

EAST AFR. PROT

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Governor  
Belfield 582

MASAI RESERVE  
WATER SUPPLY

1915

29th July

Trs Report by Mr G.K.Watts on work for periods  
April to June 10th 1914 and Novr 22 to May 21 1915.  
with 8 photos of the dams referred to.

Last previous Paper.

*Gov*  
23623

Sir G. Fiddes.

Good progress.

The Public Works Extraordinary provision  
was cut down ruthlessly this year and  
except for the Masai's contribution and  
anything that may remain over & be  
revoted out of last year's provision for  
water, I am afraid little more can  
be done at present.

? Put by.

*G.C.S.* 27.8.15

*at once put 22.8.15*

*S.P.S.A.*

Next subsequent Paper

*see Gov*  
54639

*Put by*

39481

GOVERNMENT HOUSE,  
NAIROBI, REG. 26 AUG 15  
BRITISH EAST AFRICA

EAST AFRICA PROTECTORATE

No. 582

July 29th 1915.

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Sir,

In accordance with the request contained in paragraph 3 of Mr. Harcourt's despatch No. 385 of May 2th, I have the honour to transmit, herewith, a report by Mr. G. K. Watts on his work in connection with the Masai Reserve Water Supply for the periods from April to June 10th 1914, and November 22nd 1914 to 21st May 1915, together with 8 photographs illustrative of the dams referred to therein.

I have the honour to be,

Sir,

Your humble, obedient servant,

*Alarway, B. J. P. S.*

GOVERNOR.

THE RIGHT HONOURABLE

ANDREW BONAR LAW, P.C., M.P.,

SECRETARY OF STATE FOR THE COLONIES,

DOWNING STREET,

LONDON, S.W.

Report

Photographs

8

*See  
23623*

MASAI RESERVE WATER SUPPLY-

GENERAL REPORT From April 1914 to June 10th 1914, and  
from November 22nd 1914, to May 21st 1915.

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During these periods, (excluding work done in the Kedong Valley - June 10th to November 22nd 1914 - on which I submitted a report to the Director P.W.D. some months ago) I have:-

- (a) partially constructed two dams at Ngeri Gori
- (b) Built (1) A large dam at the Weikei
- (2) A large dam at the Penyin.

I could have done more work in the same time, had more money been available, so that I could have employed regularly teams of oxen and dam-scoops etc, and have had a larger number of porters.

The dams at Ngeri Gori are useful for the Purka tribe of Masai, and those at the Penyin and Weikei for the Kakenyuki tribe. The latter suffered so severely from want of water during the late drought that they have contributed Rs10,000 towards the improvement of their Water Supply. This sum will not go very far, but the fact that the Masai subscribed it, shows that they value the dams already supplied.

I attach some calculations showing the work done on the above dams.

At present I am making a dam on the East side of Leleahwa facing Mt. Suswa, at El Motige to Kamusien across a narrow ravine with a very rocky bed. The site is a very good one, and was suggested to me by Mr. Hemstedt. The country round it contains excellent pasturage, so this work should be a very useful one, I hope to complete it in a few weeks time. I had intended when I finished here making small dams at Mballik and Kaberr (the former on the S. slope of Mt. Suswa and the latter one March further

South) but I cannot do these works now, as the water-holes at these places have already dried up.

I therefore shall probably go from here to the Mamonet on the slope of the Mau, S.W. of Nairobi, and make a small dam there (about a months work probably, but I have not seen the place yet) which Mr. Hemsted wishes to be constructed. 271

When that is finished, I propose going to Ngori Gori and the Lemak, to complete the dams at Ngori-Gori, and to repair two of the three Lemak dams. One requires no repairs but the lower dam has had a washaway, and the upper dam owing to the waste weir having got checked up, was topped and requires repairs. In both cases I shall cut a small waste weir so as to err on the side of safety.

In future a regular system of Annual Repairs to all the Dams in the Masai Reserve will have to be arranged for. This will be quite an inexpensive matter, if the small repairs are done regularly. The "stitch in time" principle must be applied in the case of all earth-work dams. All three dams in the Lemak stood three monsoons, without any damage being done, and without any money being spent on repairs, it was during their fourth monsoon that the washaway occurred. Vegetation grows very quickly in the waste weirs as they are not lined with concrete or masonry, and they should be cleared before every monsoon. Fortunately, as neither of the breaches were as deep as the sill of the waste weir no water was lost.

The dam at the Bardamat (built 1913-14) has just been visited by Mr. Hemsted, who tells me it is in excellent condition, not having suffered in any way.

In the Masai Reserve all works are carried out at great expense owing to (1) the cost of the carriage of posts (2) the high charges of the hire of oxen for waggons, dam-scoops etc.

As owners of oxen do not care about sending their animals to the Reserve as the frequent scarcity of water tells so much on the oxen. If only the Masai could be induced to have some of their oxen trained, and to buy dam-scops, waggons and picugas, then dam-making here would be greatly cheapened.

Dams may be considered by some, an expensive means of storing water, but the experience of many countries with geological formation similar to that of the Masai Reserve, has been that Dams are the only means of obtaining a reliable Water - Supply. In such countries it has been frequently found that after dams have existed for a number of years, owing to seepage through the bed of the dam, and through the rocks on either side, the water level has risen nearer the surface than formerly, and consequently wells have been able to be sunk at reasonable cost. Had the dams, however, not been built, this would not have been the case.

Mr. Hemstedt knows of some springs which he thinks could be opened up, and below which concrete or masonry troughs could with advantage be built. Should funds in future admit of it, I should like to carry out this schemes.

I append reports on the dams referred to above.

Sd/- G. K. Watts.  
Temporary Engineer, F.V.D.  
E. Masai Reserve Water Supply.

10th June 1913.

Masai Reserve Water Supply.

The Weikai Dam.

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This Dam is situated on the East slope of the Mau Escarpment, South of Lake Naivasha, and West of Mount Suswa. Except in the deep ravine through which this river runs, the jungle is not thick, and all around there is excellent pasture land.

The Weikai River in a year of very heavy rainfall like that of 1913, runs all the year round to close to the site of the Dam. In a year of average rainfall, it runs from March to August, and from November to January. In a year like 1914, when both monsoons were exceptionally light, it ran from March to July, then for a few days in November, and twice in January 1915, as far as the Dam. From February 1st to March 25th. the river never once got within some miles of the dam.

Owing to the failure of the monsoons in 1914-15. The Masai could not utilize the grazing within reach of the Weikai as there was absolutely no water for their cattle, and they told me that except in a year of abnormally heavy rainfall, they could not stay near the Weikai long enough to utilize all the available grass there.

The Dam I have now constructed, will, I hope, when the bed and sides of the area impounded by the water are thoroughly saturated, hold enough water to enable the Masai to keep their cattle there till the grazing is all finished, within 5 or 6 miles of the Dam on either side. In December 1914 the Masai from these parts had to water their cattle at the white farms in the Kedong Valley, and at other times to take their cattle as far as 14 or 15 miles to the top of the Mau, and to water-holes, near Naivasha Lake; but I am in hopes that in the future

anything of this sort will not be necessary.

The Dam is 308 ft. long at the top, 20 ft. high at the deepest part, and has slopes of 3 to 1 on each side. The earths used in its construction are sandy loams, and fairly still clay. The stone used for pitching the sides of the Dam is basalt of varying quality. Unfortunately, very little stone was available near the Dam; most of it had to be quarried, broken up, and brought to the site of the Dam by porters. Practically all the work was done by porters - Kisii & Kavirondo - as there was no water for oxen.

The Waste weir level I fixed at <sup>R L</sup> 94.00, so as to give plenty of freeboard above this level to the top of the Dam during this monsoon, as this Dam had not had time to thoroughly settle before the rains began. After the rains the waste weir level could be raised to <sup>R L</sup> 98.00, by building a low masonry or concrete wall across it. With the waste weir level at <sup>R L</sup> 94.00, there will be a depth of 14 ft. of water in the Dam, and the water spread will be 1100 ft. long, by 250 ft. wide. The contents will be 1,220,000 cubic ft. at R.L. 94.00, and after allowing 3 ft. depth for evaporation and absorption twice a year, there remains 825,000 cub. ft. of water for consumption.

As the soil in the sides and bed of the water-spread impounded by the dam is very light, the absorption is excessive, and it may take two or three seasons before enough soil is brought down by the river to make the sides and bed water-tight. When this happens, the dam will hold sufficient water in any season, after the rains have ended, and the river ceases to flow, for 2000 head of cattle for 120 days, allowing for 5 acres of grazing land per animal in the dry weather, and assuming 100 sq. miles :- 54,000 acres to be the area which will be within easy reach of the Dam.

During construction the work was very much hampered by want of water. Practically all the time the water for the entire camp had to be fetched from a water-hole three miles up the river, and at times, when this dried up, the water had to be brought daily by 80 men, from the Satukiak stream on the top of the Mau, a distance of from 5 to 8 hours from the Camp.

Up to the 1st of March the health of the porters was quite fairly good, but during that month, and in the early part of April there was a good deal of sickness - chiefly dysentery, due to porters drinking foul water from half dried up pools in which cattle had been trampling - and four men died, although all that could be done for them was done.

The Dam was begun on November 22nd 1914, and was finished on April 8th 1915.

#### THE PERVIN DAM.

This Dam is built in a valley situated at the top of the Mau Range on its western side, at the junction of two portions of the Mau, called by the Masai "El Melili" and "Lalashua"; El Melili, being towards the North, and Lalashua the spur on the South going towards Lake Magadi. The Dam is about 6,900 ft above sea-level.

The Mau range is in the volcanic area, and the soils available vary from a fairly stiff buff clay to light-coloured sandy loams.

The Dam was begun on April 22nd 1914, and work on it was continued till June 10th, when I went to the Kedong Valley at Mr. Hemsted's suggestion, as he was afraid if I did not go then, I should get no work done there, as the monsoon was a very poor one.

On April 1st 1915, I resumed work on the Dam, and it was completed on May 21st 1915.



In June 1914 some water was impounded in the unfinished Dam, and cattle were able to water there till about the end of August. As the small rains last October and November were very short, no water collected again in the Dam till the end of March 1915. Since then it has not been dry, and now - early in June - it is nearly full. Sub. Assistant Surgeon Moorjani, who was at the Dam on June 7th. told me he saw many Masai watering their cattle there, and they told him what a boon it was to them.

The Dam is 462 ft. long, and 18.55 ft high in the deepest parts. The slopes are somewhat irregular because as there was water in the dam when I recommenced work in April 1915 I could add earthwork only on the top & back.

The stone available for pitching the slopes and top of the Dam was a hard grey basalt, which had to be quarried, broken up, and carried to site.

During May 1914, the river ran the whole time, but during May 1915 it came down only at intervals, for a few hours after heavy showers had fallen.

The waste weir is at the left or West end of the Dam, and is 57 ft wide by 2 ft deep, and is capable of discharging over 100 cubic feet per second. The waste weir level has been fixed at R.L. 94.00, which gives a depth of 11 feet of water. The water-spread is very large, and the Dam will contain 500,000 cubic feet at R.L. 94.00.

In 1914 a large number of Danescoops and ploughs were used, as many as 10 teams working at one time, but this year I used only porters.

When I left the Dam in June 1914, as I was afraid the Masai Cattle would tread down the earthwork, I had it covered with stone-pitching on the front and top, and turfed behind in places where there was no time for stone-pitching. Most of this stone-pitching had to be removed

this year, when I began the completing of the dam. Owing to want of rain the turf had died, but the whole dam, back and front, is now heavily stone-pitched.

The soil in the bed of the Penyin Dam is much more retentive than that of the Weikai, and seem to hold water well.

The health of the porters at the Penyin was on the whole good, but there two deaths from dysentery contracted at the Weikai.

The Ngeri-Geri Dams.

These unfinished Dams I touched on in the Report which I wrote in May 1914. They are situated in the granitoid-gneiss area of the Masai Reserve. I have not been to Ngeri-Geri since I left off the work there in April 1914, but Capt. Luckman, District Commissioner, Ngare Harok, told me that there had always been plenty of water in them, although there had been a washaway in one of the dams.

I hope to complete both Dams in August.

Sd/- G. K. Watts

Temporary Engineer, P.W.D.  
S. Masai Reserve Water Supply.

June 10th 1915.

P.S. The expenditure given in each case is approximate as all the accounts for work done in April & May have not yet been paid.

Intd/- G.K.W.

10/6/15.

**MASAI RESERVE**

**NATIVE LABOUR.**

	Men	Days	Men-Days
Total April 1914			5266
<u>Less</u>			
April 1st to 5th	182		
" 25th to 30th	165		1650
Total Men-Days			3616

2373

**RATIONS.**

125 loads of Mealie Meal (including cost of carriage)	Rs 1024
	per load

Cost of Labour &c. &c.

	Rs	cts
<b>NATIVE LABOUR</b>		924.20
Hire of Teams of oxen, Ploughs		Rs cts
Scoops, waggons etc.		
The A.B. Co. Kijabe	1222.75	
John Morgan & Sons Setik loads	290.00	1478.75
Rations - 125 @ Rs8 per load		1024.00
Blankets &c. &c.		150.00
<b>Total</b>	<b>Rs 5876.95</b>	
	<b>Rs 5877</b>	

Cost of works done by the above labour etc.

	Dam No. 1	Dam No. 2		Rs.
Jungle clearing	140000	180000	$\frac{59\%}{2.7\%}$	130
Earthwork	25352	37352	$\frac{62\%}{30\%}$	1200
Stone Pitching	5256	8035	$\frac{29\%}{11\%}$	1261
Turfing	3612	2075	$\frac{59\%}{2\%}$	135
Blankets &c				150
<b>Total</b>				<b>Rs 3577</b>

The Earth used in the Dams was a stiff clay very hard to plough and work up.

The stone was quarried and brought from hills above 1/3 of a mile from the Dams. The geological formation at the Nguro Hills is granitic gneiss.

June.

56/- G.K. Watts  
Temporary Engineer, P.W.D.  
S. Masai Reserve Water Supply.

THE FREYER DAM  
MASAI RESERVE

{ Encls to Mr. G.K. Watts' }  
No. 89 of 10/6/15 to  
the D.P.W.

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NATIVE LABOUR

	Men	Days	Men-days		Men	Days	Men-days
April 25th to 30th 1914	165	x 6	990	April 1915			8965
May 1914			4224	Less	110	x 8	880
June 1st to 11th 1914				May 1915			6440
		(142 x 6)		Less			2264
		(141 x 3)	1883				3886
		(139 x 3)					
<b>Total</b>			<b>6077</b>	<b>Total</b>			<b>8661</b>

RATIONS USED

	Leads	Rs	Rs	sts
April 1914	55	x 8 per lead	200	00
May & June 1914	221	x 3	663	00
April & May 1915	295	x 2.50 p.l.	738	00
Add for 48 leads the differe. in cost betw. 6x 2.50 per lead	48	x 3.50	157	00
<b>Total</b>			<b>1828</b>	<b>00</b>

Cost of Labour, Rations Etc.-

	Rs.
Headmen, Porters, Native labour	3080
Hire of Teams of Oxen in 1914	5875
Waggons &c. in 1915	620
Rations	1632
Blankets	200
<b>Total Expenses.</b>	<b>11397</b>

WORK DONE BY THE ABOVE LABOUR ETC.

	Rs.
Cutting 2 seasons	408
Earth-Work 26400 sq. ft @ 20¢ sq. ft.	5280
Stone Pitching 21444 sq. ft. @ 12¢ sq. ft.	2573
Jungle clearing 250000 " @ Rs2 / "	500
Blankets cooking pots &c	292

Total Rs 11637  
Sd/- G.K. Watts  
Temporary Engineer, P.W.D.  
Masai Reserve Water Supply

June 1915

~~-THE WHIKKI DAM-~~

~~-MADAI RESERVE-~~

{Enclosure to Mr.  
G.K. Watts' No. 69 of  
(10/6/15 to the D.P.W.)}

**NATIVE LABOUR**

Men-days Leads of 60lbs  
of Mealie Meal  
used.

Rations.

1st to 30th Nov 1914	1323	43.00
Dec: 1914	4734	172.00
Jan: 1915	4328	155.00
Feb 1915	4371	148.42
Mar: 1915	4240	203.00
1st to 5th April 1915	302	27.18
	<hr/> 21004	<hr/> 751.00

280

Add 50 men carrying Rations } 300  
from Naivasha January 1915 }

Total Mendsays 21304

**COST OF LABOUR RATIONS &c.**

		Rs	cts
Native labour		4084	50
Hire of Waggon Scoops Ploughs also of team of 5222	121 days @ 12.50	1512	50
Extra Waggon for short period		429	50
Rations 711 Leads	@ Rs2.50	1477.50	
40 "	@ Rs3.00	120.00	1897 50
Blankets &c.		450.00	450 00
	<hr/> Total	<hr/> Rs	<hr/> 2294 00

**COST OF WORK DONE BY THE ABOVE LABOUR &c.**

		Rs	ct
Matting		217	00
Jungle clearing	200000 sq. ft. @ 1.50	300	00
Earthwork	229271 c. ft. @ 16.00	4776	00
Stone Pitching	20000 " @ 8.00	2440	00
Blankets &c.		450	00
	<hr/> Total	<hr/> Rs	<hr/> 2294 00

June 1915.

54/- G.K. Watts  
Temporary Engineer, P.W.D.  
S. Madai Reserve Water Supply



1. Ngoro-Nori Bar  
Loway.



2. Ngoro-Nori Bar  
Loway.





4. Bardamat Dam



5. One of the 3 Lemek Dam.



6. Lemek Dam  
Nos. 2 & 3.



7. Weihei Dam.  
in course of construction.



8. Peryn Dam  
(incomplete)