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MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No. 1090 (9)	Press
~~B.P. No.~~	~~Mis.~~
Dated 1-5-	1876

Not to be folded or roughly handled

Read the following papers:—

No. 48 W.

No. 18.

Note by the Chief Engineer for Irrigation.

THE correspondence as per margin, between the Superintending Engineer, Chingleput, and this office, is submitted for the consideration of Government, and orders are solicited on the following points:—

From Superintending Engineer, No. 4,509, 15th February 1876, with Executive Engineer's No. 2,954.

To do. No. 265, 29th February 1876.
From do. No. 4,932, 17th March 1876, with Executive Engineer's No. 3,341.

1st.—As to the date from which the account of issues to the Municipality should be commenced yearly, so as to determine at any given time the quantity of water remaining for issue to the town out of the available reserve for the year of 45.32* — 20.48† = 24.84‡ millions.

* Quantity below 31.31 + 6 feet = 37.31.
† Do. do. 31.31.
‡ Do. between 31.31 and 37.31.

2ndly.—As to whether loss by evaporation, absorption, &c., is to be taken

into account in correction of the quantity reserved.

2. It will be seen that, for the immediate guidance of the Superintending Engineer, it has been intimated that the 1st December is probably a date which may conveniently be fixed for the commencement of the annual supply, and that, were the official year taken, the supply due in March being then necessarily very small, and there being at that time of the year but little probability of local rain or a fresh in the Cortelliar, there would be much risk of no water being available in the earlier months of the following year. On the other hand, starting with the full supply for the town in store on the 1st December, there should be enough water to last not only until the occurrence of freshes which may be expected in July, but until the north-east monsoon. As a matter of supply, therefore, the year from the 1st December to the 30th November would appear to be very suitable.

3. The other question relating to evaporation and other causes of loss of water is a difficult one to deal with, the data being far from well determined. Still it is clearly very necessary to take these losses into account, for otherwise there will be no certainty of any arrangements for dividing storage between the town and irrigation respectively giving satisfactory results, and while it may be necessary to give the town supply the first consideration, it is certainly very desirable that those irrigating under the tank may not suffer loss from the stoppage of the supply to their fields after they have commenced cultivation.

4. Captain A. C. Smith in his letter, No. 3,341, states that he has taken careful measurements, and he is certain that the loss by evaporation and percolation is double the issue of water for irrigation. There has not yet been any satisfactory account made out of the receipts, issues, and loss for any year, and of course such an account for a series of years, showing the average results for each month, would be necessary to obtain a safe guide to the duty both as regards town supply and irrigation which any given quantity of water, remaining in the tank after the close of the north-east

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monsoon, or at about the date (1st December) proposed for the town supply year, may be expected to perform. Even such information would not be, moreover, a really safe guide as regards the removal of all risk of a failure of the supply of water to Madras, unless the worst year in a considerable series were taken, and practically to take this would mean that a great deal of water, which in ordinary years would be available for irrigation, must be left unutilized. Lately the President of the Municipal Commission has expressed some fear, a fear which in the event of no rainfall for some time to come may probably prove to have been quite reasonable, lest Madras should be left without water, but, if in addition to storing and keeping for the use of the town about three times as much water as is actually drawn off for town use, of which the quantity above the sill of the Municipal sluice lowest pipe is about twice as much as is, at all events at present, required, a further reserve has to be made as a precaution against the evaporation and other losses of a long dry season, it will, it is thought, be necessary for Government to decide what the arrangements to be made are to be, and, as it does not appear to be feasible beforehand to say what the character of any season will be, either some risk must be incurred, or the reserve will have to be made larger than was contemplated in the Order of the 5th January last, No. 21.

5. On the 18th March last, the date when the gradual lowering of the water level of the Red Hills tank led to the representation made by the President of the Municipal Commission, this level was 7.23 feet above the sill of the lowest pipe, so the water surface was at 38.54, and the contents of the tank were about 51 millions of cubic yards, or 5.68 millions more than the whole quantity supposed to be reserved for town use. If the 1st December be taken as the commencement of the supply year, the balance of water which ought to have been held available for the town would have been $24.84 - \frac{1}{3} \times 24.84 + 20.49 = 24.84 - 7.42 + 20.48 = 37.90$, so the tank had 13.10 millions more than the quantity supposed to be held in reserve.

6. As regards the difference between the diminution of water in the tank between the 1st December and the 18th March and the issues recorded, the water reports show that on the—

	Millions of cubic yds.
1st December the water surface was at 40.36. Contents ...	62.058
Receipts* ...	7.692
	69.750
31st December the water surface was at 41.01. Contents ...	65.850
Difference ...	3.900
while the issues recorded are—	
for town supply ...	0.735
„ irrigation ...	0.778
Total ...	1.513

Proportion of issues to total consumption 1 to 2.57.

* Vide Pencil notes in remarks column of Statement for December.

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Similarly for January—

	Millions of cubic yds.
1st January surface level 40.99. Contents ...	65.742
31st January do. 40.20. Do. ...	61.124
Difference ...	4.618
Issued to town supply ...	0.897
„ to irrigation ...	0.942
	1.839

Proportion of issues to consumption 1 to 2.52.

The short period to which these calculations refer is of course insufficient to establish a rule of proportion, but so far as these may be taken as a guide, it would appear that the storage would have to be about two and a half times the issues, and that supposing the minimum head admissible on the town lowest pipe sill to be 3 feet, and the issues 12 millions, the quantity required to be reserved for the town would be—

	Millions of cubic yds.
Below sill of pipe ...	20.48
3 feet above sill of pipe ...	11.06
$12 \times 2\frac{1}{2}$...	30.00
Total ...	61.54

instead of 45.32, as supposed in the Proceedings of Government of the 5th January last. The first item of the above is a fixed quantity, the second can, it is thought, be settled definitely by the President of the Municipal Commission, and the third before multiplication may possibly be determined with fair accuracy for the maximum of the next ten years. The proper multiple will be reported as soon as the necessary information shall have been obtained from the Superintending Engineer, Chingleput.

7. It would appear that it is desirable to discourage second crop cultivation under the Red Hills tank, for though the second crop is a short one and takes less water directly, the direct supply, added to the loss by evaporation and absorption, &c., makes the total consumption greater per acre than that of the first crop. Again, the water level corresponding to the above quantity of 61.54 millions is just under 40.31, or 9 feet above the sill of the lowest pipe, and on the 31st January this year the water level was 40.20 or, taking the two months' supply already obtained by the town since the 1st December, higher than would have seemed ample. Yet fears are entertained that the water may run short, and, as a fact, the level of the water fell 1.77 feet in less than seven weeks* afterwards, and

* Forty-seven days.

the supposed 3 feet minimum head would take a less proportionate time owing to the diminution of water-spread and contents of each lower similar depth of water. The direct proportion would be 112 days, and the probable time for the water to fall to the 3 feet level (34.31) above the pipe sill would be ninety-three days as a maximum, and possibly eighty as a minimum, taking the hotter weather and greater

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evaporation into account on the one hand, and the less absorption due to less depth and less pressure therefore on the other hand.

FORT ST. GEORGE, (Signed) JOHN MULLINS, Lt.-Col., R.E.,
5th April 1876. Chief Engineer for Irrigation.

No. 18-A. From Colonel F. J. MOBERLY, R.E., Superintending Engineer, Chingleput, to Lieutenant-Colonel J. MULLINS, R.E., Chief Engineer for Irrigation, dated Mount, 15th February 1876, No. 4,509.

I HAVE the honor to enclose copy of a letter from the Executive Engineer, Mount Range, regarding the retention of water in the Red Hill Lake for Municipal use. 1 Copy of a letter from the Executive Engineer, Mount Range, No. 2,954, dated 28th January 1876.

2. From the contents of G.O., No. 2,981, of 21st October, it appears obvious that by the lowest sluice mentioned in paragraph 3 is meant the lowest Municipal pipe at 31.31 feet above mean sea level, but I cannot instruct Captain Smith as to his further difficulty regarding the date at which 6 feet depth of water is to be retained on this sluice floor.

3. We cannot expect any supply before July next, and if the Government mean that up to that time I must have a minimum of 6 feet, it is clear that I must shortly shut off all issues for irrigation.

4. We have now 8.75 on the sluice, and are pretty sure to lose 2.75 by evaporation and absorption in the next four and a half months.

5. I would again urge on your consideration the advantage of erecting a small pumping engine to lift, at the most 8 feet, in case of necessity, and thus enabling us to utilize the large quantity of water lying below the Municipal level.

6. This would be probably paid for over and over again by the return as second crop, for which we must refuse irrigation in such years as the current one.

7. We should require to cut a channel into deep water, and might have a small basin to clear the water a little at all times of the year; it is certainly always less clear at Surapedu than at the north end.

From Captain A. C. SMITH, R.E., Executive Engineer, to Colonel F. J. MOBERLY, R.E., Superintending Engineer, Chingleput, dated Mount, 28th January 1876, No. 2,954.

With reference to paragraph 3 of G.O., No. 2,981 of 21st October last, forwarded with your No. 3,341, of 9th November last, I have the honor to request for information as follows:—

2. Is the Red Hills tank never to be allowed to go below the minimum level of 6 feet above the sill of the lowest Municipal pipe? This I take it is the meaning of the "sill of the lowest sluice," for the tank at 6 feet above sill of lowest irrigation sluice contains only 6 or 7 millions.

3. If so, we must at once stop all issues to irrigation, as the supply is not likely to be increased this year until the next monsoon, and we now have only 24 millions in the tank* and

* Above the 6 feet level over Municipal sluice.

this will be lost in six months by percolation, evaporation, &c.

If not, I shall be glad of some specific orders as to the different heads which may be allowed at different times of year.

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No. 265.

IRRIGATION MEMORANDUM.

In reply to the letter, No. 4,509 of the 15th instant, from the Superintending Engineer, Chingleput, the undersigned has the honor to say that it is not understood that the water in the Red Hills tank must be kept at a minimum of 6 feet above the sill of the lowest pipe of the Municipal off-take, but that on the one hand it is considered by Government that the tank level should be kept as high as possible, and on the other that 45.32 millions of cubic yards, or

the quantity below the 6 feet contour, should be reserved for the use of the Municipality. The instructions conveyed in this office memorandum, No. 1,378 of the 23rd November 1875, indicate that it was not contemplated that the tank water would never fall below the 6 feet level. It is thought that unless the tank were reserved entirely for Municipal purposes it would be impracticable to secure this result, while even in that case it might not always be possible.

2. There has as yet been but little if any extension of the area irrigated under the tanks, and except under special orders of Government the supply of this irrigation should be continued under proper supervision until the cultivation has been completed.

3. Captain A. C. Smith mentions that 24 millions of cubic yards, or enough water for the irrigation of the whole area* nearly under the two tanks (were that cultivation but just beginning instead of the main crop having been harvested,) was available in the larger tank alone when he wrote at the end of January, above the 6 feet level, and beyond therefore the full quantity required to be reserved for the Municipality. Out of this latter quantity, moreover, a considerable quantity has no doubt been already taken.

* 4,181 Acres.

4. It is more difficult to fix a date which may be conveniently taken as the commencement of the time from which the Municipal supplies are to be calculated; were the commencement of the official year to be the date towards the end of that year the quantity due would be very small, and the desire of Government might not be readily secured. On the whole the undersigned thinks that, for this special purpose, the 1st December will be the most convenient date, and the quantity on any given date to be reserved absolutely for the Municipality should be the full quantity of 45.32 millions less the issues made from the 1st December inclusive, while the quantity practically claimable would be 45.32 — (20.48 +* the quantity already issued).

* The quantity below the lowest pipe.

5. As to when a further supply of water may be hoped for nothing better than an opinion can be expressed. It is, however, not probable that the Coréilliar will be without water, or that there will be no local rainfall before July. At any rate the great importance in the present state of the water-supply, of being prepared to pass down every drop of water which the Coréilliar may be able to afford, should not be for a moment lost sight of, and the inefficient state of the Cholaveram tank supply channel, as indicated by the absence of fall through the head sluice with even very considerable depths of water, and the entire cessation of discharge with about 2 feet on the sluice sill, although the nominal fall of the channel is great, should have led to the prompt putting to rights of this channel the moment the north-east monsoon was over and the channel had ceased to convey water.

(Signed) JOHN MULLINS, Lieut.-Colonel, R.E.,
Chief Engineer for Irrigation.

20th February 1876.

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Endorsement of the Superintending Engineer, Chingleput, dated Mount, 17th March 1876.
No. 4,932.

From Captain A. C. SMITH, R.E., Executive Engineer, No. 2 or Mount Range, to Colonel
F. J. MOBERLY, R.E., Superintending Engineer, Chingleput, dated Mount, —
1876, No. 3,341.

With reference to Chief Engineer's No. 265, forwarded with your No. 4,829, of 9th instant, I have the honor to point out that though (*vide* paragraph 3 of Memorandum) there were 24 millions in the tank* at the end of January, this was by no means sufficient for the irrigation, as stated by the Chief Engineer; the latter forgets the fact of loss by percolation and evaporation, a loss which in the Red Hills tank is exactly double the amount issued to irrigation; so out of the 24 millions left in January 16 millions, or very near it, would be lost. I have taken careful measurements and am certain of this.

2. With regard to paragraph 5, I have to state that the channel was cleared whenever practicable between the small freshes, and directly the channel was dry I set to work on the large estimate, though I had no funds for the purpose, and the clearance is now virtually completed, though I have been unable to pay for a yard of it. The estimate has been in my office for many days waiting its turn for checking with many others, this is now the normal state of things in my office as already reported on several occasions.

FORWARDED to the Chief Engineer for Irrigation with reference to his memorandum, No. 265, of 29th February 1876.

(Signed) F. J. MOBERLY, Colonel, R.E.,
Superintending Engineer, Chingleput.

No. 19. ORDER THEREON, 1st May 1876, No. 1,090.

IRRIGATION, No. 4.

THESE papers will be communicated to the Financial Department in continuation of G.O., 5th January 1876, No. 21, with a view to the consideration of the circumstances connected with the water-supply of Madras brought to notice in the Note by the Chief Engineer for Irrigation.

2. It will be observed that the points on which a settlement is desired in order that corresponding arrangements may be made in the Public Works Department are—

First.—The date from which the annual supply of the town should be deemed to commence. The 1st of December has been suggested by Lieutenant-Colonel Mullins, and the reasons for its selection have been stated.

Second.—The minimum depth of water on the sill of the lowest pipe of the Municipal off-take sluice which will suffice to ensure a full supply of water to the town.

Third.—The maximum quantity of water likely to be actually drawn off at the town sluice for a year's supply during the next ten years.

3. If a settlement of these points be come to it is anticipated that, with the information regarding the proportion between storage and issues, likely to be soon

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available, the details of arrangements which will avoid risk of the failure of the water-supply to the town in years of short rainfall, or in seasons of prolonged absence of rain, may be drawn up, and orders thereupon passed for the guidance of the Public Works Officers in charge of the Madras Water Works Reservoirs.

(True Extract.)

Colonel,

Offg. Under Secy. to Govt., P.W.D.

To the Financial Department.
" District Engineer, Chingleput.
" Chief Engineer for Irrigation.

Exd. S. T. Austin.
Spare Copies

CHOLAVARAM TANK.

Table showing Water Surface, Areas, and Cubical Contents at half foot vertical intervals up to crest of new Calingulah.

Height above mean sea level.	Difference of Area for each half foot.	Area at level in column 1.	Difference of cubical contents at each half foot.	Contents at level in column 1.
1	2	3	4	5
FEET.	SQ. YARDS.	SQ. YARDS.	CUB. YARDS.	CUB. YARDS.
43.68	137,617	1,935,035	342,698	967,517
44.18		2,072,652	365,628	1,310,215
44.68		2,210,269	388,350	1,675,843
45.18		2,347,886	410,853	2,064,193
45.68		2,485,503	433,805	2,475,046
46.18		2,623,120	456,652	2,908,851
46.68		2,760,738	474,148	3,365,403
47.18	151,730	2,912,468	499,086	3,839,551
47.68		3,064,198	531,111	4,338,637
48.18		3,215,928	540,743	4,869,748
48.68		3,367,658	563,088	5,410,491
49.18		3,519,388	597,752	5,983,579
49.68		3,671,118	625,025	6,581,331
50.18		3,815,286	648,860	7,206,356
50.68	144,168	3,959,454	672,369	7,855,216
51.18		4,103,622	695,257	8,527,585
51.68		4,247,791	719,364	9,222,842
52.18		4,391,959	742,748	9,942,206
52.68		4,536,128	758,934	10,684,954
53.18		4,673,511	785,580	11,443,888
53.68		4,810,895	811,774	12,229,468
54.18	137,383	4,948,279	837,471	13,041,242
54.68		5,085,663	864,161	13,878,713
55.18		5,223,047	890,359	14,742,874
55.68		5,360,431		15,633,233

CHOLAVARAM TANK—(Concluded.)

Table showing Water Surface, Areas, and Cubical Contents at half foot vertical intervals up to crest of new Calingulah.—(Concluded.)

Height above mean sea level.	Difference of Area for each half foot.	Area at level in column 1.	Difference of cubical contents at each half foot.	Contents at level in column 1.
1	2	3	4	5
FEET.	SQ. YARDS.	SQ. YARDS.	CUB. YARDS.	CUB. YARDS.
56-18	176,872	5,537,303	908,302	16,541,535
56-68		5,714,175	936,384	17,477,919
57-18		5,891,048	969,135	18,447,054
57-68		6,067,921	996,076	19,443,132
58-18		6,244,794	1,025,911	20,469,043
58-68		6,421,667	1,055,239	21,524,282
59-18	174,310	6,596,007	1,091,237	22,615,519
59-68		6,770,347	1,118,155	23,733,674
60-18		6,944,687	1,144,578	24,878,252
60-68		7,119,027	1,170,105	26,048,357
61-18		7,293,367	1,197,141	27,245,498
61-68		7,467,708	1,223,471	28,468,969

RED HILL TANK.

Table showing Water Surface, Areas, and Cubical Contents at half foot vertical intervals up to crest of new Calingulah.

Height above mean sea level.	Difference of Area for each half foot.	Area at level in column 1.	Difference of cubical contents at each half foot.	Contents at level in column 1.
1	2	3	4	5
FEET.	SQ. YARDS.	SQ. YARDS.	CUB. YARDS.	CUB. YARDS.
22-31	202,460	2,833,544	541,133	941,514
22-81		3,336,004	614,314	1,485,647
23-31		3,838,464	687,191	2,099,961
23-81		4,340,924	759,496	2,787,152
24-31		4,843,385	833,007	3,546,648
24-81		5,345,845	905,787	4,379,655
25-31	408,784	5,848,305	962,747	5,285,442
25-81		6,100,375	1,017,892	6,248,189
26-31		6,352,445	1,073,917	7,266,081
26-81		6,604,515	1,127,810	8,339,998
27-31		6,856,585	1,183,244	9,467,808
27-81		7,108,655	1,238,905	10,651,052
28-31	408,784	7,360,725	1,293,905	11,889,957
28-81		7,612,795	1,348,905	13,141,584
29-31		7,864,865	1,403,905	14,475,912
29-81		8,116,935	1,458,905	15,873,637
30-31		8,369,005	1,513,905	17,338,013
30-81		8,621,075	1,568,905	18,873,401
31-31	417,483	8,873,145	1,623,905	20,477,034
31-81		9,125,215	1,678,905	22,132,523
32-31		9,377,285	1,733,905	23,864,963
32-81		9,629,355	1,788,905	25,671,308
33-31		9,881,425	1,843,905	27,552,497
33-81		10,133,495	1,898,905	29,510,484
34-31		10,385,565	1,953,905	31,542,914

RED HILL TANK.—(Concluded.)

Table showing Water Surface, Areas, and Cubical Contents at half foot vertical intervals up to crest of new Calingulah.—(Concluded.)

Height above mean sea level.	Difference of Area for each half foot.	Area at level in column 1.	Difference of cubical contents at each half foot.	Contents at level in column 1.
1	2	3	4	5
FEET.	SQ. YARDS.	SQ. YARDS.	CUB. YARDS.	CUB. YARDS.
34-81	485,602	12,803,932	2,103,979	33,646,893
35-31		13,280,534	2,179,526	31,826,419
35-81		13,775,136	2,253,893	38,080,312
36-31		14,260,738	2,326,067	40,406,379
36-81		14,746,340	2,403,165	42,809,544
37-31	406,002	15,231,942	2,509,506	45,318,050
37-81		15,637,944	2,581,662	47,899,712
38-31		16,043,946	2,644,721	50,544,433
38-81		16,449,948	2,704,458	53,248,891
39-31		16,855,951	2,761,504	56,013,395
39-81	321,887	17,261,953	2,827,344	58,840,739
40-31		17,667,956	2,927,260	61,767,999
40-81		17,989,843	2,900,823	64,667,822
41-31		18,311,730	2,983,425	67,651,247
41-81		18,633,617	3,065,310	70,716,557
42-31	661,307	18,955,504	3,145,221	73,861,778
42-81		19,277,391	3,229,074	77,090,852
43-31		19,599,278	3,310,764	80,401,616
43-81		20,260,585	3,399,281	83,800,897
44-31		20,921,892	3,479,667	87,280,564
44-81		21,583,199	3,558,171	90,838,735
45-31		22,244,506	3,631,392	94,473,127
45-81		22,905,813	3,715,062	98,188,189
46-31		23,567,120	3,793,626	101,981,815

CHEMBRAMBAUKUM TANK.

Table showing Water Surface, Areas, and Cubical Contents at half foot vertical intervals up to crest of new Calingulah.

Height above mean sea level.	Difference of Area for each half foot.	Area at level in column 1.	Difference of cubical contents at each half foot.	Contents at level in column 1.
1	2	3	4	5
FEET.	SQ. YARDS.	SQ. YARDS.	CUB. YARDS.	CUB. YARDS.
67-4	343,371	13,487,466	90,000	13,487,466
67-9		13,830,837	297,541	13,577,466
68-4		14,174,208	636,951	13,743,195
68-9		14,517,579	925,739	14,380,146
69-4		14,860,950	1,365,752	15,305,885
69-9	502,264	15,204,321	1,655,122	16,671,537
70-4		15,547,693	2,621,720	18,326,659
70-9		16,049,957	2,711,156	20,948,379
71-4		16,552,221	2,799,048	23,659,535
71-9		17,054,485	2,895,158	26,458,583
72-4	554,316	17,556,750	2,975,772	29,343,741
72-9		18,059,014	3,061,732	32,319,513
73-4		18,561,279	3,234,340	35,381,145
73-9		19,115,625	3,287,826	38,615,485
74-4		19,669,971	3,344,012	41,903,311
74-9	101,474	20,224,317	3,364,403	45,247,323
75-4		20,778,663	3,485,678	48,611,726
75-9		21,333,009	3,508,058	52,097,404
76-4		21,887,356	3,512,371	55,605,462
76-9		21,988,830	3,560,509	59,116,833
77-4		22,090,304	3,658,703	62,677,342
77-9		22,191,778	3,737,838	66,336,045
78-4		22,293,252	3,821,053	70,073,883
78-9		22,394,726	2,902,304	73,894,936
79-4		22,496,201		77,797,240

CHENDRAMBAKUM TANK — (Concluded)
Table showing Water Surface, Areas, and Cubical Contents at half foot vertical intervals up to crest of new Calingulak — (Concluded.)

Heigh. above mean sea level.	Difference of Area for each half foot.	Area at level in column 1.	Difference of cubical contents at each half foot.	Contents at level in column 1.
1	2	3	4	5
FEET.	SQ. YARDS.	SQ. YARDS.	CUB. YARDS.	CUB. YARDS.
79.9	872,400	24,268,067	3,997,527	81,794,767
80.4		24,241,134	4,076,301	85,871,068
80.9		25,113,600	4,148,183	90,019,253
81.4		25,986,067	4,219,452	94,238,705
81.9		26,858,533	4,293,081	98,537,786
82.4		27,731,000	4,373,074	102,910,840

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No. 328. Read the following endorsement of the Officiating Chief Secretary, dated 26th July 1875.

Read the following papers:—

From L. R. BURROWS, Esq., Acting President of the Municipal Commission, Madras, to the Hon. D. F. CARMICHAEL, Officiating Chief Secretary to Government, Ootacamund, dated Madras, 21st July 1875, No. 271-G.

I HAVE the honor to request that the attention of the Honorable the Governor in Council may be drawn to a statement which appears in the Memorandum of the Chief Engineer, Public Works Department, on the subject of the Madras Water-supply, printed in Proceedings of Government, Public Works Department, dated 5th May 1875.

2. Colonel Walker says "the amount stored at the Red Hills with express reference to the supply of 20 gallons per head to a population of 312,000 inhabitants is 32 millions of cubic yards." Taking the contents of a cubic yard of water to be 168 $\frac{3}{4}$ gallons, the quantity 32 millions cubic yards expressed in gallons will be 5,400 millions of gallons. This number being divided by the number of the inhabitants, viz., 312,000, gives 17,307, which is the number of gallons used annually by each inhabitant. Divide 17,307 again by 365, the number of days in a year, and you obtain 47 $\frac{1}{3}$, which is the number of gallons used daily by each inhabitant.

3. The quantity annually required to supply a population of 312,000, consuming at the rate of 20 gallons per head per day, is 2,277,600,000 gallons, or less than 13 $\frac{1}{2}$ million cubic yards.

4. It appears therefore that the storage of 32 millions of cubic yards of water at the Red Hills with express reference to the supply of 20 gallons per head to a population of 312,000 leaves a very wide margin for contingencies, viz., 18 $\frac{1}{2}$ millions of cubic yards.

5. The Government, in passing orders on the Memorandum, observe that they have resolved to commit to Mr. Clark the elaboration of the plans for fully utilizing the water-supply stored at the Red Hills.

6. At page 7 of his report, Mr. Clark says:—"The new source of supply to Madras is said to be capable of giving 40 gallons per head to the entire population, a quantity I think not likely to be required," and lower down on the same page he says:—"I have taken the usual quantity of 20 gallons per head for the purpose of calculation."

7. Again in G. O., Financial Department, dated 12th April 1875, No. 821, communicating an Order of Government in the Public Works Department based on Colonel Mullins' Note regarding the smallness of the Municipal consumption of water, the President of the Municipality is called upon for information as to the immediate and ultimate demands of the Municipality on the storage at the Red Hills Lake, and this information has been partially given to Government in Mr. Coleman's letter, dated 12th May 1875, and the Municipal Commissioners are now engaged in collecting more detailed information on the subject.

8. The present daily consumption is about 9 gallons per head of the population supplied, viz., 280,000; and, although the Commissioners hope by a judicious extension of the pipe-laying to reach the consumption taken by Mr. Clark as the basis of his

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calculations, they neither desire nor expect to exceed that consumption to any considerable extent.

9. It appears to me that the expression of a Resolution on the part of Government to have the 32 millions of cubic yards of water stored for the Municipality fully utilized is somewhat at variance with their other orders calling for information as to the ultimate demands of the Municipality for water.

10. After giving the most thoughtful attention to the matter, I arrive at the conclusion that the Government are under the misapprehension that 32 millions of cubic yards of water are required for the supply of a population of 312,000 at the rate of 20 gallons per head per day, and that under this mistaken impression they desire to have the water-works constructed on a scale requisite for the distribution of this quantity.

TRANSFERRED to the Public Works Department for disposal.

(Signed) D. F. CARMICHAEL,
Officiating Chief Secretary.

No. 329.

Memorandum by the Chief Engineer.

THE President of the Municipal Commission is right as to the verbal inaccuracy of the first sentence of my Memorandum recorded with G. O., No. 1,287, of 5th May. Not to go further back than the Municipal Engineer's Report of 2nd June 1873, it would seem that the population for which water was to be supplied was 540,850. This would appear from the Water-supply Committee's Report of 1868 to have been purposely over-estimated; hence it is that, as stated by Mr. Standish Lee and now repeated by Mr. Burrows, the supply per head (including water for Municipal purposes) would amount to 48 gallons per diem. There is no inaccuracy in my statement of the quantity for which storage was to be provided, *viz.*, 32 millions of cubic yards, to the use of, and payment for, which it appeared to me that the Municipality pledged themselves. They now only want to use and pay for 6 millions; who is to pay for the rest? That is the simple question, and it is not affected by any thing that Mr. Burrows has said.

COONNOOR, (Signed) G. W. WALKER, Major-General, R.E.,
21st August 1875. *Chief Engineer, P.W.D.*

No. 329-A. From the Chief Engineer for Irrigation, dated 2nd September 1875,
No. 1,002.

No. 330.

ORDER THEREON, 21st October 1875, No. 2,981.

IRRIGATION, No. 30.

On careful consideration of the wording of the Resolution of the Madras Municipality recorded with G. O.,

No. 1,622, of 17th May 1869, that of the letter to the Government of India, No. 1,623, of same date, communicating it, and that of the Government of India Resolution recorded with G. O., No. 2,327, of 17th July 1869, accepting its terms, His Excellency the Governor in Council cannot but hold the Municipality of Madras liable only for

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payment of so much water as they may draw off from the Red Hills Tank at the rate of Rupee 1 per 1,000 cubic yards.

2. It is rightly enough stated by the Chief Engineer of the Public Works Department in paragraph 5 of his Memorandum recorded with G. O., No. 1,287, of 5th May 1875, that "the Madras Municipality knew much better than the Government the value of the concession made to them." And the Government of India appear to have become alive to the same fact, from their letters recorded with G. O., Nos. 65 and 1,014, of 10th January and 18th April 1872. But there is no doubt that the supply of 40 millions of cubic yards to the Town of Madras contemplated in Mr. Fraser's original scheme was not to have been charged for, neither was the reduced supply of 32 millions to have been paid for. See the Report of the Water Supply Committee of 1868, *passim*. It was only on the raising of the level of delivery of water by 6 feet from the Red Hill Tank by which 15½ millions of cubic yards of storage were lost that the question of payment for water actually delivered arose. See G. O., No. 3,409, of 30th October 1868, and minutes reviewing the Committee's Report. Hence the cost of storing the 20½ millions cubic yards below the sill of the lowest delivery sluice must be considered as so much capital sunk by Government to secure a revenue from water supplied at the low rate of Rupee 1 per 1,000 cubic yards. It is to be regretted that the amount of water supplied should have been greatly over-rated at 32 millions cubic yards; but that error is attributable to the imperfection of the Census Returns, for which the Municipality is not responsible. Moreover, the calculation in paragraph 19 of Appendix A. to the Committee's Report reducing the quantity to be supplied to Madras from 40 to 32 millions appears to have been purely arbitrary; the reduced supply might more properly have been assumed at 25 millions, and for that quantity the Madras Municipality must be held to have a prior claim. Doubtless when Mr. Clark's Drainage Scheme shall have been carried out, and the Water-supply System more fully developed by him, it will be approximated to.

3. The Chief Engineer for Irrigation will at all events regulate the quantity to be taken off for Irrigation with reference to an ultimate town demand of that amount. It is remarked that the fixing of this available reserve for Municipal wants involves (according to the figures of paragraph 6 of the Memorandum of the Chief Engineer for Irrigation of 31st August) a maintenance of the level of the Red Hill Tank to a minimum of 6 feet above the sill of the lowest sluice. Every endeavor should therefore be made to keep up this supply, and the Chief Engineer for Irrigation will see that it is attended to.

(True Extract.)

(Signed) G. W. WALKER, Major-General, R.E.,
Secretary to Government.

To the Financial Department.

" Controller of Public Works Accounts.

" Chief Engineer for Irrigation.

Clarendon

Exd. W. J. Lewis.

Spare Copies

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Nos. 41 & 42. Read the following endorsement of the Acting Secretary to Government, Revenue Department, dated 8th October 1874 :—

Proceedings of the Board of Revenue, dated 29th September 1874, No. 2,805.
Read the following letter from R. W. BARLOW, Esq., Collector of the Chingleput District, to J. GROSE, Esq., Secretary to the Board of Revenue, dated Sydapet, 26th August 1874, No. 451 :—

I HAVE the honor to forward the statement of irrigation under the Cholaveram and Red Hills Tanks for a series of years, as directed in G.O., No. 1,313, of the 27th November, and Board's Miscellaneous Proceedings of the 4th December last, No. 8,303. I regret, however, to state that I am unable to give the necessary statistics for the Cholaveram Tank for a longer period than the last seventeen years, as, from the report of the Tahsildar of Ponnery, it seems that accounts for the previous three years are not forthcoming. As regards irrigation under the Red Hills Tank, I have given the statistics for twenty years for all villages under it but one, *viz.*, Cosa-poor, and the Tahsildar reports that the accounts of this village, for Faslis 1270, 1271, 1272, and 1273 inclusive, are not forthcoming, though a careful search has been made for the same.

2. Adverting to the concluding part of paragraph 3 of the Chief Engineer's letter, printed in the Proceedings of Government quoted above, wherein he remarks "that the causes which have led to a decrease of cultivation, and particularly to the

	Actual cultivation.	Assessment including Fasli jasi and Tervajasi.	Net Revenue after deducting remissions.	
	ACRES.	RS.	RS.	
1280 ...	3,329	14,107	13,299	grant of considerable remissions in Fasli 1281, should be inquired into," I may observe that there has been an increase in the actual cultivation of late years, and also in the net revenue, though there was a slight falling off in Fasli 1281, but this increase is nothing like
1281 ...	4,070	14,069	12,005	
1282 ...	4,494	15,108	14,915	

what was expected for the reasons stated further on.

3. The remissions granted in Fasli 1281 are due chiefly to a great deal of nunjah cultivation having been destroyed by floods, owing to the enormous quantity of water that was let out in that fasli to prevent the tank bursting.

4. It is to be remarked that the irrigation under the Red Hills and Cholaveram Tanks has not as yet been extended by cutting channels newly to any of those villages which were expected to be benefited by the project; but it is a question for calculation and consideration how far, if this was done, the supply of water would suffice for Madras, and for the extended cultivation.

5. As regards the apparent decrease of cultivation, noticed by the Chief Engineer in Faslis 1280, 1281, and 1282, as compared with Fasli 1276, I beg to remark that the figures of the former do not include (1) cultivation of nunjah minor inams in ryotwary villages; (2) the area irrigated in Zemindary and Shrotriern villages; (3) the area on which second-crop cultivation was raised in those faslis; whereas the figures of Fasli 1276, as given in Mr. Blair's report alluded to, includes the area of all these items, and further an amount was added, calculated at sixteen per cent. on the holding, as the approximate increased area likely to result from the new more accurate survey, and all these swelled the total to acres 5,559.

6. I may also add that the object of the figures given in Mr. Blair's report was to determine, as nearly as possible, the quantity of water required for irrigating the

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lands already entitled to it, and to see what supply would be available for Madras, after meeting the demand for irrigation, while that aimed in the statement furnished by this office to the District Engineer in August last, on which the Chief Engineer's remarks as to decreased holding are based, was simply intended to show the net revenue of Fasli 1282, as compared with the two previous ones.

7. The statements now sent even do not include the extent of cultivation in Moottahs and Shrotriom villages, because it is not possible to separate the revenue due to irrigation in these cases from other sources; the peishush or the quit-rent collected being a lump sum fixed with reference to the average collections of a series of years on the entire villages.

SUBMITTED to Government with reference to G.O., dated 27th November 1873, No. 1,313.

2. The Collector shows that the figures contained in Mr. Blair's report included the cultivation on wet minor inams; the area irrigated in Shrotriom and Zemindary villages, and the breadth under second-crop cultivation. But these items formed no part of the Collector's statement, and hence the difference remarked upon.

3. The heavy remissions in Fasli 1281 appear to have been owing to the damage done when allowing an enormous escape to prevent the bank breaching.

4. The Board would direct attention to the Collector's remark regarding nothing having been done towards extending the channels for new irrigation, now that the capacities of the reservoirs have been increased. If there is surplus water at any time it might be diverted into some of the many tanks lying below the Red Hills Tank.

5. It is observed from the report of the Director of Revenue Settlement now before the Board, that he has raised the grouping of the villages under these tanks owing to the certainty of the supply, and placed the assessment thus derived to the credit of the project.

(A true Copy and Extract.)

(Signed) J. GROSE,
Secretary.

TRANSFERRED to the Public Works Department.

(Signed) C. G. MASTER,
Acting Secretary to Government.

No. 42-A. Read the following Proceedings of the Madras Government in the Revenue Department, dated 25th August 1875, No. 1,276.

Proceedings of the Board of Revenue, dated 23rd July 1875, No. 2,058.

Read the following Proceedings of the Madras Government, dated 9th June 1875, No. 1,221, Revenue Department.

Read the following Proceedings of the Madras Government, dated 2nd June 1875, No. 1,548, Public Works Department.

ABSTRACT.—*Madras Water Works Project.*—Passing orders on the Memorandum of the Chief Engineer for Irrigation affording some information as to points noticed by the Government of India relative to the —

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ORDER THEREON, 9th June 1875, No. 1,221.

FORWARDED to the Board of Revenue with the request that they will be good enough to report at an early date on the points referred to in paragraphs 4 and 10 of the foregoing Order.

(True Extract.)
(Signed) LORNE A. CAMPBELL,
Under Secretary to Govt.

With reference to paragraph 4 of Government Order, Public Works Department, printed with the Order above read, the Board observe that the discrepancies therein referred to were explained in, and a statement of revenue forwarded with, the Board's Proceedings, dated 29th September 1874, No. 2,805. The Board, however, observe that the statement is slightly defective, since it does not show the assessment of dry lands, and the quit-rent of Inams, irrigated, both of which under the Order of Government, dated 25th July 1872, No. 1,766, Public Works Department, have to be treated as revenue due to irrigation. The Collector will, therefore, be separately requested to submit the statement in the Board's Proceedings, dated 21st Sept. 1874, No. 2,711.

form required by Government in their Order, dated 23rd March 1874, Public Works Department, No. 791.

2. The Collector's attention will be drawn to paragraphs 7 and 8 of the Government Order, Public Works Department, printed with the Order above read.

3. With reference to paragraph 10 of the Order just referred to, the Acting Director of Revenue Settlement in his report, about to be separately submitted to Government, on the resettlement of a tract in the Sydapet Taluq, which includes fifty villages under the influence of the Red Hill Tank, has furnished information which enables the Board to answer the questions now put. An extract from this report, which contains also suggestions as to the best method of utilizing the supply, is herewith submitted.

4. The area of waste in these villages is not large, and the land is of a very poor description. The tract is a poor one on the whole, and the people are not well off. Mr. Puckle doubts whether the land would fetch much at auction. It would have to be sold, under the terms of the settlement now made, subject to a swatantram, payable to mirassidars, of two Annas in the Rupee of assessment. The revised assessment has not yet come into operation; the lands are specially poor, and the people are as yet unacquainted with the benefits of good irrigation. Under these circumstances there would probably be a reluctance to buy, and the Board are, therefore, of opinion that the sale of the waste is not expedient.

5. The Board see no reason whatever for revising the Inam settlements in this tract by the imposition of additional charge for water supplied to wet lands, which they suppose is the intention of the Government Order. They have recently placed their views on this point and the grounds of them before Government in connection with the Sangam project, and there is nothing in the present case to render different treatment of the Inams possible.

6. From Mr. Puckle's report it will be seen that the wet lands in Government villages could bear, if furnished directly or indirectly, by means of Red Hill Tank water, with a regular and sufficient supply, an addition of Rupees 2 per acre to their present revised wet assessment, and that the dry lands could pay a water-rate of

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Rupees 4 in addition to the dry assessment. The wet average being now almost exactly 3 Rupees and the dry about 1 Rupee, this arrangement would bring all the lands under the influence of the project to a rate of Rupees 5 per acre on the average, and this, in Mr. Puckle's opinion, will be a moderate and fair rate of assessment.

7. Mr. Puckle, it will be seen, suggests certain methods for extending the supply and making it go as far as possible; and, if his estimate of the quantity of water available is correct, a return of Rupees 61,266 might be obtained from the fifty Government villages under the Red Hill Tank alone. It is for the professional department to say how much water can be made available and whether it can be utilized as suggested by the Director of Revenue Settlement.

(True Extracts.)

(Signed) H. E. STOKES,
Acting Secretary.

*Extract from a letter from the Acting Director of Revenue Settlement, to the Acting Secretary to the Board of Revenue, dated 9th June 1875, No. 1,099 A.
31 A.*

PARAGRAPH 18.—*Red Hill Tank.*—This tank commands fifty of the villages reported on with an aggregate area of 35,608 acres. Of this, 3,585 acres are now irrigated from the tank direct, and 10,833 acres from petty rain-fed tanks; these latter are nearly all out of repair, and probably have been purposely left so, as the District Engineer informs me that when the system of irrigation from the Red Hill Tank is complete, these minor tanks will no longer be needed but may be levelled in and cultivated. If this is done, the tank beds will add 2,935 acres to the

* Including Government and inam cultivated and was. land.

irrigable area; the manawari* will give 3,670 acres and ordinary dry lands 6,021 acres, total 12,626 acres, supposing the whole to be cultivated.

19. Now, the Red Hill Tank contains 48,000,000 cubic yards of water, of which Madras takes 5,000,000, there are thus at least 40,000,000 cubic yards available for irrigation, and if each acre requires 6,000 cubic yards of water there is store sufficient to irrigate 6,600 acres without replenishing, but the tank is supplied by a river channel which has a continual flow; deducting therefore the area already irrigated 3,585 acres, there is probably water enough for 10,000 acres of dry land, and if the small tanks are repaired and deepened and their water-spread contracted, enough may be stored in these tanks from falling rain and the drainage of higher levels to fully irrigate the area that they now poorly supply.

20. The want of drainage and protection from the inundation of the Courtaliyar river is very much felt in these villages, and a thorough system of drainage to get rid of the salt and soda that has now no escape from the soil should, I think, be the precursor of an improved system of irrigation, as much that is deleterious may be washed away with the aid of falling rain if there is but an open channel. But as matters stand at present there is no drainage whatever, the calingulah channel from the Red Hill Tank is bunded across in places to turn water to the fields, and the surplus of the nunjai is allowed to soak into the manawari lands instead of being carried away by a clear cut channel. The consequence is that some lands deteriorate yearly, and all are more or less injured by the want of a proper out-fall.

21. The advantage of repairing the minor tanks and restricting their capacity to their deep water bed is the more apparent from the fact that the shallow waterspread of many of those tanks is already cultivated, and only the deep bed is available for the extension of cultivation; if these deep beds are defined and the cultivation above them embanked, a high level channel from the Red Hill Tank might not only irrigate the cultivation hitherto periodically submerged, but might furnish the rain-fed tanks with a regular supply for the better cultivation of the lands below them.

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22. If the Red Hill Tank water is brought to these lands, the assessment of the existing nunjai may be raised by at least half a water-rate, or by Rupees 2 an acre. This will give Rupees 21,666 on the 10,833 acres now cultivated, and if to this be added Rupees 40,000, at a full water-rate of Rupees 4 an acre, on the 10,000 acres of dry land to be irrigated, the total results will be Rupees 61,666 for one crop plus Rupees 11,772, the present single crop assessment of the 3,585 acres now irrigated by the Red Hill Tank.

(True Extract.)

(Signed) H. E. STOKES,
Acting Secretary.

COMMUNICATED to the Public Works Department, with reference to G.O. in that Department, dated 2nd June 1875, No. 1,548, for early attention and full report.

(True Extract.)

(Signed) A. MACGREGOR,
Acting Secretary to Government.

No. 1,439.

No. 42-B.

Note by the Chief Engineer for Irrigation.

THE Board of Revenue in the first paragraph of their Proceedings No. 2,058, of the 23rd July 1875, point out that, in their Proceedings of the 29th September 1874, No. 2,805, the discrepancies pointed out in Proceedings, Madras Government, No. 1,313, of the 27th November 1873, were explained. This was overlooked when the order of the 2nd June 1875, No. 1,548, was passed, and the undersigned regrets that very great carelessness in his office led to the Government being misinformed. The revised statements for the Madras Water Works, directed by the Board to be prepared, have not yet been received, but as a settlement has recently been made of the quantity of water to be reserved in the Red Hills Tank in connection with the supply of the town of Madras, information can be given as to the quantity likely to be available for irrigation.

2. In paragraph 19 of the extract from the report of the Acting Director of Revenue Settlement there are some material misapprehensions. He mentions that the Red Hills Tank contains 48 millions of cubic yards, that Madras takes 5 millions of cubic yards, and that the supply-channel has a continual flow. The facts are as follow:—

	Millions of Cubic Yards.
The Cholaveram tank holds	28.47
" Red Hills do. do.	101.98
Total	130.45

In the Government Order quoted above the Government have directed that water is to be retained in the Red Hills Tank at 6 feet above the sill* of the lowest sluice of the Municipal off-take, and the quantity of water below this level† is 45.32, so that the water available for irrigation, if the tanks be only once filled annually, would be 85.13. Generally a great deal of additional water will be received, but this year it is possible or probable that the tanks will not be once filled, the Red Hills Tank being now more than 5 feet below the full level.

3. The storage of water in a tank required for the irrigation of an acre of land is in many cases more than the 6,000 cubic yards mentioned by the Acting Director,

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owing to the large quantity wasted by evaporation; but in these tanks of great area and considerable depth, in the larger of which, moreover, under the arrangements directed in connection with the supply of Madras, a considerable depth of water will always be maintained, evaporation will be less, while it will be probably more than compensated for by the additional surplus received from the river. Ere this, detailed information as to the supplies received in the last few years, and as to the extent and details of expenditure of water, should have been forthcoming; but the Superintending Engineer has not yet sent in his report for any year. Pending the receipt of the more definite information required, and looking to the low level of the land irrigated and to be irrigated, it may, it is thought, be assumed that the quantity* of water

* $130.45 - 45.32 = 85.13$.

available for irrigation in the reservoirs of the Madras Water Works up to F.T.L., may be divided by 4,500 to obtain the irrigable acreage, which will thus be 18,900 acres.

4. The Acting Director of Revenue Settlement, in the extract from his report transmitted by the Board, refers to the area already irrigated and to the land capable of irrigation under the Red Hills Tank only, and the Cholaveram tank is not referred to; but it would seem from the following figures that his area of 3,585 acres is under both tanks. From the statements transmitted with the Board's Proceedings, No. 2,805, of the 29th September 1874, it appears that, subject to the corrections yet to be made, the cultivation and revenue for years prior to the enlargement of the tanks were as follow:—

	AVERAGE CULTIVATION.		INAM FASULJASTI, &c.		Total Revenue.	Remarks.
	Extent.	Revenue.	Extent.	Revenue.		
Faslis 1266 to 1279 ...	1,458	4,994	1	1	4,995	Cholaveram Tank.
Do. 1263 to 1279 ...	1,824	7,487	1	3	7,490	Red Hills do.
	3,282	12,481	1½	4	12,485	
Similarly, the average for the subsequent faslis are,						
Faslis 1280 to 1282 ...	1,730	4,945	...	1	4,946	Cholaveram Tank.
Do. do. ...	2,451	9,119	23	70	9,189	Red Hills do.
	4,181	14,064	23	71	14,135	

It appears, therefore, that only nine villages are irrigated under the Cholaveram and ten under the Red Hills Tank, and, as the Acting Director states that there are fifty villages altogether—thirty-one remain to be supplied. A list of these thirty-one, with the area irrigated and irrigable in each, will be useful to the Superintending Engineer, Chingleput, in determining the details of the distribution arrangements required. The available area of land for irrigation, taking the Director's figures, will apparently be—

	ACRES.
The old irrigation ...	3,585
Do. under petty tanks to be superseded ...	10,833
Do. tank beds ...	2,935
Do. manawari or waste ...	3,670
Do. dry lands to be converted ...	6,021

Total ... 27,044

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but of this, unless the water-supply prove better than has been supposed, only 18,900 acres can be irrigated, and, judging from the particulars of returns from the several descriptions of land given by the Director, it would appear that the most profitable application of water to the 15,315 acres, which can be supplied in addition to the old area, will be to arrange, at least in the first instance, for the irrigation of the—

	ACRES.
Waste lands ...	3,670
Dry lands to be converted ...	6,021
and to make up the difference by bringing about 5,624 acres of the irrigation under minor tanks under the influence of the better supply. The revenue will then be—	
9,691 acres at 4 Rupees ...	Rs. 38,764
5,624 do. 2 „ ...	11,248
	Rs. 50,012

5. The additional quantity of water stored in the reservoirs by the outlay on the Madras Water Works project is the—

	Acres.	Millions of Cubic Yards.
Present capacity of the tanks ...	130.45	
Less the former do. ...	*23.84	
	Total ... 23.84	

In both cases the zero of Mr. Fraser's contours has been taken as ordinary F.T.L. instead of the occasional or possible F.T.L., which would make the former capacity 45.01.

Additional storage... 106.61 and it may perhaps be assumed that by extra supplies at intervals the total receipts annually of water will amount to one-fifth more or $130.45 + 26.09 = 156.54$, and the additional water provided will then be in round numbers 132.70 millions. As above stated, the water reserved for municipal purposes is to be 45.32, and the additional supply for irrigation will be 87.38.

6. The Government of India have intimated that a part of the capital outlay on the project should be borne by Provincial Letter No. 854 I, dated 9th December 1873. Funds, and a sum of two lakhs of Rupees was suggested as the share of the latter, but at that time apparently neither the cost of the project nor the proportion of water to be appropriated for new irrigation and town purposes respectively was known. The cost of the project has not yet been determined, but the proportionate shares can be fixed from the information above given, and should, it is thought, be—

The Municipal or the Provincial Fund share, ... $\frac{45.32}{132.70}$ say $\frac{45}{132} = \frac{15}{44}$

The irrigation share... ... $\frac{87.38}{132.70}$ say $\frac{87}{132} = \frac{29}{44}$

Further, the sum to be thus divided will be the total cost of the project less the outlay on distribution and excluding the contribution for the town delivery channel, and to the ratable share chargeable to Provincial Funds the amount of the contribution will have to be added, while the irrigation share will be enhanced by all distribution outlay for conveying water to the fields.

7. The Acting Director's report refers to the want of improved drainage for the lands of the villages commanded by the reservoirs. There can be no doubt of the great improvement which good drainage would secure, and the necessary investigations should be made. Probably the levels taken for distribution purposes will enable

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the wants of this tract of country as regards drainage to be readily determined and estimated for.

8. In the argument enunciated in paragraph 21 of the Director's Report the undersigned is unable to concur. To take water, other than surplus, from the reservoirs and store it in petty tanks would be the reverse of economical; there would inevitably be additional waste. The natural out-fall of the drainage of fields situated in the beds of these petty tanks is into the deeper parts of those beds, and were the fields bunded to enable water in the deep beds to be stored above the fields' level there would be a complete barrier to drainage; if not so stored embanking will be unnecessary. Some water will remain in the hollow parallel to the bunds of the minor tanks, even if the beds be generally reclaimed; but this should be used, or can conveniently be used, only for the irrigation of lands lying on a lower level and below the bunds. Some of the tanks will be capable of abandonment altogether; others probably will have to be retained, and some little judgment will be needed to make the best selection for either purpose.

FORT ST. GEORGE,
7th December 1875.

(Signed) JOHN MULLINS, Lieut.-Col., R.E.,
Chief Engineer for Irrigation.

*A.
Abstract Statement of the Area of Cultivation and Revenue of each Fasli from 1266 to 1282 for all the Villages together under the Cholavaram Tank.*

Villages.	Fasli.	NUNJAH AYACUT.		CULTIVATION.		INAM FASULJASTY AND TEERVAJASTY.		Total of Columns 6 and 8.
		Extent.	Assess-ment.	Extent.	Revenue.	Extent.	Assess-ment.	
1	2	3	4	5	6	7	8	9
No. 6, Sembilivaram.	1266	...	RS. A. P.	1,325 48	4,858 14 6	0 48	0 12 10	4,859 11 4
	1267	...	...	1,230 56	4,347 5 1	...	...	4,347 5 1
	1268	...	...	1,383 84	5,026 4 11	...	...	5,026 4 11
	1269	...	...	1,503 09	5,592 8 3	...	...	5,592 8 3
	1270	...	...	1,444 23	5,205 10 1	0 76	0 8 2	5,206 2 8
	1271	...	...	1,663 26	5,999 1 2	...	...	5,999 1 2
	1272	...	...	1,759 51	6,013 9 7	...	...	6,013 9 7
	1273	...	...	1,763 16	6,079 8 7	...	...	6,079 8 7
	1274	...	...	1,681 67	5,756 9 3	...	...	5,756 9 3
	1275	...	...	1,803 63	6,163 11 3	1 86	4 8 9	6,169 4 0
	1276	...	...	1,292 54	4,545 4 9	3 32	8 7 7	4,553 12 4
	1277	...	...	1,071 36	3,501 0 6	...	...	3,501 0 6
	1278	...	...	1,180 29	4,298 8 3	0 67	1 1 0	4,299 9 3
No. 8, Amkadoo.	1279	...	...	1,321 15	4,662 0 7	...	...	4,662 0 7
	Total ...	...	...	20,419 68	69,910 0 9	7 09	15 6 4	69,925 7 1
	Average...	...	...	1,453 53	4,993 9 2	0 50	1 1 7	4,994 10 9
No. 9, Kammannoor.	1280	...	...	1,361 68	4,529 1 6	1 17	2 18 6	4,531 12 0
	1281	1,474 66	4,674 0 6	1,756 92	4,778 4 9	...	...	4,778 4 9
	1282	...	...	2,071 97	5,528 3 5	...	...	5,528 3 5
No. 10, Seroonayam.	Total ...	...	...	5,190 57	14,835 9 7	1 17	2 10 6	14,838 4 1
	Average...	...	...	1,730 19	4,945 3 2	0 39	0 14 2	4,946 1 4

FORT ST. GEORGE,
December 1875.

(Signed) JOHN MULLINS, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

*Proceedings of the Madras Government, Public Works Department,
5th January 1876.*

*B.
Abstract Statement of the Area of Cultivation and Revenue of each Fasli from 1263 to 1279 for all the Villages together under the Red Hills Tank.*

Villages.	Fasli.	NUNJAH AYACUT.		CULTIVATION.		INAM FASULJASTY AND TEERVAJASTY.		Total of Columns 6 and 8.
		Extent.	Assess-ment.	Extent.	Revenue.	Extent.	Assess-ment.	
1	2	3	4	5	6	7	8	9
No. 23, Kosapoor.	1263	...	RS.	1,541 0	6,936 0 0	...	...	6,936 0 0
	1264	...	...	1,320 0	6,059 0 0	...	...	6,059 0 0
	1265	...	...	1,396 0	5,452 0 0	1 0	3 0 0	5,455 0 0
	1266	...	...	1,628 0	6,303 0 0	...	...	6,303 0 0
	1267	...	...	1,759 0	7,530 0 0	...	...	7,530 0 0
	1268	...	...	1,856 0	7,831 0 0	1 0	1 0 0	7,832 0 0
	1269	...	...	1,953 0	8,457 0 0	1 0	1 0 0	8,458 0 0
	1270	...	...	1,798 0	7,864 0 0	...	...	7,864 0 0
	1271	...	...	1,701 0	7,250 0 0	...	...	7,250 0 0
	1272	...	...	1,706 0	7,836 0 0	3 0	7 0 0	7,843 0 0
	1273	...	...	1,933 0	8,356 0 0	1 0	3 0 0	8,359 0 0
	1274	...	...	1,963 0	8,825 0 0	...	...	8,825 0 0
	1275	...	...	2,211 0	8,839 0 0	...	...	8,839 0 0
No. 20, Sathimadoo.	1276	...	...	2,133 0	9,080 0 0	4 0	10 0 0	9,084 0 0
	1277	...	...	2,009 0	6,923 0 0	3 0	5 0 0	6,933 0 0
	1278	...	...	1,821 0	4,665 0 0	2 0	10 0 0	4,675 0 0
No. 18, Alingivakam.	1279	...	...	2,182 0	9,036 0 0	1 0	7 0 0	9,043 0 0
	Total ...	...	...	31,006 0	1,27,286 0 0	17 0	47 0 0	1,27,333 0 0
	Average...	...	...	1,823 83	7,487 6 7	1 0	2 12 3	7,490 2 10
No. 16, Thandlakalini.	1280	...	...	2,109 0	9,170 0 0	...	...	9,170 0 0
	1281	2,948 0	10,260	2,607 0	8,088 0 0	19 0	55 0 0	8,143 0 0
	1282	...	...	2,667 0	10,098 0 0	49 0	76 0 0	10,174 0 0
No. 15, Vadakarai.	Total ...	...	...	7,353 0	27,356 0 0	68 0	210 0 0	27,566 0 0
	Average...	...	...	2,451 0	9,119 0 0	23 0	70 0 0	9,189 0 0

(Signed) JOHN MULLINS, Lt.-Col., R.E.,
FORT ST. GEORGE,
December 1875.
Chief Engineer for Irrigation.

*C.
Statement showing the Average Area of Cultivation and Revenue for each Village under the Cholavaram Tank, from Fasli 1266 to 1279, and the subsequent years (1280 to 1282) individually.*

Villages.	Fasli.	NUNJAH AYACUT.		CULTIVATION.		INAM FASULJASTY AND TEERVAJASTY.		Total of Columns 6 and 8.
		Extent.	Assess-ment.	Extent.	Revenue.	Extent.	Assess-ment.	
1	2	3	4	5	6	7	8	9
No. 6, Sembilivaram.	1266 to 1279	...	...	115 85	612 14 7	0 23	0 7 7	613 6 3
	1280	...	...	121 60	647 15 5	...	...	647 15 5
	1281	165 98	658 2 2	127 40	619 7 11	...	...	618 7 11
	1282	...	...	127 27	676 7 11	...	...	676 7 11
No. 8, Amkadoo.	1266 to 1279	...	...	185 77	634 13 8	...	...	634 13 8
	1280	...	...	174 13	609 4 11	...	...	609 4 11
	1281	202 88	636 14 2	31 43	778 5 2	...	...	778 5 2
	1282	...	...	310 34	848 15 5	...	...	848 15 5
No. 9, Kammannoor.	1266 to 1279	...	...	162 45	303 14 5	...	...	303 14 5
	1280	...	...	63 70	217 15 11	...	...	217 15 11
	1281	76 31	217 15 11	76 31	217 15 11	...	...	217 15 11
	1282	...	...	163 60	297 3 5	...	...	297 3 5

Proceedings of the Madras Government, Public Works Department,
5th January 1876.

Statement showing the Average Area of Cultivation and Revenue for each Village, &c.—(Concluded.)

Villages.	Fasli.	NUNJAH AYACUT.		CULTIVATION.		INAM FASULJASTY AND TEERVAJASTY.		Total of Columns 6 and 8.
		Extent.	Assess-ment.	Extent.	Revenue.	Extent.	Assess-ment.	
1	2	3	4	5	6	7	8	9
			RS. A. P.		RS. A. P.		RS. A. P.	RS. A. P.
No. 10, Seroona-yam.	1266 to 1279	...	...	134 72	585 5 0	...	...	585 5 0
	1280	...	...	165 24	660 0 9	...	...	660 0 9
	1281	205 57	707 15 9	216 68	730 2 3	...	...	730 2 3
	1282	...	...	217 24	778 9 7	...	...	778 9 7
,, 13, Cholave-ram.	1266 to 1879	...	...	584 68	1,814 7 11	0 19	0 8 5	1,815 0 4
	1280	...	...	543 24	1,703 12 9	...	...	1,703 12 9
	1281	545 80	1,648 7 5	612 64	1,719 13 3	...	...	1,719 13 3
	1282	...	...	757 80	2,073 0 11	...	...	2,073 0 11
,, 64, Karanoodai	1266 to 1279	...	...	89 77	168 11 7	0 03	0 0 11	168 12 6
	1280	...	...	35 67	176 10 4	1 17	2 10 6	179 4 10
	1281	36 85	149 8 7	38 62	175 0 7	...	...	175 0 7
	1282	...	...	43 90	214 2 9	...	...	214 2 9
,, 72, Vijianul-loor.	1266 to 1279	...	...	72 58	147 3 7	...	...	147 3 7
	1280	...	...	24 12	29 5 1	...	...	29 5 1
	1281	31 80	58 6 2	31 50	45 8 7	...	...	45 8 7
	1282	...	...	31 24	61 6 4	...	...	61 6 4
,, 105, Sathoopo-rumbeda.	1266 to 1279	...	...	119 78	468 5 1	0 05	0 0 7	468 5 8
	1280	...	...	118 54	126 11 3	...	...	126 11 3
	1281	8 59	46 1 8	133 63	152 0 4	...	...	152 0 4
	1282	...	...	198 73	223 2 7	...	...	223 2 7
,, 153, Nulloor...	1266 to 1279	...	...	162 90	259 13 1	...	...	259 13 1
	1280	...	...	135 44	357 5 1	...	...	357 5 1
	1281	200 90	500 8 8	148 73	340 14 8	...	...	340 14 8
	1282	...	...	152 85	855 2 6	...	...	855 2 6

FORT ST. GEORGE.

(Signed) JOHN MULLINS, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

D.

Abstract Statement showing the Average Area of Cultivation and Revenue for each Village under the Red Hills Tank from Fasli 1263 to 1279, and the subsequent years (1280 to 1282) individually.

Villages.	Fasli.	NUNJAH AYACUT.		CULTIVATION.		INAM FASULJASTY AND TEERVAJASTY.		Total of Columns 6 and 8.
		Extent.	Assess-ment.	Extent.	Revenue.	Extent.	Assess-ment.	
1	2	3	4	5	6	7	8	9
			RS. A. P.		RS. A. P.		RS. A. P.	RS. A. P.
No. 22, Kosapoor.	1263 to 1279	...	...	91 23	331 13 2	0 47	0 10 4	332 7 6
	1280	...	...	135 0	496 0 0	...	...	496 0 0
	1281	239	712 0 0	190 0	503 0 0	...	...	503 0 0
	1282	...	...	191 0	521 0 0	2 0	4 0 0	525 0 0
,, 20, Sathimu-door.	1263 to 1279	...	...	36 0	128 4 8	...	...	128 4 8
	1280	...	...	49 0	151 0 0	...	...	151 0 0
	1281	127 0	362 0 0	58 0	178 0 0	...	...	178 0 0
	1282	...	...	59 0	168 0 0	...	...	168 0 0
,, 18, Alingiva-kum.	1263 to 1279	...	...	64 53	505 0 0	...	...	505 0 0
	1280	...	...	64 0	574 0 0	...	...	574 0 0
	1281	71 0	414 0 0	66 0	571 0 0	...	...	571 0 0
	1282	...	...	66 0	574 0 0	...	...	574 0 0
,, 16, Thundlaka-lini.	1263 to 1279	...	...	141 30	454 11 3	...	...	454 11 3
	1280	...	...	134 0	549 0 0	...	...	549 0 0
	1281	155 0	431 0 0	156 0	604 0 0	...	...	604 0 0
	1282	...	...	151 0	573 0 0	6 0	15 0 0	588 0 0

Proceedings of the Madras Government, Public Works Department,
5th January 1876.

Abstract Statement showing the Average Area of Cultivation and Revenue, &c.—(Concl'd.)

Villages.	Fasli.	NUNJAH AYACUT.		CULTIVATION.		INAM FASULJASTY AND TEERVAJASTY.		Total of Columns 6 and 8.
		Extent.	Assess-ment.	Extent.	Revenue.	Extent.	Assess-ment.	
1	2	3	4	5	6	7	8	9
			RS. A. P.		RS. A. P.		RS. A. P.	RS. A. P.
No. 15, Vadaka-rai.	1263 to 1279	...	...	36 06	143 15 0	0 12	0 4 8	144 3 8
	1280	...	...	41 0	165 0 0	...	...	165 0 0
	1281	43 0	133 0 0	50 0	186 0 0	9 0	26 0 0	212 0 0
	1282	...	...	49 0	179 0 0	3 0	7 0 0	186 0 0
,, 21, Vadapoo-rambakum.	1263 to 1279	...	...	156 41	590 0 0	...	...	590 0 0
	1280	...	...	220 0	723 0 0	...	...	723 0 0
	1281	359 0	1,116 0 0	324 0	1,034 0 0	...	...	1,034 0 0
	1282	...	...	623 12	2,375 13 2	...	...	2,375 13 2
,, 38, Polul	1263 to 1279	...	...	623 0	2,952 0 0	...	...	2,952 0 0
	1280	...	...	653 0	2,049 0 0	10 0	29 0 0	2,078 0 0
	1281	668 0	2,734 0 0	658 0	3,031 0 0	38 0	50 0 0	3,081 0 0
	1282	...	...	347 53	1,248 8 5	...	...	1,248 8 5
,, 13, Line	1263 to 1279	...	...	319 0	1,236 0 0	...	...	1,236 0 0
	1280	...	...	899 0	1,007 0 0	...	...	1,007 0 0
	1281	430 0	1,221 0 0	409 0	1,344 0 0	...	...	1,344 0 0
	1282	...	...	32 12	150 5 8	...	...	150 5 8
,, 19, Poyasum-kum.	1263 to 1279	...	...	45 0	213 0 0	...	...	213 0 0
	1280	...	...	113 0	313 0 0	...	...	313 0 0
	1281	145 0	569 0 0	114 0	447 0 0	...	...	447 0 0
	1282	...	...	356 59	1,558 15 0	0 41	1 1 10	1,560 0 10
,, 9, Velangadoo-vakum.	1263 to 1279	...	...	480 0	2,111 0 0	...	...	2,111 0 0
	1280	...	...	608 0	2,014 0 0	...	...	2,014 0 0
	1281	711 0	2,518 0 0	616 0	2,227 0 0	...	...	2,227 0 0
	1282	...	...	...	...	...	...	...

(Signed) JOHN MULLINS, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

No. 43. ORDER THEREON, 5th January 1876, No. 21.

IRRIGATION, No. 5-A.

THESE papers contain in an approximate form part of the information required in connection with the Madras Water Works Project.

1st.—There is the water-supply available, and this supply, though necessarily liable to variation, has been supposed by the Chief Engineer for Irrigation to be equivalent to one-fifth more than the capacity of the two reservoirs in which it is stored. The figures are as follow, and they will be liable to correction when the actual receipts and expenditure of water as deduced from the registers of recent years, including the present year, have been worked out:—

	Millions of C. yds.
Available for irrigation	111.234
Do. for additional irrigation	87.33
Reserved for town of Madras	45.32

2ndly.—The land capable of being irrigated, and this is shown to be—

	ACRES.
That already or formerly irrigated under the reservoir	3,585
Other lands	23,459
Total	27,044

Of this, for the reasons stated in the foregoing note, somewhat more than two-thirds will, it is anticipated, be actually irrigated ultimately, and the additional area, after deducting the old irrigation, will be about 15,315 acres.

*Proceedings of the Madras Government, Public Works Department,
5th January 1876.*

3rdly.—The probable returns from irrigation will be, selecting out of the gross area which can be irrigated, those lands which will give the largest income,

9,691 Acres at 4 Rupees	...	...	...	...	...	...	Rs. 38,764
5,624 Do. „ 2 „	...	...	...	...	...	...	11,248
Total							50,012

or, say, in round numbers, half a lakh of Rupees gross revenue will be the return on the outlay.

The average cost of maintenance of the tanks prior to Fasli 1279 (1869-70), and the cost of upkeep subsequently, with the probable average from 1870-71, have yet to be determined and stated.

The gross revenue up to 1869-70 inclusive averaged, subject to correction, Rupees 12,485.

4thly.—A material portion of the storage provided by the outlay on the project having been reserved for the benefit of the town of Madras, this outlay has to be divided between Provincial and Agricultural in proportion to the quantity of water made available for municipal purposes and irrigation respectively, and it has been shown that out of 132.70 millions of cubic yards additional supply provided altogether by the project, the shares will be—

Municipal	...	...	...	...	...	45.32 millions.
Irrigation	...	...	...	...	...	87.38 „

subject to certain deductions and additions specified in paragraph 6 of the Chief Engineer's Note, the shares of outlay chargeable to Provincial will therefore be $\frac{1}{2}$, and to Agricultural $\frac{1}{2}$ of the cost of the project. Under this arrangement the payments for water-supply made by the Municipality will be carried to the credit of Provincial Funds, but these will have to bear $\frac{1}{2}$ of the difference between the cost of maintenance of the works prior and subsequent to 1869-70.

2. These papers will be communicated to the Revenue Department, with reference to the Order in that Department of the 25th August last, No. 1,276, and to the Board of Revenue in order that the revised statements referred to in their Proceedings of the 23rd July 1875, No. 2,058, may be submitted as soon as possible. Also to the Superintending Engineer, Chingleput, and to the Controller of Public Works Accounts, who should submit the information needed from them at an early date.

3. Ordered that a copy of these Proceedings be forwarded for the information of the Government of India.

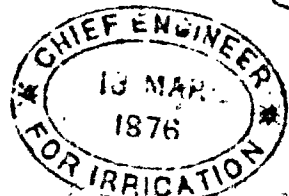
(True Extract.)

(Signed) G. W. WALKER, Major-General, R.E.,
Secretary to Government.

To the ^{File} Public Department.

- „ Revenue
- „ Superintending Engineer, Chingleput.
- „ Chief Engineer for Irrigation.
- „ Board of Revenue.
- „ Controller of Public Works Accounts.

Exd. S. T. Austin.
Spare Copies



PUBLIC WORKS.

THE PUBLIC WORKS DEPARTMENT

G.O. No. 1 - May 7/6 - 1090.

JANUARY.

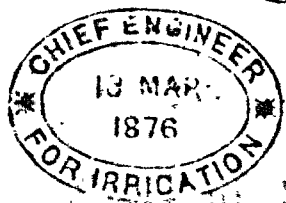
No. 41-13

Print.
in Carriage
Factory
at Baslay.
in Carriage
Factory.

Public Works, Stores and Workshops,
Madras, 18th March 1876.

My dear Major Scott
Enclosed I
send you a list
of Engines & Boilers
in the custody of
Storekeeper of Machs.
which are of service
for pumping water
at the Red Hills
No suitable pumps

Engine - Serviceable - }
Factory.



PUBLIC WORKS.

Q. 134
71

or. h...d
James J. Smith
J. H. M...
J. H. M...

2 Engines 15 H.P. Vertical Combined - no Boilers. }
1 Do 12 H.P. Vertical with boiler. Incomplete. }
1 Do 12 H.P. Horizontal with Boiler in good condition. } Print.

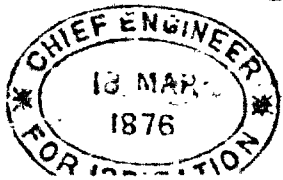
1 Engine Steam Vertical High Pressure 15 H.P. with Boiler, Gun Carriage }
incomplete } Factory

1 Engine Steam 12 H.P. without Shafting and Pulleys }
or Boilers } Bullet Factory

2 Gun Boilers for Potatoes Horizontal Condensing Gun Carriage }
Engine - Serviceable } Factory

These Engines have been
a property of the State of California

No. 134
71



Received of - Cashier of the U.S. Treasury
for the sum of \$1000.00 - 1000 - 00 - 00
in full of the amount of the bill of exchange
drawn by the U.S. Treasury on the
Bank of New York and
paid to the U.S. Treasury on the
13th day of March 1876
and the receipt of the
U.S. Treasury on the
13th day of March 1876

FORMER CASES.

No. of 187
" "

Form No. 20.

Register No.

From

Receipt No.

Dated

LATER CASES.

No. of 187
" "

REMINDERS RECEIVED.

No. 1, dated 187
" 2, "
" 3, "
" 4, "
" 5, "

Keep-Withs.

12:14 M. 18 March/6

No. Sent Sup of Stores
Dated Works Dept.

Your letter of the 18: "
Subject: - Amount Steam Engines
on hand. -

~~Remember~~ - Pumping
spanning the works to
be done at 3000 gallons
per minute with a maximum
lift of 10 feet ~~planned~~
and that one engine is to
be in reserve while the
other is working -

Please state:
1. Which Engines you would
recommend for use at
the Municipal Outlet
Orders and Drawings in file.
Red Hill Court

No.	Date.	No.	Date.
2	How long it would take to place them in serviceable condition		
3.	How long to set them up, provided foundation & engine house are ready & the Pumps are delivered at the workshops.		

From Genl. Supt. Mr. Washburn
22. Dec. 1876 11:15 AM.

No. 14 M.

2.

The Genl. Supt., P. W. Storer
& Workshops
Chepauk.

Dated 18 } March 1876.
Dec. 20 }

Papers:—

Deini. Off. letter 8/10/3/76.
from Genl. Supt. P. W. Storer & Workshops.

Red Hill Tank - Requests certain
information with regard to the
Engines for pumping work at
the —

Dec. 1876

No. 8 L.R.

Urgent

The D.R. Chepauk is
ordered to report
as far as possible
the reasons to the
accompanying letter
from the President of
the Municipal Commission.
Whether there is at
present any serious
waste of water from the
Red Hill Tank by leakage
or by breakers in the
primary distribution channels
under the tank or from
any other cause & if
so to state what
measures he would
recommend for obviating
such waste as far as
practicable.

It may be suggested that
leakage from the north
end of the canal & from
the latrine under the
massing dam or through
the dam itself might
be intercepted by a
temporary earth dam
& weir across the surplus
channel opposite the
north sluice & turned
into the irrigation sluice
channel which the sluice
discharges surplus.

3
The assistance of the
Revenue Officer may
be necessary in order to
prevent the extravagant
use of water for irrigation
& to ensure the speedy
repair of breaches in

the main channels.

The Sup. Engineer should
state whether the matter
is for the Special Attention
of the Rev. Secy.

Adm.
10-3-76

708cn.

To The District Sup.
Chimpaput

Destroyed by ants
while hanging on wall
letter to the D. W. H.

Dated 18 } March 1896
Recd: 18 }

Encls. 1

Papers—

P.N.C. N° 1867 of 13 March 1896.

Red Hills Tank — Requests that
he will report the measures
he would recommend
for obviating any waste
of water, if there be any likeli-
hood of any, from the —
by leakage &c.

Office Note

To Sup^{ts} of St. Andrew's
I propose to suggest the
purchase of two 10HP or
12HP. Portable Engines from
Neill & Co. Also two 8" or
two 7" Centrifugal Pumps.
Will you telegraph and
ascertain if they have these
in stock & can deliver
at once.

If they have not got the
Engines and Pumps on
hand & would have to
order from England it
would be better for
the Municipality to order
themselves direct from
England from Messrs. Gwynne
& Co. Two engines & two
pumps to do the work?

Portable Engine on beach to
be in reserve at Red Hills
Adelph
27-3-96
Please reply on same
side

I have telegraphed to
Messrs. The Romney.
"Can you supply im-
mediately two seven
inch and two eight
inch Centrifugal pumps
also two portable
Engines ten or twelve
horse power each."

If the above are not
obtainable it will
be best for the Muni-
cipality to order them
out from England
on their own account.

S.

It is to be remarked that
there are usually fresher in
the Collier River at the
end of July or during August
& that there is every season to
rely on for a ~~by no means~~ ^{by no means} in-
sufficient supply during one
of these months. This is of course
no argument against the ^{existing} ~~existing~~
~~provisionary~~ precautionary measures.

Regarding the temporary arrangements
it does not seem that the
Railway Companies stores can
be relied on to supply the

needed ~~quantity~~ ^{quantity} ~~of~~ ^{of}
pumps unless purchased
either in England or Bombay
directly ~~from the~~ ^{from the} ~~authorities~~ ^{authorities}.

~~to be met~~
Considering the uncertainty which
there is as to the time for
pumping will be necessary, the
probability of variation in the height
of the ^{depth} ~~depth~~ of the water
to the municipal works, it
is considered that portable
engines should be used.

A 12 H.P. engine should be
immediately ordered from

Maple Mill & Co if they have
them in stock. And also the
four pumps referred to by
the Dept. of Mines by two seven
and two 8 inch.

It would be ~~more satisfactory~~ ^{to have}
no doubt ^{two} 12" or 15"

The 10 H.P. engine now on the beach
near the fort should rather
be sent to the Red Hills or held
in reserve.

pumps with suitable portable
engines ~~rather~~ ^{directly}
from Messrs. Gwynne of. but
there is the risk of delay or
accident on the journey to
England & the arrangements for this year.
must in any case be of
a makeshift character.

The question of creating permanently
at the Red Hills
an engine & pumps for raising
water is ~~separate~~ ^{apart}
from this. It will have to be
considered whether the cost of
procuring & placing ^{two}
stationary engines
with all the arrangements for
supplying fuel & with the
necessary buildings ^{to pump} will
the cost of ^{the pumps} ~~be~~ ^{be}
repaid by the utilization
of the low level water of the
Reservoir for 2 cup irrigation
of the ~~reservoir~~ ^{of the} ~~land~~ ^{land}
and by the advantage of
being ready to meet an
emergency like the present one.

Ans. S.

When the water in the tank
has fallen to ~~below~~ ^{the level}
of the lowest outlet it will
have receded to a considerable
distance from the sluice.
It will be necessary to
cut a sloping in the bed
of the tank and probably
a number of trustees &
some lengths of iron piping will
be required to lead the
water which may be pumped
into the channel ~~leading~~ ^{into}
the sluice. It will be
well to decide on the details
of the arrangements and
commence at once the transport
to the spot of the necessary
material.

It is different as respects
water used for irrigation.

The Cultivators are busily
engaged in flooding &
breaking up their land
preparatory to sowing
a second crop and a
large quantity of water is
being drawn daily from
the tanks for this purpose.

In view of the scarcity of
water measures should
it is thought be
at once taken to limit
cultivation. The Rights
have already drawn off
for their main crop far
more than they would
have been available
~~had~~ ^{not been} ~~the tanks~~ ^{enlarged}
& they have no claim
whatever to any of the
present supply.

Made available & then
is it would appear a
possibility of its being re-
-quired for railway purposes.

The Genl. Sup. of Straits
has forwarded a report
which shows that there
are two ~~stationary~~ engines
of different power which
might be ~~made available~~ ^{used}.
One of which is a stationary
engine & is at present at
Jambly & that two
12" pumps would be
required. As more readily
procureable he recommends
that two 8" & two 4"
pumps be ^{obtained} from
Messrs. Meele of Bombay.
Messrs. Meele's reply
is not definite and
they have been again
communicated with.

^
which were asked that
they would apply but then

The undersigned is not ~~to be concerned~~
prepared to endorse the
statement of the S. Engineer
of the C. N. Dep. that the
disappearance of the water
unaccounted for by discharge
through the sluices is due
^{chiefly} to evaporation. The
information available regarding
the loss in other reservoirs would
lead to the conclusion that during
the period of 172 days referred
to by Capt. Smith the loss by
evaporation & absorption should
not exceed 10 million cubic yards
& that the actual waste, (reported
to be in that period of time
22 million cubic yards) is
altogether abnormal.

This subject requires & will
receive further attention but
it is not apparent that any-
thing can be done which will
be of immediate effect in
reducing the rate of fall of
the water surface of the Reservoir from

Memorandum

There is unquestionably a
probability - that towards the
end of July ^{or even sooner} the water in
the Red Hill tank will be
so low that the town of
Madras will have to be
supplied ~~therefrom~~ by
pumping.

Since the endorsement of
the Chief Secy in the letter
of the President of the
Municipal Commission has
been received in this office
the undersigned has been
~~in communication~~ ^{in communication} with
the Superintending Engineer
of the Chingleput District -
the Genl. Supt. Public Works
Stores, the ^{Commissioner} Chief Engineer

for Railways and Mftⁿ

Nicoll & Co. of Bombay.

He has also inspected the tanks
has been ~~convinced~~ that the tanks.

Note

The Superintending Engineer
reports that there is no
leakage of importance from
the tanks and no wasteful
irrigation & that the rapid
disappearance of the water
to an extent unaccounted
for by measured discharge
is due to evaporation.

The Consulting Engineer
~~has reported~~

has ascertained that there
are no portable engines
in possession of the Railway Corp
available for use at the
Nad hills & that there
is only one pump belonging
to the South Indian Railway
which it is thought be

but it has been ascertained
that there is only one
pump belonging to the
S. Indian Railway which
may possibly be

Copy from

30
Pough estimate of probable cost of
procuring two 12 H.P. portable engines
two 8" & two 7" Centrifugal pumps
& erecting the necessary fixtures at
the Nad Hills.

Two 8" C. Pumps delivered at Nad Hills 2100

" 7" " " " " 1700

XB " 12 H.P. Portable Engines { Double Cylinders. — 8900

Trusses, Staging, Iron Piping &
Excavation at Nad Hills { — 3000

Carrriage — — — 15700

Lang B. 16000

Curry

Ch 324

No. 20. M.

Low Chief

To
From

The Chief Secy to Govt
P.D.

Dated 29th } March 1876
Disp 30 }

CC 1 May 76 1090

Encl 2^x

1 Letter (rough)

1 Office note by Mr. Greiner
stating that Mr. Greiner
can supply 17" & 18" Centrifugal
pump at once.
No engines in stock -
one of each of size 6 & 8

Papers

R & 15 M. 25 March 76

1/11 CH 21

Memo: on the present
state of water supply in
the Red Hills Tank
and of the measures to be
taken to continue the
supply to the by pumping.
Should the water fall below
the sill of the masonry
sluice in the ensuing
months -



Since 1st

P.W.-G. Aridley 178. The 178.

January 1876.

ISSUES TO IRRIGATION.

Cholavaram Tank.

122692453 Cubic yards for 152301 Acres.

22,864.46 " " " 223.78

g month 1429788.99 Cubic yards for 1746.79 Acres.

pril 11,074.361.12 " " " 1291.93 Average Acres.

date 12,504,150.11, Cubic yards for 1328.41 Average Acres.

Red Hills Tank.

82,191.84 Cubic yards for 265.45 Acres.

649,57108 " " " 1,326.41

180; 19874 " " " 46101

29,486.33 " " " 96.00

g month 94184879 Cubic yards for 2168.87 Acres

April 17, 182, 21368 " " " 2,478.39 Average Acres

January 1876.

Receipts—Cholavaram Tank?

Cholavaram Sluice

Rain-fall

Total

10-6-80

24
24
24
24
24
24

100

date	pril	or mo	Total	Net Receipts during month	Add Receipts since 1st April	Total Receipts to date
01	01	01	01.00	01.00	01.00	01.00
02	02	02	02.00	02.00	02.00	03.00
03	03	03	03.00	03.00	03.00	06.00
04	04	04	04.00	04.00	04.00	10.00
05	05	05	05.00	05.00	05.00	15.00
06	06	06	06.00	06.00	06.00	21.00
07	07	07	07.00	07.00	07.00	28.00
08	08	08	08.00	08.00	08.00	36.00
09	09	09	09.00	09.00	09.00	45.00
10	10	10	10.00	10.00	10.00	55.00
11	11	11	11.00	11.00	11.00	66.00
12	12	12	12.00	12.00	12.00	78.00
13	13	13	13.00	13.00	13.00	91.00
14	14	14	14.00	14.00	14.00	105.00
15	15	15	15.00	15.00	15.00	120.00
16	16	16	16.00	16.00	16.00	136.00
17	17	17	17.00	17.00	17.00	153.00
18	18	18	18.00	18.00	18.00	171.00
19	19	19	19.00	19.00	19.00	190.00
20	20	20	20.00	20.00	20.00	210.00
21	21	21	21.00	21.00	21.00	231.00
22	22	22	22.00	22.00	22.00	253.00
23	23	23	23.00	23.00	23.00	276.00
24	24	24	24.00	24.00	24.00	300.00
25	25	25	25.00	25.00	25.00	325.00
26	26	26	26.00	26.00	26.00	351.00
27	27	27	27.00	27.00	27.00	378.00
28	28	28	28.00	28.00	28.00	406.00
29	29	29	29.00	29.00	29.00	435.00
30	30	30	30.00	30.00	30.00	465.00
31	31	31	31.00	31.00	31.00	496.00

Stewart Captain P.E.
Executive Engineer

*To The Chief Engineer,
for Irrigation*

0-11-40 11:40/11:40 1090

Receipts—Cholavaram Tank.

Cubic yards.



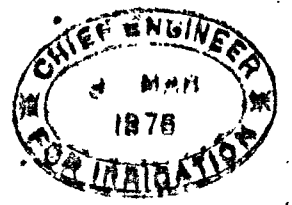
Issued, Cholavaram Head Sluice...
By V. S. S. S.

Tamarapak	...
Rain-fall	...
Total	...
Net Receipts during month	...
Receipts—Red Hill	...

caus of ...

Abdurith
Captain
Executive Engineer

68



April		Total
Net Receipts during month		
Add Receipts since 1st April		
Total Receipts to date		

By North Sluice

„ Weir „

„ South „

Total d.

Since 1

Total u

By Weir Sluice

„ North „

„ Polal „

„ Soorapedu

Total

Since

66

Channel
 Accref
 73-3-76
 12-11-8
 G. G. 1-11-11/76 11/10/94

ISSUES TO IRRIGATION.

Cholavaram Tank.

784,746.03 Cubic yards for 1,523.01 Acres.

30,589.76 " " 223.78 "

g m during month 815,335.79 Cubic yards for 1,746.79 Acres.

pril 1st April 10,259,125.23 " " 1,223.82 Average Acres.

date up to date 11,174,361.12 Cubic yards for 1,281.93 Average Acres.

Red Hills Tank.

88,267.20 Cubic yards for 85.45 Acres.

377,355.10 " " 1,328.41 "

238,072.32 " " 461.01 "

luice 74,489.16 " " 96.00 "

g during month 778,183.78 Cubic yards for 2,168.87 Acres.

1st April 16,374,029.90 " " 2,513.70 Average Acres.

Encls. 4.

From duty Engineer
 to 4579. 11/11/76 with margin
 to do 4586. 11/11/76
 From 4586. 11/11/76
 with 4586. 11/11/76

Note by the Chief Engineer for Irrigation

The correspondence as per margin between the Superintending Engineer Chingleput and this office is submitted for the consideration of Government and orders are solicited in the following points

1st as to the date from which the account of issues to the Municipality should be commenced yearly, so as to determine at any given time the quantity of water remaining for issue to the Town out of the available reserves for the year of 45.32 - 20.48

* quantity below 31.31 + 6 p.m. 37.31
 + quantity below 31.31
 + quantity between 31.31 and 37.31

2nd. As to whether loss by evaporation is to be taken into account in correction of the quantity reserved.

It will be seen that for the immediate guidance of the Superintending Engineer it has been intimated that the 1st December is probably a date which may conveniently be

er 265 p.m.

be fixed for the commencement of the annual supply, and that, were the official year taken, the supply due in March being then necessarily very small, and there being at that time of the year but little probability of local rain or a fresh in the Cortellias, there would be much risk of no water being available in the earlier months of the following year. On the other hand starting with the full supply for the Town in store on the 1st December there should be enough water to last not only until the occurrence of freshes which may be expected in July, but until the N. E. Monsoon as a matter of supply hereafter the year from the 1st December to the 31st November would appear to be very suitable.

3. The other question relating to evaporation and other causes of loss of water is a difficult one to deal with, the data being far from well determined. Still it is clearly very necessary to take these losses into account, for otherwise there will

will be no certainty of any arrangements for dividing storage between the Town and irrigation respectively, giving satisfactory results and while it may be necessary to give the Town supply the first consideration it is certainly very desirable that those irrigating under the tank may not suffer loss from the stoppage of the supply to their fields. After they have commenced cultivation Captain A. C. Smith in his letter No 3341 states that he has taken careful measurements, and he is certain that the loss by evaporation & percolation is double the sum of water for irrigation. There has not yet been any satisfactory account made out of the receipts, issues and loss for any year and of course such an account for a series of years shewing the average results for each month would be necessary to obtain a safe guide to the duty both as regards Town supply and irrigation which any given quantity of water, remaining in the tank after the close of the N. E. Monsoon is at about the date (1st December) proposed for the Town supply.

supply year, may be expected to perform. Even such information would not be ~~more~~ a really safe guide as regards the removal of all risk of a failure of the supply of water to Madras, unless the worst year in a considerable series were taken, and practically to take this would mean that a great deal of water, which in ordinary years would be available for irrigation must be left unutilized. Lately the President of the Municipal Commission has expressed some fear - a fear which in the event of no rain fall for some time to come may probably prove to have been quite reasonable, lest Madras should be left without water, but if in addition to storing and keeping for the use of the Town about 3 times as much water as is actually drawn off for Town use, of which the quantity above the sill of the Municipal sluice lowest pipe is about twice as much as is, at all events at present, ~~about~~ ~~the~~ ~~supply~~ required, a further reserve has to be made as a precaution against

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against the co-operation and other losses of a long dry season, it will, it is thought, be necessary for Government to decide what the arrangements to be made are to be, and as it does not appear to be feasible beforehand to say what the character of any season will be, either some risk must be incurred or the reserve will have to be made larger than was contemplated in the order of the 5 January last - No 21.

5. ^{5.00} ~~templated in~~ ^{on the 13th March last} the date
~~last 20th~~ when the gradual lowering of the water
 level of the Red Hills Tank led to the repre-
 sentation made by the President of the
 Municipal Commission, this level was
 72.30 feet above the sill of the lowest pipe,
 so the water surface was at 38.54 and
 the contents of the tank were about
 37.13 millions of cubic yards or 5.68 millions
 more than the whole quantity supposed
 to be reserved for Town use. If the
 9th December be taken as the commencement
 of the supply year, the balance of
 water which ought to have been held
 available for the Town would have
 been $24.84 - \frac{109}{366} \times 24.84 + 20.49 = 24.84 - 7.42 + 20.48$
 = 37.90, so the tank had 13.10 millions
 of quantity supposed to be

to be held in reserve.

As regards the difference between the diminution of water in the Tank between the 1st December and the 18th March and the issues recorded, the water reports show that on the

1st December	the water surface was	at 40.36	Contents	62.058	Millions of cubic feet
	Receipts			7.692	
31st	do	at 41.01	do	65.850	
	Difference			3.900	

+ also pencil notes in Remarks column of statement for December

while the issues recorded are	
for Town supply	0.735
irrigation	0.778
Total	1.513

Proportion of issues to total consumption	1 to 2.57
Similarly for January	
1st January	surface level 40.99
Contents	65.702
31st	do
do	40.20
Contents	61.124
Difference	11.618

Issued to Town supply	0.897
irrigation	0.942
Total	1.839

Proportion of issues to consumption 1 to 2.52

The short period to which these calculations refer is of course insufficient to establish a rule of proportion, but so far as there may be taken as

a guide it would appear that the storage would have to be about $2\frac{1}{2}$ times the issues, and that supposing the minimum head admissible on the Town lowest pipe sill to be 2 feet, and the issues 12 millions, the quantity required to be reserved for the Town would be Millions of
20.48

below sill of pipe	11.00
2 ft above sill of do	50.00
$12 \times 2\frac{1}{2}$	
Total	61.54

instead of 45.32 as supposed in the Proceedings of Government of the 5th January last. The first item of the above is a fixed quantity, the second can it is thought be settled definitely by the President of the Municipal Commission, and the third before multiplication may possibly be determined with fair accuracy for the maximum of the next 10 years. The proper multipl. will be reported as soon as the necessary information shall have been obtained from the superintending Engineers. It would appear that it is desirable to discourage second crop cultivation.

578

No. 1090 *W* Public Works Department.

PROCEEDINGS of the MADRAS GOVERNMENT.

Under date the *1 May/76*

Read the following:—

From

The Chief Engr for Ingr (No. 1874 dt 5th April/76)

Papers

These Proceedings will be communicated to the Financial Department in continuation of G. O. 5 January 1876 No. 25 with a view to the consideration of the circumstances connected with the water supply of Madras brought to notice in the Note by the Chief Engineer for Irrigation.

M

2. It will be observed that the points on which a settlement is desired in order that corresponding arrangements may be made in the Public Works

Dept

1876 Department

5204

The Chief Engineer

for Irrigation

Recd 13th May 1876

Engrs H. V. 5204

Note to the Honble Secy to the Government regarding the state of the water of the Hill Lake

18

Recd from 27-5-76
Civ. 27-4-76
H. P. 17 April

Department are

1st the date from which the Annual supply of the Town should be deemed to commence. The 1st of December has been suggested by Lieut Colonel Mullins, and the reasons for its selection have been stated.

2nd the minimum depth of water on the sill of the lowest pipe of the Municipal offtake sluice, which will suffice to ensure a full supply of water to the Town.

3rd the maximum quantity of water likely to be actually drawn off at the Town sluice for a year's supply during the next 10 years.

4th the settlement of these points he comes to. It is anticipated that, with the information regarding the proportion between storage and issues, likely to be soon available, the details of arrangements which will avoid risk of the failure of the water supply.

supply to the Town in years of short rainfall, or in seasons of prolonged absence of rain, may be drawn up and orders thereupon passed for the guidance of the Public Works Officer in charge of the Madras Waterworks reservoirs.

May 25/4

J. H. Dept.
D. E. Chingfent
C. E. for L. with 4 Encl.

copy