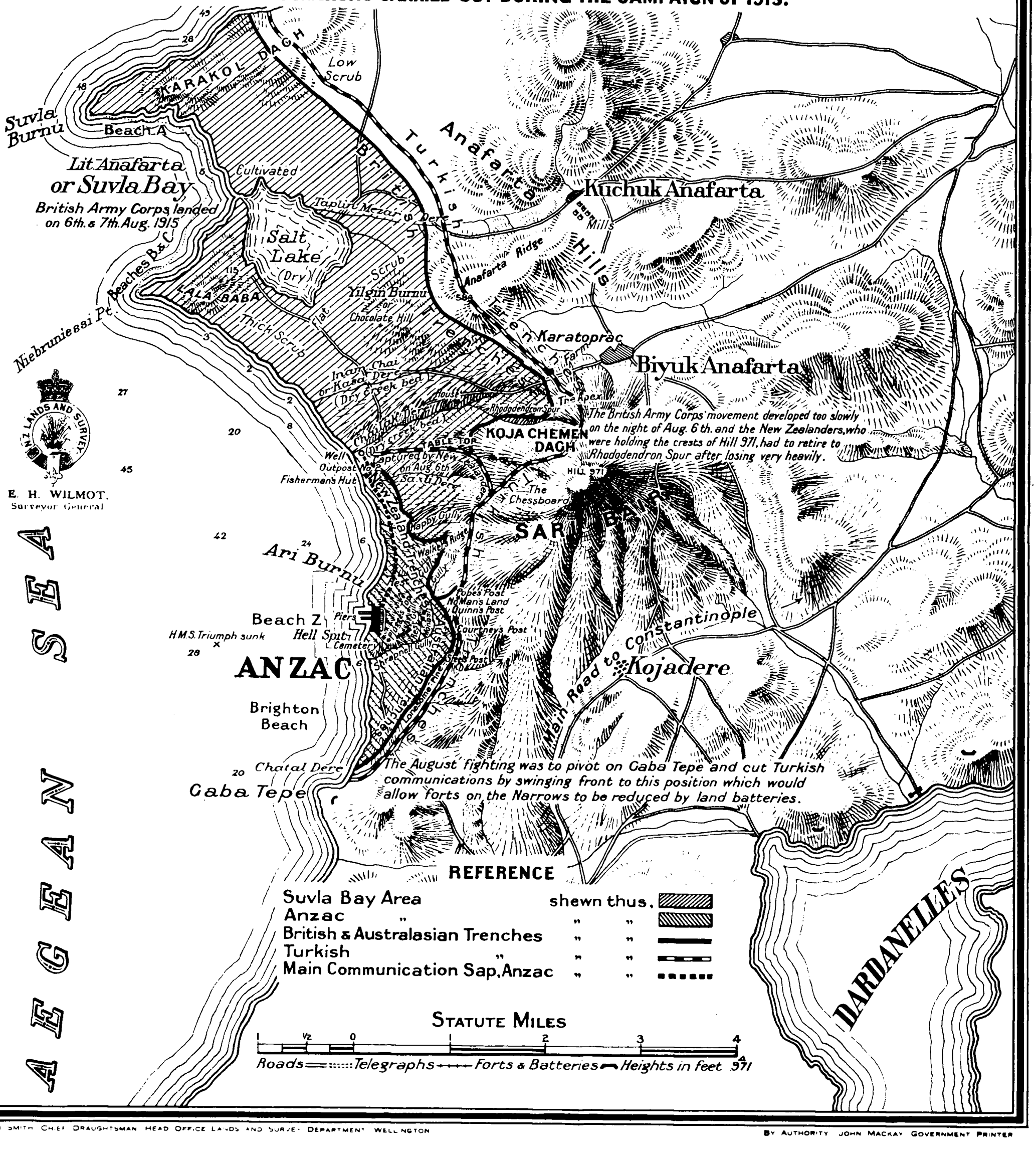
Bathing on the beach near the piers was the only recreation, but this involved the risk of being hit by the Turkish artillery, which was able to enfilade the beach from Anafarta Ridge on the north and from below Gaba Tepe Point. Very heavy casualties were caused by this shell-fire, which tried continuously to smash up the accumulated stores of rations, many hundreds of our men losing their lives here.

As the Australians and New-Zealanders did not have enough men to attempt an advance, an Army Corps (40,000) of "Kitchener's Army" under General Stopford, was sent from England to assist in a forward movement. This force on the night of the 6th August made a surprise landing in Sulva Bay, and on the same night the New-Zealanders assaulted and captured the

MAP OF ANZAC AND THE SUVLA BAY AREA,

GALLIPOLI PENINSULA,

TO ILLUSTRATE OPERATIONS CARRIED OUT DURING THE CAMPAIGN OF 1915.



N.Z. LANDS AND SURVEY

E. H. WILMOT.
Surveyor General

REFERENCE

Suvla Bay Area	shewn thus,
Anzac "	" "
British & Australasian Trenches	" "
Turkish "	" "
Main Communication Sap, Anzac	" "

STATUTE MILES

1 ½ 0 1 2 3 4

Roads ═══ Telegraphs ····· Forts & Batteries ⌐ Heights in feet 971

M. CROMPTON SMITH, CHIEF DRAUGHTSMAN, HEAD OFFICE LANDS AND SURVEY DEPARTMENT, WELLINGTON

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C.—1A

Turkish positions on Table Top, and, moving quickly up Chailak Dere (which was a dry creek-bed), took up a position on Rhododendron Spur. This position was firmly held by midday on the 7th, and a further advance was made to try and take Hill 971, which was the key to the Turkish positions. Desperate assaults were made by the New-Zealanders to seize the top of the hill, but owing to the fact that the British troops from Suvla Bay were unable to press forward far enough towards Bujuk Anafarta and Kuchuk Anafarta and thereby protect the left flank, the New-Zealanders had to retire to Rhododendron Spur, leaving the Turks masters of the main position. It was in this furious fighting that the New-Zealanders suffered such serious losses. Numberless heroic deeds were enacted, and some were recognized and rewarded. One of these was that of Corporal Skinner (son of the Chief Surveyor, Napier), who carried urgent messages under heavy fire and received the D.C.M.

The inability of the Suvla Bay force to push forward and cut the Turkish roads of communication nullified the great efforts made by the Australians and New-Zealanders, and as a result of this failure the whole force evacuated the peninsula, without loss, during December, 1915.

Thus ended what will go down in history as one of the most trying pieces of work that ever troops were asked to do, and in the execution of which a new standard of valour was set by the brilliant Australian, New Zealand, and British troops, repeating again almost within sight of Troy those famous deeds which still echo down the corridors of history from the far-off days of Greek and Trojan heroes.

As will be seen by the notices in last year's report and in the present one, these far-off scrub-covered ridges and gullies overlooking the Aegean Sea have entered with those of our own country into the inner life of our Department, having become the last resting-place of many of our most promising young officers; others also from our field parties exchanged the labour of our survey lines in New Zealand forest, scrub, and tussock for rifle and trenching-tool in Gallipoli trenches, never again to return. Haere, haere, haere!

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NORTH ISLAND
(TE IKA-A-MAUI)

NEW ZEALAND
Showing the State of Public Surveys, 1916.

E. H. WILMOT,
Surveyor General

Scale of English Miles

Reference

Cities ..... thus WELLINGTON
Boroughs ..... " Marton
Railways ..... "
Roads ..... "
Boundaries of Land Districts ..... "
Projection – Rectangular Tangential
Initial Stations ..... "

REFERENCE

Section Survey, index check
Section Survey, plan

Three Kings Is

Bay of Islands
Kaipara Harbour
Manukau Entrance
Waikato R.
LITTLE BARRIER
GREAT BARRIER
Hauraki Gulf
GREAT MERCURY ISLAND
WAIHEKE ISLAND
Firth of Thames
TAURANGA
Maketu
Bay of Plenty
NEW PLYMOUTH
North Taranaki Bight
South Taranaki Bight
Mohaka R.
Ruahine Range
Wanganui R.
Rangitikei R.
Mahia Peninsula
Hawke Bay
NAPIER
South Latitude
KAPITI I.
Golden Bay
D'Urville I.
Tasman Bay
NELSON
COOK STRAIT
SOUTH ISLAND

TASMAN SEA

PACIFIC OCEAN

RAOUL or SUNDAY I.
Scale

MACAULEY I.
Scale

CURTIS I.
Scale

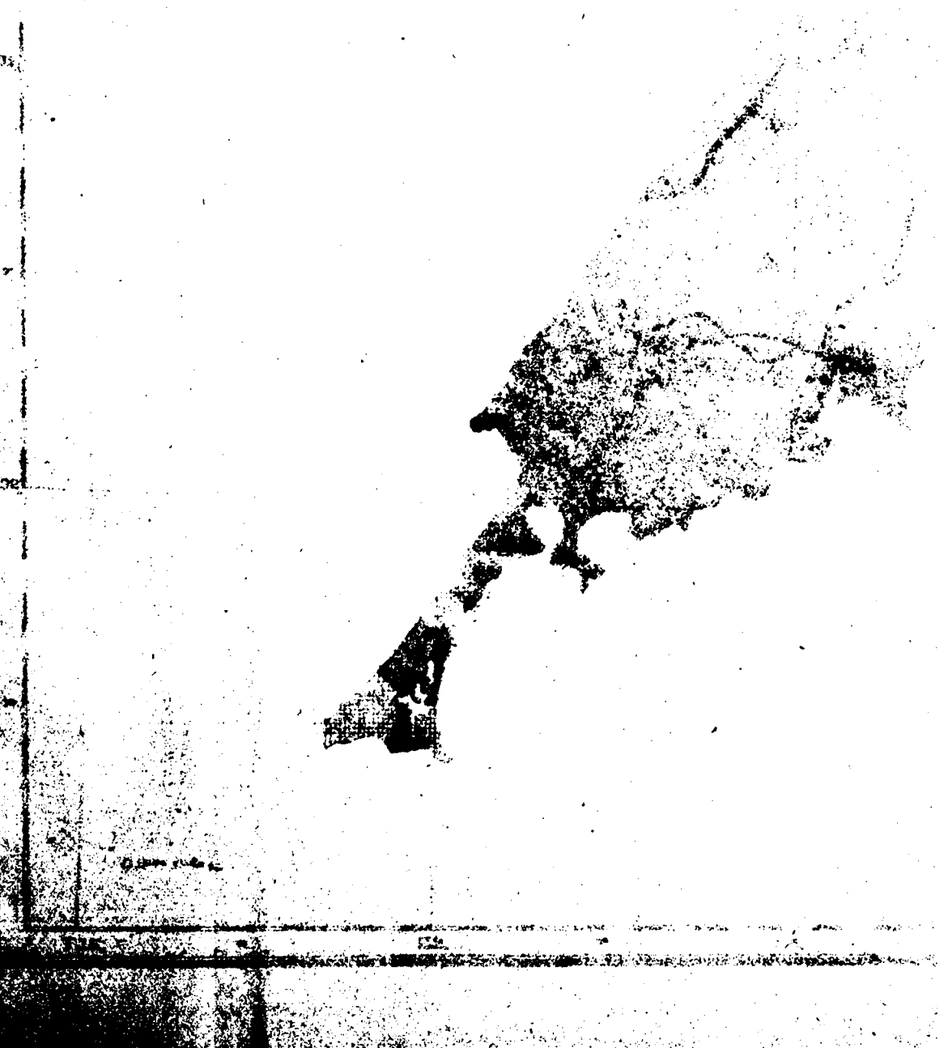
L'ESPERANCE

KERMADEC ISLANDS

8° South Lat.
23° South Lat.
COOK ISLANDS

175° East Longitude

M. Crompton Smith Chief Draughtsman Head Office Lands and Survey Department, Wellington



E. H. WILMOT,
Surveyor General

SOUTH ISLAND
(TE WAI-POUNAMU)

NEW ZEALAND
Showing the State of Public Surveys, 1916.

Scale of English Miles

10 5 0 10 20 30 40 50 60 70 80 90

Reference

Cities	thus DUNEDIN
Railways and stations	..
Roads	..
Boundaries of Land Districts	..
Projection – Rectangular Tangential	
Initial Stations	..

D'Urville Id

Tasman Bay

Karamea Bight

Karamea

Buller

Westport

Mills

Clarence R

Greymouth

HOKITIKA

Waimakariri R

CHRISTCHURCH

Pleasant

Banks Peninsula

Rakaia R

Rangitata R

TIMARU

Canterbury Bight

Waitaki R

OAMARU

Otago Peninsula

DUNEDIN

Observation Spot

Stewart Island

T A S M A N S E A

S O U T H P A C I F I C O C E A N

South Latitude

BOUNTY Ids

ANTIPODES

AUCKLAND Ids

CAMPBELL Ids

(REKOHU or WHARE-KAURI)
CHATHAM ISLANDS

167° 168° 169° 170° East Longitude 171° 172° 173° 174°

M. CROMPTON SMITH, CHIEF DRAUGHTSMAN, HEAD OFFICE, LANDS AND SURVEY DEPARTMENT, WELLINGTON