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Registration (1882) Department

P. D. No. 610
JAN 82

From.

The Inspector-General
of Registration,
Madras.

To.

The Chief Secretary to
Government.
Fort. St. George.

~~CURRENT No. 215~~

Dated 19th January 1882.
Recd. 20th

No. 295.

Enclosures (two)

B. No. 285 W. 1st July 1882

Requesting to obtain the
sanction of the Government
for the issue of the requisite
orders in the Public Works
Department for building
Sub Registry offices at
Narayanavanam, Pullam-
pet and Proddatur.

C. P. W. order *Indira*

187

Approved and trans-
ferred to the Public Works
Department for the
issue of the necessary
orders.

By order.

For St. George. *P. D. No.*
27th Jan 1882. *By order*

B. No. 285 W. 1-2-82
B

Communicated to
the Supts. Divs 3rd & 4th
Circles for submission of
the necessary abstract es-
timates on receipt of standard
designs.

Cy

S.S. 3 Circles 31.1.82

Registration Department.

No. 295. CURRENT No. 218

From,

George Hammett Esqr.

Inspector-General of Registration,
Madras.

To,

The Honorable R. Davidson C.S.I.

Chief Secretary to Government.

Fort. St. George.

Dated, Madras, 19th January 1882.

Honble Sir,

I have the honor to transmit two

* In original letters from the Registrars of North Arcot,
No. 12. dated 17th and Cuddalore, and for the reasons urged
January 1882.

No. 5. dated 17th by those officers, to request that you will
January 1882. be pleased to obtain the sanction of the

Government for issue of the requisite orders
in the Public Works Department for the
preparation of plans and Estimates for
Sub-Registry offices to be built at Kara-

Entd. in Receipt Regd

yanavanam in the District of North
Arcot, and at Pullampet and Prodda-
tur in the District of Cuddapah.

I have the honor to be

Honble Sir

Your most obedient servant.

H. Hammett
Inspector-General of
Registration.

HL

3. The estimate does not provide for amount to Rupees 5,732. It is, however, carried out by the District Engineer, as owing should be left undone to prevent any possible. The Commissioners will not be able to provide sum of Rupees 8,672 over and above the loan that Government will be able to allow the Engineer free of charge, or that, if that is not possible, the Commissioners cannot pay during the year the completion of the water-supply and to Public Works supervision, which will be very necessary that the work should be carried to the position of the reservoir nothing but the chance of the embankment giving way. From their current year's budget the Government will allow Rs. 20,000, and I trust, therefore, the work being carried out by the District Engineer, if possible, they will allow any sum which may be required to lie over and to be adjusted when the drainage projects are passed and the

proposed loan for these works water-supply is urgently needed utmost expedition so as, if possible

REFERRED to

tioned. The present proposed increase to the the work should be pushed forward with the get a good supply for next year.

Chief Engineer for remarks.

(By Order,)

(Signed) J. STURROCK,
Under Secretary.

No. 78-A. Endorsement of the Department, dated

From A. McC. WEBSTER, Esq.,
Commission, to the Chief Secretary to Government, dated Ootacamund, 24th August 1877, No. 80.

In continuation of my letter forward an estimate for the completion of the portion of Ootacamund, together with the Proceedings of the Municipal Commission, for the sanction of Government for the completion of this portion of the

2. The amount of the loan applied for in my letter to Government of 25th January 1877, No. 11, as well as the work, estimates for which were submitted with my letter of 19th April, is included in the present estimate of the Commissioners and application for a loan. In the former application for a loan of Rupees 20,000 the Commissioners proposed to repay it in twenty years, but looking to the amount now required they propose to repay it in thirty years.

3. Government will observe that the Commissioners have decided to be content for the present with the improvement and enlargement of the Snowdon Reservoir, leaving the construction of the additional reservoirs at X and Y on Plan No. 1 accompanying my letter of 19th April 1877 in the map for future execution should the present supply become insufficient owing to increase of population or other causes.

4. I have the honor to request that Government will be pleased to sanction the estimate and the loan, and will allow the work to be carried out by the District Engineer. The Commissioners venture to hope that Government will take into consideration the exceptional circumstances of the station, and will allow the work to be carried out by the District Engineer free of cost to the Municipality. This will reduce the cost of the work to about one lakh of Rupees, and the Commissioners will be enabled to spend the remaining portion of the loan in improving the southern water-supply channel and in continuing the northern supply to Kandal and Woodcock Hill.

REFERRED to the Chief Engineer for remarks.

(Signed) H. B. GRIGG,
Ag. Under Secretary in charge.

No. 1,709.

THE Chief Engineer hoped ere the proposed reservoir on arrival at Ootacamund to do so and submitted his report hereon matter.

FORT ST. GEORGE,
21st June 1877.

(Signed) E. A. FOORD, Colonel, R.E.,
Chief Engineer, P.W.D.

No. 1,709.

RETRANSMITTED to the Chief Engineer with
(By Order,)

8th September 1877.

No. 216 W.

MEMORANDUM

OOTACAMUND WATER-SUPPLY

THE proposals which have been brought forward by the District Engineer, Nilgiris, and approved by the Municipality, embracing the provision of additional storage for the supply of the northern side of the station, and arrangements for purifying the water, with its distribution under a system of pipes, are as follows:

2. MARLIMUND RESERVOIR.—There is at present only one reservoir, if the small tank near Snowdon House be excepted, for the storage of water for this part of the station. This is called the Marlimumd Reservoir, and was constructed about seven years ago. Generally it has filled well and has surplusage on the sluice, but in 1875 the depth of water in the reservoir is full being 19½ feet. The District Engineer estimates the contents at, in round numbers, 50 millions of gallons; but from information furnished by him two or three years ago it appears that—

The total contents are ...	7,761,000 cubic feet.
The contents below the outlet ...	324,000 "
Water available for use ...	7,437,000 "
	or 46,480,000 gallons.

The catchment basin of this reservoir is 260 acres or 0.406 of a square mile. The site is certainly much the best high level site near Ootacamund.

3. WATER-YIELD REQUIREMENTS.—To fill the Marlimumd Reservoir it is necessary that a depth of 7.88 inches should flow from the whole area of the catchment basin. The District Engineer has given a table of the monthly and annual rainfall at Ootacamund, for the years 1869 to 1876 inclusive, from which it appears that its amount was as follows in—

Years.	Rainfall.	Rainy Days.	Average Fall of Rainy Days.	October Rainfall.	Rainy Days.	Average Fall of Rainy Days.	November Rainfall.	Rainy Days.	Average Fall of Rainy Days.
1869...	38.65	117	0.33	3.97	12	0.33	3.28	13	0.25
1870...	41.92	122	0.34	10.10	15	0.67	1.69	10	0.17
1871...	54.92	94	0.58	10.45	*	...	13.92	10	1.39
1872...	45.42	119	0.38	3.99	11	0.36	6.93	18	0.38
1873...	45.41	138	0.33	7.32	23	0.32	2.35	10	0.23
1874...	47.48	141	0.34	10.24	20	0.51	2.10	10	0.21
1875...	38.45	107	0.36	8.33	19	0.44	2.30	7	0.33
1876...	25.16	76	0.33	1.66	8	0.21	0.26	2	0.13
Average ...	337.41	914	2.99	56.06	108	2.84	32.83	80	3.09
	42.18	114	0.37	7.01	15	0.41	4.10	10	0.38

* Not stated.

The position and aspect of the catchment basin of this reservoir make the north-east monsoon rains those from which the greatest yield is obtainable, and a register of

rainfall at Ootacamund, a reliable criterion of the rainfall available.

It is understood that the reservoir; but at present the quantity the actual yield of the cannot be properly deduced; it would be useful to know the town; and of this there would be asked to have the requisite survey.

4. WATER-TOWER VALVES.—The water-tower valves are not as convenient as is desirable, though apparently a slight modification a fairly accurate regulation could be effected. At present the valves which are hinged at the upper edge can be regulated to somewhat more than 12 inches of lift, and were another disc placed at the other end of the drum of the valve, the difference of lift could be halved. However it will be advisable to substitute slide valves or plugs regulated by screws, and then exactly the desired discharge can readily be obtained.

5. SURPLUS CHANNEL.—The arrangements for discharge of surplus are inadequate. The capacity of the reservoir is, compared with the catchment basin, considerable; but nevertheless the tank may be full or nearly full when a heavy fall of rain occurs, and in 1871 it was in some danger. There is no escape weir at the tank, but a masonry-lined channel, 8 feet wide, starting at F.T.L., and with no bed fall, conducts the water for a considerable distance* to a series of steps or drops, the width at the first drop being 6 feet. Thence the water is conducted by an earthen channel, altogether too small, along the hill side to a safe distance from the bund. The escape should, it is considered, be 20 feet wide with a clear overfall, and 24 feet with a channel like the present, to ensure the water level being limited to 3 feet above F.T.L. as a maximum.

* 292 feet.

6. RAINFALL REQUIRED TO FILL RESERVOIR.—It would seem that a rainfall of 12 inches in October and November are about sufficient to ensure an adequate supply to this reservoir. In 1875, a very dry year in July to September, it was about $\frac{2}{3}$ filled, and the rainfall in the two north-east monsoon months was 10.63 inches. The average of the eight years gives 11.11 inches.

7. ENLARGEMENT OF MARLIMUND RESERVOIR.—At a comparatively small expense the available capacity of this reservoir could be increased one-half by raising the bund and F.T.L. 6 feet. The area of the present waterspread is 597,000 square feet, and 6 feet over this would contain 3,582,000 cubic feet, so probably the total additional storage would be just about half the present capacity.

The present top width of the bund is 25 feet and might be diminished to 18 feet at the raised top level. The top of the bund is $7\frac{1}{2}$ feet above F.T.L., and the top of the raised bund should be 3 + 5 feet above the raised F.T.L. The interior and exterior slopes above F.T.L. may be increased to 1 to 1, and if necessary the interior slope below this point may be carried down at $1\frac{1}{2}$ to 1 until the required base is obtained.

8. SNOWDON RESERVOIR.—The site of the proposed Snowdon or Snowdon House Reservoir is just below Snowdon House on the Ootacamund side of the saddle on which that house stands. The site as regards the formation of the bund is favorable, but otherwise there is not anything in its favor.

- (1).—The catchment basin is only 60 acres, so the surface yield would probably not much exceed $\frac{1}{2}$ of that of the Marlimund Reservoir, and if this be taken as 10 millions of cubic feet on the average, and one-third of that quantity in such a year as 1876, the water available would be in an average year ... 2,307,700 cubic feet.
in a year like 1876 ... 769,230 „
the intended capacity as designed is ... 3,859,860 „

on the other side of the water shed, is not a very reliable criterion of the rainfall available. At the reservoir catchment basin, but it is the best available.

—municipality have a register of the water levels in the no series of cross sections of the tank, and consequently the loss by evaporation and absorption, indeed to enable these latter to be approximated to, water has been issued to the channel supplying the tank to be no record. The District Engineer has been taken and a table of capacities prepared.

—The water-tower valves are not as convenient as is desirable, though apparently a slight modification a fairly accurate regulation could be effected. At present the valves which are hinged at the upper edge can be regulated to somewhat more than 12 inches of lift, and were another disc placed at the other end of the drum of the valve, the difference of lift could be halved. However it will be advisable to substitute slide valves or plugs regulated by screws, and then exactly the desired discharge can readily be obtained.

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the intended capacity as designed is ... 3,859,860 „

It is therefore not probable that in ordinary year this reservoir would fill. Major Morant states that the ground above the bund site is full of springs, but it does not follow that all this spring water would go to augment the water stored in the reservoir.

(2).—The capacity is small compared with the height of the bund, 56 feet, as a maximum, and the depth of water, 40 feet, at the sluice. This arises from the high level of a large part of the ground within the waterspread.

Area of waterspread 220,319 square feet.
Mean depth $17\frac{1}{2}$ feet.

(3).—The cost of storage would be high, viz., Rupees ... 5,943
Per million cubic feet, even supposing the tank to fill.
The actual cost might be Rupees ... 8,000
the million cubic feet.

The Marlimund Reservoir cost Rupees ... 14,700

So the storage there was at the rate of a little under Rupees 2,000 a million cubic feet. Its capacity could be increased one-half at a cost of about 2,000 Rupees the million cubic feet.

(4).—Although it is of considerable advantage to lay 60 additional acres under contribution, this benefit would be frequently more than neutralized by the full tank level being 15 feet above the sill of the south face of the tunnel through which the Marlimund Channel runs.

The difference of aspect would be an advantage, as more water would be received from the south-west monsoon, the rainfall in which is not much less than three times that of the north-east monsoon, but spread over five months instead of two.

31.08 to 11.10.

9. OTHER SITES FOR RESERVOIRS.—There are no really good sites at a high level available. There is a site* to the west of the Marlimund Reservoir, which was inspected, and which might possibly be of use to supply Kandal and houses in that direction. The catchment basin is about 122 acres. The level of the bund site will be ascertained.

* Marked W.

Above and to the eastward of Snowdon House there are the X and Y sites mentioned in Major Morant's report; they are on extremely steep ground, and their catchment basins are 36 and 25 acres respectively. The former is on the south or Ooty side of the hills, and the latter on the north or Snowdon side. The capacity of these tanks, even with high bunds, would be very small, but a considerable portion of the yield of their catchments could be conveyed to the Snowdon House site, and in this way a reservoir constructed at this site might perhaps be adequately supplied. Another site marked Z is situated in the next valley to the south-east of that of the X site, and has a drainage basin of 54 acres. The water could be conveyed to the Snowdon House site.

There is a site below Cinchona Villa and just where a line from the stables at Lower Norwood, at right angles to the axis of the valley, would cut the stream, at which a reservoir of some considerable capacity could be formed. The area of the catchment basin is about 307 acres, and all the water of the basin of the Snowdon House site, of the X and Z sites, and of other ground would be received by it. Its adoption would entail separate filtering arrangements and distribution, but it is comparatively near the town, and the level of the stream at the bund site being 292.81,* as compared with Ooty lake surface 209.81,† the command would probably be sufficient.

* Datum 200 feet below sill of lake sluice.

† The F.T.L. of Ooty lake is nearly 10 feet above sill of sluice in west bund.

‡ Letter No. 145, 18th April 1877.

10. WATER-SUPPLY REQUIRED.—The District Engineer in paragraph 15‡ notes that the Marlimund Reservoir was designed to supply 6,000 people at 30 gallons a head

a day, or 180,000 gallons a day altogether. He considers it to be desirable to provide for a population of 10,000; but that with masonry conduits or pipes 20 gallons a head a day should suffice: the daily provision would then be 200,000 gallons. It is mentioned that in London only $\frac{2}{3}$ ths of the whole delivery enters into consumption, and that in Glasgow 18 gallons out of 32 are wasted, or the wastage is rather less than in London. Major Morant thinks that the waste at Ootacamund need not be so great. Were the delivery pipes to be similar to those of the London Companies, this conclusion might be accepted, because their pipes work under considerably greater pressure than is intended in this case. Altogether, however, it would be unwise to suppose that the Ootacamund distribution arrangements will be more efficient than those existing in England after many years' experience. The issues from the reservoirs should therefore be assumed to be at least half a million of gallons a day. In ordinary seasons it is considered by the District Engineer that the reservoirs would have to store enough water for five months' consumption; but that to ensure the station against a failure of water in bad years there should be provided a storage equal to ten months' consumption. In the former case consequently the water to be available for issue from the reservoirs would be 75, and in the latter case 150 millions of gallons.

11. LOCAL DATA WANTING.—It is particularly unfortunate that reliable data, such as the Marlimund Reservoir might have furnished, are wanting as to—

- (1).—The yield of a given area of ground;
- (2).—The proportion between water stored in a reservoir and that available for issue after loss by absorption and evaporation.

Information on these points for the Marlimund Reservoir would have been very greatly more valuable than deductions from English experience. The loss by evaporation is dependent upon surface area; that by absorption is influenced by the nature of the bed and the depth of water. It would, it is thought, be a very favorable site at which the losses from these two causes would be less than one-third of the quantity stored. The conclusions arrived at in paragraph 18 of the District Engineer's letter appear therefore to need somewhat radical modification.

Taking, as Major Morant has done, first an ordinary year

	GALLONS.
200,000 gallons a day for 152 days	30,400,000
Wastage based on London data	45,600,000
Quantity to be issued from reservoirs	76,000,000
Evaporation and absorption	25,335,000
Storage required	101,335,000

against 45,600,000 according to Major Morant's calculation.

Secondly in the case of a very bad year like 1876

200,000 gallons a day for 304 days	60,800,000
Wastage on London data	91,200,000
Evaporation and absorption	50,670,000
Storage required	202,670,000

against 91,200,000 as estimated by the District Engineer.

12. WHAT THE IMPERFECT DATA AVAILABLE INDICATE.—Major Morant has been asked to obtain from the office of the Municipal Commission such registers of, and information about the Marlimund Reservoir as may be available, and to have a sufficient number of sections taken to enable a table of capacities at different levels to be drawn up. It may then be practicable to approximate more or less closely to the yield of its catchment basin in 1875 and 1876, and thus to get some data for determining what area must be laid under contribution to yield the quantity of water needed. At present there is no information available, while a deduction from the fact that the water did not rise in the reservoir higher than 9 feet above the sluice sill in 1875 would indicate that it is very improbable that a sufficient area for a ten months'

supply can be found at the required level. Below the sill level the mean depth is said to be 4 feet and the contents 324,000 cubic feet. The mean depth of the tank when full is 13 feet, contents ... 7,761,000 " It is probable therefore that with a depth of 9 feet out of 19 $\frac{1}{2}$ on the sill, the contents above sill level did not exceed one-third of the quantity when the tank is full, or say 2,600,000 cubic feet and if it be assumed that the quantity drawn off in addition was 2,600,000 "

the total receipts would be 5,200,000 "

or gallons ... 32,500,000

from an area of 260 acres.

13. CATCHMENT BASINS OF OTHER SITES AND THEIR PROBABLE YIELD.—The areas of the basins of the other sites which have been suggested are—

	ACRES.	
W	122	<i>Vide plan.</i>
X	36	
Y	25	
Z	54	
Snowdon House site	60	
Below Cinchona Villa	307	
Deduct X and Z	90	
	217	
	514	say 510

If the yield be supposed to be the same in proportion it would amount to 63.75 millions of gallons, and this quantity added to that of Marlimund would be 96.25 millions. Moreover to obtain 202.670 millions for a ten months' supply the acreage of gathering ground required would be 1,621 acres or 2.53 square miles, and this is certainly no very great area in itself for the supply of a large station, though it appears to be altogether impracticable to find it, together with sites at a suitable level at which water could be stored.

14. MAJOR MORANT'S MODIFIED PROPOSALS.—Major Morant's proposals, even as somewhat modified during the recent discussions, amount to the formation of a reservoir at the Snowdon House site, and to supplementing the supply from its own basin by conducting water to it from the X Y Z basins; but, making every allowance for more favorable aspect in the case of all but Y, which much resembles that of Marlimund, the total area of drainage would be only 175 acres, and the yield would not exceed, and would probably fall short of that of the Marlimund basin. These calculations are based on no reliable or indeed ascertained data, for such data have yet to be made available; but they will suffice to indicate that there is but little chance of making provision for the supply of water to the whole station on the scale which has been proposed. When actual data, however imperfect, are given, it will be easy to show what is likely to be feasible. The Ootacamund water-supply scheme should be based on what is demonstrably probable.

15. THE WAY IN WHICH THE YIELD OF THE SNOWDON HOUSE SITE WAS ESTIMATED.—Major Morant's calculations, from which he concluded that the proposed Snowdon House Reservoir would fill more than once from the drainage of its own basin in the event of three consecutive dry years, were based, as explained by him in a demi-official note, dated the 25th September, on English experience. From the average annual rainfall one-sixth is deducted, and the remainder is taken as the average of the three driest consecutive years, 14 inches were then deducted from this quantity for evaporation and absorption (the allowance in English mountain districts) and 20 inches were found to be the depth actually draining off, the yield being 31,630,900 gallons against 24 millions, the capacity of the Snowdon House Reservoir. The area of the basin has since been found to be 60 instead of 70 acres; and the quantity corresponding to 20 inches draining off would therefore be 27,225,000

and so is therefore

gallons or one-eighth in excess of the capacity of the reservoir. The depth of drainage required to fill the latter would be therefore a little under 18 inches. Now it has already been shown that 7.88 inches draining off the Marlimund basin would suffice to fill that reservoir, and allowing for all possible difference of aspect in the case of sites a few hundred yards apart, it is certain that Marlimund Reservoir would have filled to overflowing two or three times in 1875, and have more than filled in 1876, had these deductions from English experience been applicable to the circumstances. As a fact it did not nearly fill in 1875 and did not half fill in 1876; so whatever data are to be relied on should be obtained on the spot. To this end it is desirable that rainfall should be registered at the Marlimund Reservoir which can easily be managed, and at Snowdon House, which probably can be arranged for. A knowledge, for even a short time, of the falls at these places corresponding to the falls registered at Ootacamund will be of value in determining the effect of difference of aspect and elevation.

16. REGISTERS OF SURPLUS FROM EXISTING RESERVOIRS SHOULD BE KEPT.—It may further be noticed that registers should be kept to show what the quantity of surplus discharged from the Marlimund and Dodabet Reservoirs may be, and it will be necessary to know not only the depth at the tank end of the surplus channel, which will be found from the known reading of the sole of the channel on the water tower gauge, agreeing as this does with F.T.L., but the depth also at the lower end of the horizontal part of this channel. Similarly the depths of water, or the water levels in the channels leading from these reservoirs, should be recorded at such points as will allow of the discharge being calculated. Such data are essential to the solution of the questions relating to water-supply, and their continuous record for the past six or seven years would have afforded all that would have been necessary for dealing effectively with the questions now awaiting settlement.

17. ENLARGEMENT OF MARLIMUND RESERVOIR SHOULD BE ESTIMATED FOR.—The Marlimund Reservoir has, it would seem, received more water than it could store in five years out of seven. An addition of 6 feet to its depth will enable it to retain about as much water as the proposed Snowdon House Reservoir would hold, and it is therefore recommended that this enlargement should be estimated for at once, and, if as expected the cost will be moderate, carried out at once. Its contents will then be about 11,155,500 cubic feet 69,722,000 gallons.

18. X, Y, AND Z SITES SHOULD BE FURTHER INVESTIGATED.—In the next place the X, Y, and Z sites should have sufficient sections taken to determine how far they can be utilized as reservoir sites, and what their capacities at the levels which appear to be most suitable would be. There will, it is thought, be no objection to the construction of reservoirs at these sites if it be found that storage can be effected at a reasonable cost. The X and Z sites are within the catchment basin of the site below Cinchona Villa; but the quantity of water which they will store will not, it is thought, materially affect the supply of the lower reservoir should it be deemed desirable to construct it.

19. POSITION OF FILTERS CAN DEPEND UPON ADEQUACY OF FUNDS TO ENCLOSE CHANNELS ABOVE ST. STEPHEN'S CHURCH.—All the water from the Marlimund Reservoir and from the X, Y, and Z sites can be brought to filters situated at any point below the Snowdon House site; and it must, it is thought, depend a good deal upon what the Commissioners can afford, at what point the filters should be placed. If money for enclosing all supply channels will be available the filters can conveniently be placed a short distance below Snowdon House. Otherwise the nearer they can be placed to St. Stephen's Church the shorter will be the length of piping necessary to maintain the purity of the water after filtration. It is desirable, if financially practicable, to enclose the water channels; but it can hardly be deemed essential. To take the channel from Marlimund Reservoir to Snowdon House tunnel for instance. There are one or two short lengths which should in any case be enclosed, because more or less liable to pollution from their proximity to dwellings and gardens, but the rest of this channel runs through clean ground, and the catch drain above it would, if properly looked after and the troughs which pass this drain water across the channel kept clear, prevent much fouling. Some cross fences and frequent inspection would do the

rest. The channel is certainly not in proper order, as the depths of water and velocities were found to vary greatly, which would not be the case with a channel the fall of which was equally distributed, and the waterway uniform or varied according to the nature of the channel lining. Similarly the channel from Snowdon House to near the Church could by means of catch drains and troughs be preserved from material fouling. The cost of enclosing

Above tunnel	14,646
Below do.	6,374
	21,020

the channels is estimated at 21,000 Rs., the interest on which at 6 per cent. is Rupees 1,260. Probably 360 Rupees a year in inspection and work would keep open channels in good order. Closed

channels would economize water and would be altogether more satisfactory. It is simply a matter of expense.

20. PRESENT CONSTRUCTION OF SNOWDON HOUSE RESERVOIR NOT RECOMMENDED.—The present construction of the Snowdon House Reservoir is not recommended, because the cost of storage would be great; the drainage basin is small, and it would often necessitate the passing to waste of water from the Marlimund Reservoir; for no water therefrom could be supplied to the station while that in the Snowdon House Reservoir was above 15 feet below the F.T.L. This might, as suggested by Major Morant, be remedied by closing permanently any connection between this reservoir and the tunnel and continuing a closed channel from the latter through the upper part of the bed of the latter. Then water could be conveyed to the filters from Marlimund at all times, and the reservoirs could be worked independently as might seem expedient. This arrangement does not however get rid of the cost of storage which is very high. It may ultimately be necessary to utilize this site, and nothing should be done to prejudice such future use, but until it has been demonstrated that it is not practicable to store water elsewhere more cheaply this part of the scheme may properly be held in abeyance.

21.

22. GENERAL CONCLUSION AND DETAILS TO BE INVESTIGATED AND PLANNED.—The general conclusion arrived at by the undersigned is that storage is not likely to be available for the supply of Ootacamund with a delivered quantity of water of 20 gallons a head for 10,000 persons for ten months, and it is thought that before any complete scheme of storage and distribution is brought forward for sanction, it is desirable that it should be considered more particularly what the Municipality propose to undertake to do, and for what purposes pure water is to be supplied. The District Engineer's letter of the 1st June 1877 brings forward proposals for a certain rough division of the water-supply above St. Stephen's Church into two parts, the one* to be

* 100,000 gallons.

† 150,000 do.

carried by a high level channel to above Syllk's Hotel and ultimately on to Kandal; and the other† and larger supply past the

Post Office. With these proposals estimates amounting to, in the form accepted by the Commissioners, Rupees 98,954 were submitted for enclosing the water channels and filtering the water; but these estimates evidently include only a part of the expense necessary to provide for the convenient and economical use of the water-supply. The estimates relate in fact only to a part of what may be called the principal distribution, and were so much of the work done and nothing more it would happen that by far the greater part of the supply provided at a very considerable outlay would run into the lake unused. To do much good the works contemplated will require to be supplemented at once by other works, and the following remarks will serve to indicate what are the details which have still to be planned and estimated for—

1stly.—For the supply of pure water to the bazaar: there should be service tanks or reservoirs capable of containing about three hours' supply of water, and from these pipes should run to street fountains furnished with taps from which alone water should be obtainable by the population. The number and capacity of the tanks should be fixed with reference to the population to be supplied by each, and to facilities of construction. The pipes supplying these service tanks should be

capable of being closed, and it would seem to be proper to arrange for filling them every three hours, and in the intervals to furnish the supply to individual houses.

2ndly.—For detached house-supplies it will be needful that cisterns should be

* Ordinary ball cocks.

provided to be supplied by taps* which will close on the cistern becoming full. It will not, it is thought, be feasible to do without cisterns. If the pipes for the supply of individual houses are to be allowed to run so long as there may be water in the supply pipes, such house pipes must be extremely small in order to avoid great waste, and for convenience cisterns of some sort would be necessary. It will, it is thought, be much better to require cisterns in all cases to be provided, and to supply them under self-regulating cocks. The cisterns can then be placed in such positions and at such an elevation as will make the house service thoroughly effective. It is presumed that house-supply will include water for drinking, cooking, baths, and stables, on which one rate would be charged according to the class of house and the probable wants of the residents. If water for gardens or other than domestic purposes be available and supplied, a separate and additional rate would be fairly leviable, and at any rate in dry years supplies for gardens can be afforded only to a very limited extent.

3rdly.—The intended scheme of branch pipes for the supply of the detached houses and establishments has to be worked out. There must evidently be several such lines, and the cost will not be inconsiderable. If the Commissioners propose to supply the houses on the ridge commencing with Harrow on the hill and ending with Lockend, the cost will be very material, for a great length of iron piping and probably a service tank at the off-take will be necessary. If this line of houses and the higher parts of Metoocherry are not to be supplied, a considerable part of the proposed supply of the high level channel from above St. Stephen's Church will not be required, and a proportionately less quantity will need to be stored.

4thly.—Service tanks should be constructed in connection with such a system as the circumstances of Ootacamund necessitate, whenever required to meet variations of discharge; for otherwise a good deal of water must be run to waste to prevent injury to pipes from excessive pressure. Pipes may be intended to run half or three-fourths full, but if a constant supply be issued from the principal reservoirs and if a variable quantity be drawn off from the pipes as must be the case, the variations being sometimes moderate and sometimes excessive,

* A pure water reservoir below the filters would be of material assistance.

such service tanks to act as moderators* will be essential to the prevention of waste.

23. CEMENT PIPES.—The undersigned has seen some of General Morgan's cement pipes, which it is proposed to use in part as water conduits for the distribution of the pure water. On their general merits no opinion can be given in the absence of tests, but on two points an opinion may be offered—

1stly.—The cement pipes should be capable of standing a very much higher pressure than that due to a head of six feet as named in paragraph 10 of the District Engineer's letter of the 1st June, or to a head of 10 feet which Major Morant has mentioned has subsequently been suggested. Individual pipes ought to be capable of standing a pressure of at least two-thirds of an atmosphere or $21\frac{1}{2}$ feet, and the pipes when joined by the saddle pieces should be water-tight under a moderate head of say 5 or 6 feet, otherwise the results of using them will not be satisfactory.

2ndly.—The interior surface of the cement pipes should be perfectly smooth; this surface as seen in the pipes at the manufactory was far too rough. A facing of cement rubbed hard would seem to be necessary.

The undersigned is of opinion that masonry or concrete, covered, channels are preferable to pipes whether of cement or earthen ware whenever the quantities of water to be carried are considerable, and the level of the water surface can be regulated so as not to rise above the sides. In those parts of the service in which off-takes whether to branch pipes or to individual houses will be numerous, iron pipes will be alone suitable. In these pipes a head will not only be unavoidable but advantageous, and at the junction of the masonry channels, cement or earthen ware pipes, and the iron piping there should be cisterns provided with means of discharging surplus so that the head of water may be strictly regulated.

24. SUMMARY.—By way of summary to the foregoing remarks it is noted—

1stly.—That the character and extent of the water-supply of Ootacamund should be determined with reference to the supply likely to be available.

2ndly.—That all available storage sites should be examined in order to settle where water can be most economically impounded, and to what total extent, taking the probable yield of the catchment basins into account.

3rdly.—That an estimate for adding about 6 feet to the depth of water in the Marlimund Reservoir should be prepared, and, if moderate, that this enlargement should be carried out as soon as possible.

4thly.—That the scheme of distribution of the water-supply, which is, as at present drawn up, both incomplete and imperfect, should be properly matured and its cost estimated.

5thly.—That the supply of pure water should, unless in excess of the demand for purposes for which pure water is necessary, be limited to those purposes. For these there is every reason to suppose it will suffice, but it will probably be altogether inadequate to supersede the present other sources of supply for cleansing drains, watering gardens, &c.

6thly.—That all calculations of yield of water from different areas of catchment basin should be based upon the data which the Marlimund Reservoir will, it is supposed, afford rather than upon English precedents which are not reliable for application to Ootacamund, and which in the case of the Snowdon House Reservoir site would clearly lead to disappointment. That also measures be at once taken for seeing what data the registers of water at the Marlimund Reservoir will afford, and for supplementing these by a table of capacities of that reservoir, a careful register of water levels, water issued and water discharged as surplus, and the registration of rainfall at this reservoir and if possible at Snowdon House, for comparison with the registers at Ootacamund itself.

7thly.—Whenever good storage sites may be found capable of storing economically a greater quantity of water than the catchment basin would be likely to yield, probably the supply may be supplemented by catch-drains to conduct water from beyond the catchment basin proper to within its boundaries.

25. ACQUISITION OF LANDS OF GATHERING GROUNDS.—It is understood that proposals have been made for the acquisition of the catchment basins on which Ootacamund may hereafter have to depend for its water-supply, in order to secure the purity of the water. The subject is one which the undersigned is not called upon to consider further than to remark that—

1st.—If such a course be deemed imperative it is essential to concentrate storage and to make the most of each site; also to limit the pure water-supply to strictly domestic purposes.

and it is therefore

2nd.—When valuable property occupies a part of the catchment basin, it will often be feasible and preferable to drain this so as to exclude the drainage from the reservoir, than to purchase and include the area in the basin.

26. MAJOR MORANT'S ASSISTANCE ACKNOWLEDGED.—The undersigned has to thank Major Morant for the ready assistance he has afforded. His local knowledge and acquaintance with the circumstances of the supply have enabled this report to be drawn up in a much shorter time than would otherwise have been practicable.

27. ENLARGEMENT OF DODABET RESERVOIR DESIRABLE.—It may be mentioned in conclusion that the enlargement of the Dodabet Reservoir, which is connected with the supply of the south side of Ootacamund, is certainly desirable. Its drainage basin is stated to be 184 acres, and its capacity only about 3 millions of gallons, so that it would fill with a drainage of only about 480,000 cubic feet.

enlargement will probably leave it still too small to store the average yield of the rainfall.

THENCARAICOTTAI,
22nd October 1877.

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

To the Secretary to Government, Public Works Department.

No. 221 W.

MEMORANDUM.

FROM a communication just received from the District Engineer, Nilgiris, it appears that the cost of the Marlimund Reservoir, as given in the memorandum, No. 216 W, dated 22nd October 1877, does not include certain items which ought to have been added to the sum therein named, and that the cost or expenditure stands thus—

	RS.
Marlimund Dam	14,680
Escape weir, &c.	2,120
Masonry drop, &c.	1,120
Total	17,920

It is mentioned moreover that convicts were employed in raising the dam free of all charges except Police guards, and the supply pipes under the dam were obtained cost free from the Wellington Barracks. Possibly then the cost of this reservoir should be assumed to be Rupees 20,000 when comparing it with the estimates for storing water at other sites.

MARANDAPULLY,
28th October 1877.

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

To the Secretary to Government, Public Works Department.

No. 79. ORDER THEREON, 8th January 1878, No. 105 W.

HIS GRACE the Governor in Council resolves to communicate the remarks of the Chief Engineer for Irrigation to the Municipal Commissioners of Ootacamund for their careful consideration.

2. The Governor in Council is of opinion that the raising of the bund of the Marlimund Reservoir would be of doubtful utility, seeing that the bund is by no means in a substantial condition. The project would moreover involve heavy compensation for land, and would entail the stoppage of the supply of water for a long period during the progress of the work.

3. The Snowdon Reservoir project presents a more hopeful aspect. It would be an addition to the existing sources of supply, and at a high level would command most if not all the houses below. The question of compensation should be investigated, and when the cost has been carefully estimated an application for a loan can be made in the usual way.

4. The extension of the Dodabet Reservoir should also receive special attention.

(True Extract.)

(Signed) E. A. FOORD, Colonel, R.E.,
Secretary to Government, P.W.D.

To the Financial Department, with plans and estimates, &c.
" District Engineer, Nilgiris.
" Chief Engineer for Irrigation.

Exd. T. D. Ryan.
Spare Copies

and it is therefore

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1878} Madras.
PUBLIC WORKS.

To

THE FINANCIAL DEPARTMENT,

&c., &c., &c.

Dated January 8th.

Issued

Recd.

Encl.

G. O., 8th January 1878, No. 105 W.

JANUARY.

Nos. 78-79.

Ootacamund water supply.

Memorandum.

In circulating the
accompanying printed
copy of the Report of
the Ootacamund Im-
-provement Committee,
the undersigned requests
that the Members
will be so good as to
attach their signatures
at the end. The copy
previously signed was
found to be too full
of typographical errors
to be placed on record,
and it is therefore

R.P.

proposed that the
present copy shall be
substituted for it.

2. It is requested that
the paper may be
signed in the order
in which the signatures
appear on the ordinary
printed copies, all

Members at one station
signing before the
Report is passed on
to another place.

R. H. S. S. S.

Colonel R. H. S.

President of Committee

- (1) Colonel R. H. S. S. S.
(2) Surgeon Genl. M. C. Funnell, M.D.
(3) A. H. Roupell Esq. Commissioner
of the Nilgiris - Madras
(4) Major Genl. R. J. Barker
(5) Major Genl. H. Morgan
(6) Surgeon Major A. C. Stacey
(7) Surgeon Major J. Smith
(8) J. O'Shaughnessy Esq.
(9) W. E. Schmidt Esq.
(10) Major A. R. Keane, R.E.
(11) G. J. Walsh Esq. M.S.C.E.
(12) Lt. Col. J. O. Hasted R.E.

4.6.286
287 8/10/28

Col. R. H. S. S. S.

See corrections
of heavy typographical
errors in Appendix B.

Continued

8/12/81

C. H. S.

The within
must be considered
the authorized
Report & Appendix
corrections should
be made in all
the copies

R. H. S. S. S.
at R.E.

You may probably wish
to look through the
"Proof" of these papers.?

The paper by His Excellency
the Governor which
accompanies is signed
in full. This usually
indicates that the
document is to be
treated as a "Minute"
printed in the Proceedings.
I am not certain
however as to whether
His Excellency is
acquainted with
local usage, and
thus designedly signed
this paper in full,
or whether he only

The prices of cast iron fluctuate with changes in pig iron

intends it to be read
as a "note"?

R.S.
7-2.

If His Excellency's
attention were drawn
to paras 77 and 90 of
the Manual he would
understand exactly
how these matters are
dealt with in the
Secretariat. He
probably has not
seen the Book.

R.S.

G.B. 2868 - 1-2-82
2878

C.S.W.

H.R. evidently did
not intend to have his
note printed as a Minute
but I will mention the prevailing
practice in this matter
(a) All useful corrections should
be made in writing to the
Repub. & Appendices before
disposal to India 7-1-82 Att

7/2/82
The Secretary
to the
Council
is requested to
report on the
subject of the
proposed
amendment
to the
Manual
in the
light of
the
above
instructions
and to
report
thereon
to the
Council
at its
next
meeting
on 10/10/82
Att

APPENDIX A.

OOTACAMUND WATER-SUPPLY PROJECT.

THE MARLIMUND RESERVOIR.

The present catchment area is 268 acres, of which 188.65 acres are to be cut off and 79.35 acres retained as follows:—

Owner of Land:						Area.	Area to be cut off.	Area to be retained.	
						ACRES.			
General Baker	...	...	...	...	...	189.69	186.23	3.46	Uncultivated.
Mr. Frend	...	...	...	...	...	7.02	2.42	4.60	
„ Wapshare	...	...	...	...	...	47.73	...	47.73	
Total, Private lands						244.44	188.65	55.79	
Government waste	...	...	...	...	...	23.56	...	23.56	
Total						268.00	188.65	79.35	

The area that can be added north of reservoir is 35 acres, as follows:—

Private land (Mr. Taylor's)	...	...	...	...	...	8
Government waste	...	...	...	...	...	27
Total						35.00

and on the south of reservoir 53.42 acres, as follows:—

Private lands—						
Mr. Frend	...	...	...	...	...	13.27
„ Cowdell	...	...	...	...	...	5.0
„ Griffiths	...	...	...	...	...	5.15
Total, Private						23.42
Government waste						30.00
Total						53.42
Total, area available west of Snowden Saddle						167.77

The probable cost of securing the retained and added area will be—

				RS.
Retained area, private land, 55.79 acres at Rs. 100	...	...	...	5,579
Added on north side do., 8 at „ 50	...	...	...	400
Do. on south side do., 23.42 at „ 100	...	...	...	2,342
Total, compensation for land 86.21 acres				8,321

The cost of diverting the drainage of the area cut off will be—

One mile of channel	...	...	...	500
Culvert under Marlimumd road	...	...	...	1,000
Total				1,500

Total for compensation and works ... 9,821

or say Rs. 10,000.

The catchment area of 167.77 acres set apart as above for the sole use of the reservoir can be supplemented to any extent up to from 500 to 600 acres on the Snowden Hill, of which about 10 acres value about Rs. 1,000 is private property.

The cost of conveying this drainage will be approximately as follows :—

	RS.
Catch drain round Snowdon Hill	1,000
One thousand feet of 24-inch main pipe along Snowdon Saddle ...	15,000
Cisterns at head and mouth of pipe 1,500 each	3,000
Channel from saddle to reservoir 500, superpassages of road drainage 500, inlets for hill drainage 500, culvert under Marlimund road 750	2,250
Compensation for land on Snowdon Hill	1,000
Do. do. in course of channel to reservoir	500
And for the removal of huts above proposed line of channel ...	1,000
Total ...	23,750
Add for compensation and work on Marlimund side as detailed above	10,000
Total cost of project ...	33,750

It must be observed that the 24-inch main pipe along Snowdon Saddle is calculated to carry the drainage of only 200 acres of the catchment area available on the Snowdon Hill, and more than this is not likely to be required for very many years to come. Should it be necessary to increase the supply from the Snowdon catchment area at any future time, another pipe of the required dimensions can be laid alongside of the 24-inch pipe now proposed.

DODABETTA RESERVOIR.

The present catchment area of this reservoir is 172·72 acres, of which 80·72 acres are private property and 92 acres Government waste and forest reserve. This area is a great deal more than what is required, and it will be reduced to 74 acres by cutting off 78·72 acres of the private land and 20 acres of the Government reserve as follows :—

Owner of Land.	Area.	Area to be cut off.	Area to be retained.
	ACRES.		
Mr. Misquith	5·00	5·00	0·00
„ Cowdell	75·72	73·72	2·00
Government waste and reserve	92·00	20·00	72·00
Total ...	172·72	98·72	74·00

The 20 acres of Government land which is to be cut off lies beyond the private lands, and there is no necessity to incur the expense of leading its drainage to the reservoir; because the present capacity of the reservoir is 3,000,000 gallons, or 480,000 cubic feet. This capacity is to be increased to 6,000,000 gallons or to 960,000 cubic feet. The rainfall is 42 inches per annum, and, supposing half of it reaches the reservoir, the discharge from 74 acres would be 5,641,020 cubic feet, or sufficient to fill the reservoir seven times in the year.

	RS.
The cost of cutting off the surplus area and of securing the selected basin of 74 acres for the sole use of the reservoir will be compensation for 2 acres of private land (cultivated)	500
Catch drains to carry away the drainage of the lands cut off	1,000
A small viaduct to carry this drainage under the supply channel of the reservoir	500
Total ...	2,000

The position of the reservoirs of the lands and of the works referred to is shown on the accompanying map.

The position of the proposed distributing pipes is for convenience of reference shown also, but this part of the project is explained in another paper.

OOTACAMUND,
12th October 1881.

(Signed) J. O'SHAUGHNESSY, C.E.,
Local Fund Engineer, Nilgiri District.

APPENDIX B.

IMPROVEMENT OF OOTACAMUND WATER-SUPPLY.

SKELETON ESTIMATE.

No. of Item.	Description of Work.	Reference.	Cost of each Item.	Total.
	North side of Lake.		RS.	RS.
1	Fencing round Marlimund reservoir, length 5,750 feet.	Explanatory memorandum.	4,500	
2	Widening bye-wash, by moving back road, by 15 feet.	Do. ...	2,400	
3	Catch channels to bring extra water to Marlimund reservoir (about 4 miles at Rs. 500).	Do. ...	2,000	
4	Masonry conduit from Marlimund reservoir to Snowdon tunnel (see Captain Morant's report No. 206, 1st June 1877, paragraph 11).	Explanatory memorandum and Captain Morant's report No. 206, 1st June 1877, paragraphs 11 and 12.	14,646	
5	Cement piping (12 diameter) from tunnel to proposed service reservoir near St. Stephens', 6,000 feet at Rs. 1½ per running foot (say).		7,000	
6	Service reservoir (to hold three days' supply) near St. Stephens'.	Explanatory memorandum.	35,000	
7	Distribution piping as per detail list	Do. and map.	54,000	
8	Fountains (three) and stand-pipes (thirty), "fountains" Rs. 1,200 each = Rs. 3,600, and stand-pipes Rs. 200 each = 6,000.	Do. ...	9,600	
	Total, north side of lake (say) ...		...	1,29,146
	South side of Lake.			
1	Raising by 6 feet the bund, &c., of Dôdabetta reservoir.	Explanatory memorandum and plan.	1,700	
2	Fencing round reservoir (1,400 feet)	Explanatory memorandum.	1,050	
3	Iron piping (4 inch diameter) to service reservoir west of Elk-hill aqueduct and fencing along cascades.	Do. ...	16,070	
4	Service reservoir to hold three days' supply	Do. ...	8,500	
5	Piping (as per detail list) for distribution	Do. and list and map.	38,000	
6	Stand-pipes (five at Rs. 200)	Do. ...	1,000	
	Total, south side of lake (say) ...		...	66,320
	Grand Total ...		...	1,95,000

DETAIL LIST OF PROPOSED MAIN DISTRIBUTION PIPING.

Distin- guishing No.	Lines of Pipe.	Diameter of Pipes.	Length in	To supply.
	North of Lake.	IN.	FT.	
1	From service reservoir to Club road and by Westbury road to Kandal (Pykara road).	4 3	1,980 4,290	Branch No. 2, population. 505 Do. " 3, " 1,240 All between Westbury road and Kandal nullah, and whole of Kandal ... 1,681
	Total, Length No. 1 ...	...	6,270	Total ... 3,426
2	From No. 1 (at $\frac{1}{4}$ th of a mile) along present channel.	3	2,640	All between it and Westbury road, population. 505
3	From No. 1 (at $\frac{3}{8}$ ths of a mile) at Hadfield's roads and along that road to Westlake.	3 1 $\frac{1}{2}$	1,980 3,960	Branch No. 4, population. 942 Seventeen European houses ... 298
	Total, Length No. 3 ...	...	5,940	Total ... 1,240
4	From No. 3 (at $\frac{3}{8}$ ths of a mile) at Sandrook along Whiphurst road with three minor branches (in all $\frac{3}{8}$ ths of a mile) to Muttachari.	3 1 $\frac{1}{2}$	1,650 990	Roman Catholic establishment ... 942 European houses and whole of Muttachari.
			2,640	
5	From service reservoir new line to jail and thence to bazaar (Lake road).	5 4	1,650 3,630	Branches Nos. 6, 7, and 8, population ... 3,814 Public offices, Jail, Police Lines, &c. ... 1,214
	Total, Length No. 5 ...	...	5,280	Total ... 5,028
6	From near end of No. 5 along middle bazaar road to market.	3	1,980	Part of bazaar (say) ... 2,000
7	From end of No. 5 along Lake road to Lady Hobart's school.	3	1,320	Do. do. do. ... 1,029
8	From No. 5 (at $\frac{5}{8}$ ths of a mile) near library along Telegraph lane and along Commercial road both ways to market and Charing cross.	3	3,960	Whole of Agramham Tonga Company's stable, Alexandra Hotel, &c. ... 785
9	From service reservoir along Snowdon road to M'Carmel and thence to Allunby's stables.	3	3,300	Thirteen European houses, Allunby's stables, Engineer's office, &c. ... 398
10	From pipe between Snowdon tunnel and service reservoir starting near Stover cottage and along St. Ann's Hill to near Otley.	3	2,640	Eleven European houses and Bandy shola ... 700
	Total, Running Feet ...	...	35,970	

ABSTRACT.

			Rate per Lineal Foot.	Total each size.	Grand Total.
	IN.	FT.	RS. A. P.	RS. A. P.	RS.
Part of No. 5 ...	5	1,650	2 10 0	4,331 4 0	
Part of No. 1 (1,980 feet), and part of No. 5 (3,630 feet) ...	4	5,610	2 0 0	11,220 0 0	
Part of No. 1 (4,290 feet), whole of No. 2, part of No. 3 (1,980) ...	3	23,760	1 6 0	32,670 0 0	
Part of No. 4 (1,650 feet), and whole of Nos. 6, 7, 8, 9, and 10 ...	1 $\frac{1}{2}$	4,950	1 2 0	5,568 12 0	53,790
Part of No. 3 (3,960 feet), and part of No. 4 (990 feet) (wrought iron) ...	1 $\frac{1}{2}$	4,950	1 2 0	5,568 12 0	53,790
Total, Running Feet ...	...	35,970	...	...	54,000
Total, north of lake (say) ...	...	...	...	...	54,000

DETAIL LIST OF PROPOSED MAIN DISTRIBUTION PIPING.

Dis- guising No.	Lines of Pipe.	Diameter of Pipes.	Length in	To supply.
	South of Lake.	IN.	FT.	
1	Main from service reservoir to Woodstock	4 3 1½	3,630 2,970 6,600	All branches.
	Total, Length No. 1 ...	...	13,200	
2	From ¾ths of a mile, 11 main near Elk-hill house.	1½	2,310	Elk-hill house, Little Shars-ham and Shartham.
3	From No. 2 to bank and houses near lake.	1½	1,980	Bank, &c.
4	From No. 2 at same point as No. 3.	1½	2,310	Abdul Khader's shop, &c.
5	From ¼ths of a mile of main to brewery, &c.	1½	1,320	Brewery, Stellingberg, A.B.C. ground, &c.
6	From ⅔ths of a mile of main to Bakir house, &c.	1½	1,320	Bakir house, &c.
7	From ¼th of a mile of main to St. Thomas' church with branch to "Mobarnans."	1½	4,620	Oaklands. Birdwood, Cotissa Woodcot, &c.
8	From 1¼ths of a mile of main to Barton cottage, &c.	1½	1,320	Barton cottage, &c.
9	From 2½ths of a mile of main to Blackwood cottage.	1½	1,650	Geranium cottage, West cottage, Blackwood cottage, &c.
	Total, Running Feet ...	...	30,030	

ABSTRACT.

	IN.	FEET.	Rate per Lineal Foot.	Total each size.	Grand Total.
Part of No. 1 (3,630 feet)	4	3,630	2 0 0	7,260 0 0	
Do. of ,, 1 (2,970)	3	2,970	1 6 0	4,083 12 0	
Do. of ,, 1 (6,600 feet) and whole of all other branches (wrought iron) ...	1½	23,430	1 2 0	26,358 12 0	37,702 8 0
Total, Running Feet ...	...	30,030	...	...	
Total, South of lake (say) ...	...	...	...	...	38,000 0 0

EXPLANATORY MEMORANDUM TO ACCOMPANY ESTIMATE FOR WATER-SUPPLY IMPROVEMENT.

NORTH SIDE OF LAKE.

ITEM 1.—*The fencing round the reservoir* is intended to be of four lines of galvanized iron wire 1 foot apart running through tarred teak uprights 9 feet apart, of a total height of 6 feet, of which 2 feet buried in the ground. This will prevent cattle from getting to the water and fouling it by droppings and wallowing. It will also keep out human trespassers who now frequently use the lake to wash themselves, &c., cattle in partly from ignorance and partly from the temptation afforded by unobstructed facility. Of course, a watcher will be required, no matter what may be the character of the enclosing fence.

ITEM 2.—*Widening Bye-wash.*—On the sufficiency of the surplussing arrangements depends the safety of the reservoir; those in existence, though they have proved sufficient for the present catchment basin, are, according to theory, perilously small, and when the catchment basin is increased, as proposed, they must be widened by 15 feet.

ITEM 3.—*Catch Channels.*—Though the existing* reservoir when full holds enough† for a five months' supply, its present catchment basin does not suffice to frequently fill it, and it is therefore proposed that, if found necessary, water from other gathering grounds should be led to the reservoir.

* Capacity 50,000,000 gallons.

† 20 Gallons per head per diem × 12,000 population ×
152 days + 10,000,000 gallons evaporation =
46,480,000 gallons.

See Appendix (A).

ITEM 4.—*Masonry Conduit from Reservoir to Snowdon Tunnel.*—It has been decided that, on the score of both cleanliness and economy of water, it is necessary to enclose the channel, and the fall available being small a masonry conduit will be much cheaper than iron pipes; such a conduit has been already designed and estimated for by Captain Morant.—See paragraph 11 of his report No. 206, 1st June 1877, the cost being Rs. 14,646.

ITEM 5.—*Cement piping from Snowdon Tunnel to proposed "Service" Reservoir near St. Stephens' Church.*—For the same reasons as those given as regards Item 4, this portion of the channel should be enclosed, and, as the fall is considerable, a 12-inch pipe will be sufficient to discharge all that is required (240,000 gallons in twelve hours) running three-fourths full. An iron pipe of that diameter would cost about Rs. 6-4-6 a running foot, but as with proper surplussing arrangements at the service reservoir there need be no pressure on the pipe, a cement pipe, as proposed in paragraph 12 of Captain Morant's report, No. 206, dated 1st June 1877, will do, and this according to his estimate will cost only about Rs. 1-2-0 a running foot, or a total for the 6,000 feet of Rs. 6,750, (say) Rs. 7,000.

ITEM 6.—*Service Reservoir near St. Stephens' Church.*—From this it is proposed to lead off the distributing mains; it will serve as the pressure reservoir, and it is thought that to prevent inconvenience, in the event of stoppage of supply from the Marlimund reservoir for a time to admit of repairs to that reservoir or to the channel from it, it would be advisable to make this service reservoir of a capacity to hold three days' supply, i.e., 720,000 gallons. With a depth of water in it of 8 feet, which has been adopted, the area of the reservoir would have to be 14,400 square feet. It would have to be cut out of the side of the hill, and this would, if it were made square, necessitate such a great depth of cutting over part of the area that it is considered advisable that it should be 60 feet broad × 240 feet long, therefore the walls would have to be 9 feet high, and where not built into the sides of the excavation of a mean thickness of about 4 feet, where merely face walls to the excavation, they might be of a mean thickness of 2 feet; they should be of best brickwork in cement and coated on exposed faces with cement. The floor and foundation of walls, a 1 foot 6 inches thick platform of cement concrete. Surplus might be provided by a 9-inch iron pipe leading for about one-eighth mile to either of the natural streams east or west of Church Hill. From this reservoir would take off one-fourth inch, one-fifth inch, and one-third inch main (Nos. 1, 5 and 9 in detail list of distribution piping) with the necessary controlling valves. The total cost at rates furnished by Mr. O'Shaughnessy would be approximately Rs. 35,000.

ITEM 7.—*Distribution Piping.*—The system of mains proposed is indicated in the "detail list" of distribution piping and on the plan herewith. The sizes of the pipes would probably require rearrangement (almost always in the direction of reduction) when detail levels are taken for working the system out with accuracy. It has been assumed that the pipes should be able to carry the full daily supply in twelve hours. The rates have been arrived at from those again in the attached letter from the Ashley Works, Coonoor.

ITEM 8.—It is considered that there should be provided additional street fountains and thirty "stand-pipes" fitted with "self-closing lever valves" which will only allow a certain quantity of water to pass each time the knob or handle is lifted, and with caps from which a water-cart can be filled into which a nose may be attached. The former, will cost probably Rs. 1,200 each, and the latter Rs. 200 each.

SOUTH SIDE OF LAKE.

ITEM 1.—*Raising bund, &c., of Dodabetta Reservoir.*—The population south of the lake is 1,800; taking it as 2,000, the total storage required is $2,000 \times 20 \text{ gallons} \times 150 \text{ days} = 6,000,000$ gallons. The existing reservoir is said* to hold 3,000,000 gallons (this is probably under the mark), and I have ascertained from a survey (plan herewith) that by raising the full water-level by 6 feet, the contents would be increased by about 3,375,000 gallons, and the estimate provides for such raising of the bund, water tower, bye-wash, &c. The catchment basin and rainfall are ample.

ITEM 2.—*Fencing round Reservoir* to be of same character as described for Item 1, north side.

ITEM 3.—For the reasons given under Item 4, north side, it is proposed to enclose the whole channel from the reservoir (with the small exception named below); the fall available being great a small iron pipe (4-inch diameter) will suffice and be the cheapest arrangement. The estimate therefore provides for such a pipe to the "service" reservoir excepting along two cascades (700 feet in length) which it is proposed only to fence, leaving the water to be aerated and oxygenized by the exposure to the air and the tumbling down the cascades, a total height of about 200 feet.

ITEM 4.—*Service Reservoir* to hold three days' supply equal 120,000 gallons, 2,400 square feet required. There is a capital site between "Pepbrook" and "Elk-hill Lodge" (or "Cottage") and on the general lines indicated under Item 6, north side (except that this reservoir might be square and the surplus pipe only a few feet long), the cost would probably not exceed Rs. 8,500.

ITEM 5.—*The remarks on Item 7, north side*, are applicable to this.

ITEM 6.—*It is considered that "stand-pipes" of the character and cost mentioned under Item 8, north side*, should be provided.

(Signed) G. T. WALCH,
Executive Engineer, P.W.D.

N.B.—It will be observed that all the arrangements and calculations in the above estimate have been made for a supply of 20 gallons per head per diem; but first as in excessively dry years the quantity intercepted may be rather short of this; second as the population do not really require more than half this amount; and third as there are wells and springs to supplement the supply, the Committee in their report have adopted 10 gallons per diem as the standard. As, however, in all years of ordinary rainfall, 20 gallons may safely be distributed, they prefer not to alter the estimate framed by Mr. Walch.

REPORT.

THE Committee appointed under G.O., 6th June 1881, No. 1408 W., to consider and report on the measures deemed to be urgently required for the improvement of the station of Ootacamund, and to give an approximate estimate of the cost of the needful works, have now the honor to submit their views for the favorable consideration and orders of Government.

2. Before doing so they beg to explain that the delay which has occurred in submitting their report, has chiefly been due to the necessity for personal examination of the various localities, and discussion of details of plans for water-supply and drainage, before a final decision could be arrived at.

3. It may also be mentioned that Colonel Hasted, Major Mead, and Mr. Walch, owing to the calls of their respective duties, have been obliged to absent themselves from the later meetings; they, however, afforded valuable assistance to the Committee in the early stages of the inquiries. Mr. Minchin also had to leave for England without taking part in the discussions.

4. The work of the Committee was confided to two Sub-Committees, who, in addition to minute personal inquiry, have thoroughly considered all the important reports bearing on the sanitation of Ootacamund which have previously been submitted to Government; and the following conclusions, in which the members are unanimously agreed, will, for the sake of convenience, follow much the same order in which the various subjects of inquiry have been taken up by the Sub-Committee alluded to:—

I.—SUITABILITY OF THE EXISTING SUPPLY OF WATER IN QUANTITY AND QUALITY.

5. Ootacamund is divided into two distinct areas, each of which has its storage reservoir, one the Marlimund tank, north, with a calculated capacity of 50,000,000 gallons; the other the Dodabetta tank, south, capable of containing 3,000,000 gallons.

6. Allowing 10 gallons per head per diem, and under the supposition that it is necessary to store a five months' supply to meet the requirements of exceptionally dry seasons, the Committee consider the storage capacity of the Marlimund reservoir ample for the present inhabitants, about* 11,000,

* By the last census the total population north and south of Ootacamund has been shown to be 12,396.

and for reasonable future increase, as 16½ million gallons is all that would be consumed in that time.

7. Major Morant has, it is true, in his report, as per margin, calculated that the supply is inadequate, and with a view to counteract this suggested the construction of another reservoir below Snowdon House, but adds that at least nine-tenths of the volume is now wasted in distribution. If, as will presently be shown, the drainage of not less than 300 acres can be counted on for storage, 68 millions of gallons would be received each year by the reservoir, assuming that only 10 inches out of the average annual rainfall of 42 inches be intercepted, and the Committee therefore are satisfied that with due precautions the existing supply should prove ample.

8. The quality of the water collected in the reservoir is not, however, satisfactory. A large proportion of the area of the catchment, even at the time of its construction, was under tea cultivation, which, as the plants need considerable manuring, renders this part of the supply unfit for drinking.

9. To buy out the owner of the Tudor Hall estate would prove too expensive, but the Committee have had under consideration an alternative plan which, though not worked out in all its details, affords *prima facie* evidence of a less costly solution of the difficulty.

10. By excavating a catch-drain immediately below the Tudor Hall tea estate, it is hoped that all the impure supply from this source can be led off and delivered below the reservoir into the waste channel.

11. At the same time, in order to make good the area thus cut out (188.65 acres of the catchment, 268 acres in all) and if necessary add considerably to the supply, it is proposed to collect the drainage of not less than 200 acres of the upper part of Snowden Hill (an area which is probably more free from all sources of contamination than any other) and lead it past Snowden House in the manner indicated in the annexed survey and estimate, *Appendix A*.

12. To the Snowden area will also be added the drainage from 35 acres immediately north, and 53.42 acres south, of the reservoir, to be led in by simple catch-drains.

13. The total catchment area thus secured will be as follows:—

	ACRES.
From present catchment	79.35
From Snowden (available)	150.00*
From the new area North	35
Do. do. South	53.42
	88.42

Total Acres (say) ... 318.00

* One-fourth of the Snowden area is thrown out as the 24 inch diam. pipe would not pass the whole drainage of the 200 acres on that side. At any future time by simply adding one or more pipes the drainage of an additional 150 acres or as much more as may be needed can be added to the catchment.

14. As regards the reservoir on the south side below Dodabetta, although the number of inhabitants which it will have to supply will probably not exceed in future 2,000, the present capacity, 3,000,000 gallons, is considered insufficient, and the Committee propose to increase this by 3,375,000 gallons, raising the bund 6 feet. See *Appendix B*.

15. But here again much of the catchment area being under high cultivation, such portion as cannot be readily acquired or effectively controlled must be cut out, and a fresh supply from a thoroughly reliable source brought in. Fortunately there will be neither difficulty nor any appreciable expense in effecting this. See *Appendix A*.

16. The Committee would here venture to express an opinion that the measures above recommended for insuring a perfectly pure source of water-supply for Ootacamund will have but little practical effect, unless the most stringent rules are not only laid down but enforced, for preventing in future all contamination of the catchments.

17. Already injunctions on this subject have been issued by Government; but it is feared that owing to various causes, these have not been complied with so strictly as could be desired, and it would appear essential that in the yearly Administration Report of the Municipality, the manner in which the purity of these areas is maintained, should be invariably and specially dwelt on for the information of Government.

18. Not only should the catchment areas be properly fenced off, but even grazing of cattle should be prohibited.

19. In immediate connection with the supply of water for the station, and as a possible substitute for storage reservoirs, the Committee have had under consideration proposals for an extensive construction of wells, both public and private, and in reply to a circular addressed to house-holders with this object have elicited the fact that there exist already not less than 208 wells and 69 springs of water, many of the latter being perennial. Although this points to the existence of a large supply of drinking water in ordinary years, the Committee are inclined to think that neither on the score of purity nor of permanency in exceptionally dry seasons, can either or both of these sources be implicitly relied on.

+ Well water in the bazaar is very impure. These wells will have to be filled in or permanently covered over.

20. From evidence before them the Committee consider that well water in Ootacamund is not always pure, and as regards quantity and permanency of supply, several wells, which on first construction gave good promise, are shown to have subsequently run dry.

21. Whether special encouragement should be held out to construct wells may be a matter for future consideration; but for the present the Committee think on the whole that the construction of wells may be left to private individuals.

II.—BEST MEANS FOR ECONOMISING THE SUPPLY OF WATER.

22. There can be no doubt that, as at present distributed in open channels, an immense percentage of the water, estimated as shown by Major Morant at no less than nine-tenths of the total volume, is lost. The remedy for this is simple, and the Committee are of opinion that the only proper way to conserve the water, which in addition to loss in volume is subject to all kinds of contamination, is to conduct the supply to its destination in masonry conduits and pipes.

23. The general features and probable cost of the scheme are given in *Appendix B*, from which it will be observed that, as regards the northern area, the water is to be conveyed in a closed masonry channel from the Marlimund reservoir to a point immediately above St. Stephen's Church. Here there will be a pipe head reservoir, from which the distribution will be made in iron pipes of varying capacities, to all the most suitable points.

24. For the southern area the distribution would be wholly by iron pipes carried from the Dodabetta reservoir to the most distant points of supply.

III.—DRAINAGE WORKS REQUIRED.

25. Under this head the drainage of the bazaars claims first attention. In the opinion of the Committee the scheme framed by Mr. O'Shaughnessy for the drainage of the main Ootacamund bazaar, estimated to cost Rs. 86,400, if supplemented by gullies with gratings, and with short lengths of pipe, to drop the scourgings of the houses and backyards into the street drains, will prove suitable, particularly if everywhere stone surfaces are provided as a protection against the rough usage to which all such drains are necessarily exposed in effecting the daily cleansing, &c.

26. There is every reason to hope that, after the proper levelling and sloping of all the backyards, as contemplated by Mr. O'Shaughnessy's scheme, the provision at intervals throughout the streets of receptacles for filth and rubbish, and the strict enforcement of all conservancy rules by the municipal servants under the lately appointed Health Officer, the formation of a rotten soil should be impossible in future.

27. In addition to the special drainage works above for the main bazaar, analogous but less costly measures must be carried out for Kandal Town, which is now in a very filthy state.

28. The drainage also of one or two small localities like Bandi Shola, which cannot conveniently be brought into any large system, should be dealt with by cess-pits, which will have to be cleaned periodically.

29. Next in importance to the proper provision of surface drains for the several bazaars, &c., is the removal of the sewage, which is at present, with the exception of that from Kandal, discharged into the lake, the water of which thus becomes more foul year by year. The upper portion, east of the Willow Bund, is now in great measure a sedgy pond, covered with much floating weed, and with sewage accumulations at the extremity of all the bazaar drains. Instead of the beautiful feature which it might easily, with a little care and taste, be made, the lake is rapidly becoming a disgrace to Ootacamund.

30. Some slight modifications in the details of Captain Tulloch's project have been recommended by the professional officers on our Committee, and it is also thought that instead of commencing the sewer near the head of the lake, a sewage pipe of small capacity, (preferentially of iron,) should be carried up as far as the Madras Carrying Company's premises, as a good deal of foul matter is now discharged into the supply channel from that quarter, which it would otherwise be difficult to dispose of. These slight modifications would approximately raise the estimated cost from Rs. 74,000 to Rs. 90,000.

IV.—OBJECTIONABLE OCCUPATIONS.

31. At various places throughout Ootacamund objectionable occupations have been allowed to spring up. Though the removal of such is only matter for compensation, as the provisions of the Land Acquisition Act can be put in force, the cost will be heavy, and should be undertaken with discrimination, and be only resorted to in the most urgent cases.

32. Among the most needful measures in this respect will, the Committee consider, be the following :—

- (1) The acquisition for public purposes of Toppa Moodelly's lines and bungalow (at foot of Bombay House hill) and the land attached thereto.
- (2) Do. do. Tom's bungalow and site at foot of Shoreham hill.
- (3) The acquisition, drainage, and cleansing of—
 - (a) Joachim Petta, a collection of filthy houses.
 - (b) Charcoal village, do. do.
 - (c) The long unused Forest Department timber-yard, near Charing Cross, a great eye-sore in the heart of Ootacamund.
 - (d) Tirroovangadam Moodelly's land near Crewe Hall, most unsightly in its present condition.
 - (e) Other objectionable spots in scattered localities.

33. For the persons removed under (1), (2), and (3), fresh buildings sites, &c., should be found in Kandal and the necessary compensation paid. In most of these cases the amount of the latter has been sufficiently ascertained.

34. As a rule the future extension of native occupation should be allowed only in the last-named locality—Kandal town—where land may be acquired by the Municipality and laid out on a well-arranged plan.

35. In immediate connection with this subject, the Committee desire to bring to notice that the municipal authorities have apparently no sufficient powers, under the existing Act, to prevent the erection of unsightly tenements, and that if expenditure is now to be incurred as recommended for the removal of objectionable occupations, it would appear equally necessary to legislate with this object for the future.

V.—OBJECTIONABLE VEGETATION AND NEGLECTED LANDS.

36. The excessive growth of the Australian acacia ("wattle") has become a most serious evil in Ootacamund, and from the fact that in the form of a jungle or dense "bush", it has proved itself of value to house-owners as fire-wood, the nuisance threatens to be perpetuated indefinitely.

37. The Committee are satisfied that nothing short of complete extirpation of the "wattle" from the station will answer or should be aimed at, and they beg to press the necessity of this most earnestly on the consideration of Government. The medical officers are very pronounced in their condemnation of this overgrowth, which, as well known, is in Australia carefully kept at a distance from all towns/stops the free circulation of air, and affords shelter for nuisances of all descriptions.

38. The Municipal Commission are understood to have under contemplation, the necessity of imposing such a rate on the cultivation of the wattle, as will prevent the areas so occupied being looked on as a valuable firewood preserve.

39. This measure may be deemed oppressive by house-holders, but the magnitude of the evil is such that, in the public interests, some sacrifice is called for. To minimise as much as possible the objections that may be entertained to the proposed action, the Committee would venture to recommend that Government meet the house-holders half way, by some such arrangement as the following :—

40. It is generally understood that to eradicate the wattle costs about Rs. 200 per acre, and that even with this outlay it is difficult for private individuals to ensure that the work is thoroughly done, as coolies on daily hire, unless very closely watched, fail to remove the roots which are the source of the evil.

41. The work can, in fact, be only done satisfactorily by prison labor, and the Committee would suggest that Government maintain an adequate body of convicts to meet the requirements of private individuals in this respect, and that the jail authorities be prepared to contract for the thorough eradication of the wattle, at the rate of Rs. 100 per acre.

42. By this means alone the Committee are convinced can this evil be met, and, should Government adopt the suggestion, they are of opinion that with due notice it would be perfectly equitable to enact that the retention of the obnoxious plant in any compound after a period of ten* years should be illegal, and subject house-owners to penalties, in addition to meeting the full cost of its eradication.

* Some members of our Committee consider that a grace of only five years should be granted.

43. In a minor degree other classes of vegetation, allowed to run into excess, are very objectionable, added to which heaps of paper, broken glass or china, with the thousand and one objects which, though not actually injurious to health, are in civilized countries prohibited as nuisances, meet the eye at every turn in parts of Ootacamund. For the removal of these and for securing proper attention to the tidy and neat appearance of the various private properties, the Committee consider the Act requires strengthening.

VI.—SLAUGHTER HOUSES.

44. The mutton, beef, and pork slaughter houses should, in the opinion† of the Committee, as strongly urged by many medical authorities on previous occasions, be moved from their present site, closely adjoining the Main Bazaar, to a spot beyond Kandal on the Pykara road.

† Some members of the Committee would be satisfied with the less expensive proceeding of simply improving the present slaughter houses.

VII.—A GOOD DAILY MARKET.

45. Public opinion being unanimous as to the necessity for this, as lately evinced by the movement so heartily responded to, of associating the name of the late honored Governor with the work, that the Committee feel it would be superfluous to record their reasons for considering this to be perhaps one of the most urgent necessities of the station. They merely observe that the butchers' shops would all be transferred to this building, and that such removal would put an end to one of the most offensive sights in Ootacamund. Moreover, from information received, the work is certain to be remunerative.

46. Legislation will be necessary to compel butchers and persons of certain other callings to confine the sale of their wares exclusively to this new market.

VIII.—MISCELLANEOUS BUILDINGS, &c., NEEDED.

47. (a) A public cattle and bandy-stand with proper shelter for the animals close to the market.
 - (b) Permanent lines for municipal coolies and bandy-men.
 - (c) More public latrines and urinals in various parts of the town.
- Some of these works will be remunerative, (a) especially so.

IX.—IMPROVEMENT AND PLANTING OF PUBLIC GROUNDS.

48. All the lower parts of Ootacamund suffer both in appearance and in salubrity, from the lodgment of water and imperfect drainage.

49. One of the worst localities in this respect is at present being dealt with in constructing a new road of approach to Government House and the Botanical Gardens, advantage being taken of the work to cut a deep drain which, with other arrangements, should in time have a marked beneficial effect.

50. But all the low ground extending down the valley to the head of the lake has water so near the surface that much of it is in a sedgy condition, overgrown with docks and other rank weeds, and is both offensive to the eye and unhealthy. The A B C ground is from this cause the most notably catch-cold place in Ootacamund.

51. All the portion of the lake east of the Willow Bund is in the offensive condition previously described under head III above.

52. There are two ways of dealing with the matter, (1) by raising the level of all the affected grounds, or (2) by lowering the level of the water in the lake, which necessarily keeps up the spring level. The latter is obviously by far the cheapest plan, all that is needed being to cut down the level of the waste weir at the bund from 3 to 6 feet as may be desirable; in fact, by just so much as will lay dry the portion east of the Willow Bund. The ground so reclaimed may quickly and at small expense be turned into pleasure and recreation grounds.

53. The latter are much wanted for such purposes as Cricket, Polo, and Gymkana Sports, for which the present A B C grounds are much too restricted.

54. It must be borne in mind that the lake, as it stands, fulfils no useful functions for Ootacamund. It irrigates no ground below its bund, its water is unfit for drinking, unused for boating, and, if not ornamental, is valueless if not worse, as being little better in its present state than a receptacle for sewage.

55. The slope of the margins being very steep, the lowering of the present water-level by 6 feet would not narrow the present spread of the water in all by more than 30 or 35 feet at most; practically therefore this proposal, while pointing to an easy means for improving sensibly the sanitary condition of all east and north of the Willow Bund, and affording scope for improvements otherwise unattainable, would to no sensible degree interfere with the extent of the lake to the west of that point.

56. Instead moreover of leaving this latter portion in its present bald, unplanted, and uncared-for condition, particularly along its northern margin, the Committee strongly advocate all the knolls down to the water's edge being planted with selected trees (conifers chiefly) thereby turning the lake into the most attractive feature in Ootacamund.

57. North and close above the main bazaar it is very desirable that a wide road should be cut out of the hill side leading towards the market place, and the excavated earth used for filling in the unsightly pits, and otherwise bringing into form this most unsightly and neglected portion of ground.

58. The Committee consider that in connection with these and other improvements, to be effected chiefly through the action of the Municipal Commission, it would be highly desirable to enlist the active aid of all house-owners, in effecting judicious clearances of over-planted land, and by planting ornamental trees in groups or singly where such would be most effective.

59. With this object they would strongly recommend that both the Superintendent of the Botanical Gardens, and the Gardens themselves, should be placed much more than has hitherto been the case, at the service of the public.

60. The duties of the former might, with great advantage, be strictly confined in future to the care of all public grounds in Ootacamund, and to affording advice and assistance gratis to all house-owners, who may be desirous of improving their compounds by planting or clearing.

61.* He should maintain at the gardens a nursery of such young trees and shrubs as experience has proved to answer best, the plants to be sold to the public (of Ootacamund only) at strictly cost price, instead of as hitherto at practically prohibitory rates. It is not perhaps too much to say that, owing to the present high prices of the plants and to the location of the gardens, the latter have hitherto been of little or of no use to any one.*

62. To these duties might with advantage be added the publication from time to time of price lists of all the saleable stock, including seeds procurable from the gardens, and a monthly Gardeners' Chronicle, giving hints regarding the flowers to be put in during the succeeding month, the cultivation of vegetables, fruit trees, &c.

63. As the Committee are given to understand that the present Superintendent has many miscellaneous demands on his time unconnected with Ootacamund, which are incompatible with those above alluded to, they trust the Government may find it feasible to relieve him of all extraneous duties.

Why? Was he engaged to do this or anything like this? If he was, why decorate him with the title of Superintendent of the Botanical Gardens? I suppose he is paid as a man of science. We should have a report about this. If the gardens & their Superintendent are under, tampered, or much to blame & should be

paraded accordingly; but that the can should be for one
As at present advised I disagree with every one
of para 59 to 63 inclusive MRD Dec 3/01

64. X.—COST OF THE SEVERAL PROPOSALS.

Water-supply, North side of Ootacamund.

	RS.	TOTAL RS.
Additions to the catchment of the Marlimund reservoir with subsidiary works, &c., see Appendix A.	33,750	
Fencing and distribution generally, see Appendix B	1,29,146	
Extra establishment and contingencies at 10 per cent.	16,289	
Total, North side	1,79,185	

Water-supply, South side.

Alterations to catchment of Dodabetta reservoir, see Appendix A.	2,000
Fencing and distribution generally, see Appendix B	66,320
Extra establishment and contingencies at 10 per cent.	6,832
Total, South side	75,152

Grand Total for water-supply and distribution (in round numbers) ... 2,55,000

Drainage.

Surface drainage, main bazaar, with certain additions to Mr. O'Shaughnessy's estimate.	90,000
Do. Kandal town	30,000
Do. other localities	25,000
Intercepting sewer as estimated by Captain Tulloch with certain additions to complete the scheme.	90,000

Total, Drainage ... 2,35,000

Urgently required improvements.

(a) Unremunerative.

Removal of objectionable occupation	50,000
Improved lighting for the streets and roads	7,000
Additional latrines and urinals	7,000
Conservancy plant	7,000
Office for Municipal Commission	10,000
New road above the main bazaar, lowering the level of the lake, reclaiming same at upper end, &c.	40,000
Planting public grounds, margin of lake, &c.	25,000
Unforeseen contingencies	14,000

Total, Unremunerative requirements ... 1,60,000

(b) Remunerative.

New General Market	2,50,000
Cattle and bandy stand	30,000
Slaughter houses	25,000
Scavengers' and bandymen's lines	15,000
Contingencies	10,000

Total, Remunerative requirements ... 3,30,000

Total for improvement ... 4,90,000

Grand Total under all heads ... 9,80,000

XI.—WAYS AND MEANS.

65. As comprehensive improvements on the scale above contemplated by the Committee would unquestionably insure a valuable enhancement to all property in Ootacamund, it is only reasonable that all house-holders should be prepared to undertake a fair share of the charge imposed by the provision of the means needed for their execution.

66. House-holders are now taxed for all municipal purposes to the extent of $7\frac{1}{2}$ per cent. on the rental value of their properties.

67. This is sensibly lower than the incidence of taxation in Madras and other large towns, and the Committee see no reason why, in order to meet as far as possible the objects at present in view, a maximum *consolidated* rate of 12 per cent. on the

* Two members of the Committee deprecate so high a consolidated tax as 12 per cent. and consider that 10 per cent. should be the maximum. rental* should not be imposed, *i.e.*, under the proviso that the scheme in its entirety, as now recommended, commands the approval and sanction of Government. It

is needless to say that legislation would be necessary for this.

68. While thus prepared to recommend an increase of taxation to this large amount in the conviction that the resulting benefits will in time well repay the same, the Committee would deprecate very earnestly any increase over and above the limit specified, as such would in all probability tend to discourage permanent residence on the part of those classes, whose presence it is on every account most desirable to encourage, viz., the retired servants of Government and others with limited means.

69. The Committee are given to understand that the Municipality have already addressed Government as to the propriety of raising a loan of four lakhs of rupees at 4 per cent., with a view to carrying into effect some of the most needful improvements specified in this report, and they are of opinion, from statements of the financial condition laid before them, that with a consolidated tax to the limit proposed, the Municipality could not only meet the demand for interest on the loan, but be enabled to create a sinking fund for the eventual extinction of the debt.

70. The total approximate outlay being close on ten lakhs, the Committee see no other means for meeting the difference, viz., six lakhs, than by a Government grant, and, however large the demand, they are encouraged to hope that, taking into consideration the peculiar position which this station occupies, and the functions it fulfils towards not only this Presidency, but it may fairly be said towards the rest of India, such may not be considered unreasonable.

71. They cannot do better than here quote the cogent arguments adduced by Lord Napier when, as Governor, he recorded the following observations in his minute, dated 13th September 1867. "The Government of Madras, acting with the sanction of the Government of India, has created Ootacamund, has beautified it, has rendered it accessible by expensive roads, has made it the seat of various public establishments, such as jails, dispensaries, orphanages, and plantations, has invited the sick and the suffering of all classes to repair hither from all parts of India for the restoration of their health and vigor. The Government has given an imperial character and significance to the place, but while doing so, has marred its benevolent intentions by leaving a source of mischief in the very centre of the cherished spot. I do not think it would be liberal or equitable, at this stage when the evil has just attained proportions which can no longer be concealed or denied, that the Government should create a Municipality and discharge upon it the burthen of remedying an abuse which the Government itself permitted to grow."

72. The time that has elapsed since these eloquent words were penned, and since the more prosaic, but not less accurate and forcible, reports previously alluded to were written by the professional officers of Government, has only served to confirm and intensify the truth of all that has been thus advanced.

73. The Municipality were created at a time, when few or none of the really essential sanitary requirements of this large and growing station, had even received an initiative.

74. With means which were, and still unfortunately are, barely sufficient to meet the most urgent daily demands, and with moreover an Act, the many imperfections of which are only too patent, they were apparently expected not only to initiate but carry out several large measures of reform and improvement most urgently demanded, and the Committee feel bound to submit that prompt measures are needed to rescue this deserving body from a most embarrassing position.

75. The appeal made by Lord Napier was promptly and liberally responded to by the Supreme Government, who in their Public Works Department letter No. 792 C, dated Simla, 2nd November 1867, conveyed sanction to Rs. 74,000 as an Imperial Grant, on account of Captain Tulloch's estimate for the intercepting sewer. Most unfortunately this grant, owing it is believed to the exigencies of finance, was never availed of, and the work was consequently not carried out.

76. Looking to the foregoing considerations, and the fact that the Government of India has, it is understood, during late years given grants of not less than eight lakhs of rupees for general improvements, and lent seven lakhs more at 4 per cent. to the Simla Municipality for water-supply works, the Committee are sanguine that at least half of the 6 lakhs so urgently needed for Ootacamund may, under proper representation, be conceded as a grant-in-aid from *Imperial* Funds, with the object of carrying out the suggested improvements to this the Queen of hill stations and the finest sanitarium in India; also that the remaining three lakhs may be given from *Provincial*. These grants if conceded might if necessary be spread over the next three or four years.

(Signed)	R. H. SANKEY, Colonel, C.B., R.E.
(")	M. C. FURNELL, M.D., Dy. Surgeon-General.
(")	N. A. ROUPELL, Commissioner of the Nilgiris.
(")	R. J. BAKER, Major-General.
(")	H. MORGAN, Major-General.
(")	J. O. HASTED, Lieutenant-Colonel, R.E.
(")	N. C. NANNY, Surgeon-Major.
(")	J. SMITH, Surgeon-Major.
(")	H. R. MEAD, Major, R.E.
(")	G. T. WALCH, M.I.C.E.
(")	J. O'SHAUGHNESSY.
(")	W. E. SCHMIDT.

OOTACAMUND,
25th October 1881.

Note records
and sent to Madison
to be printed with P.M. Sept
24 May 1881

Shun solicitation in

Official Memorandum

accepting the opinions that
the B. I. R. R. for the
faced their claims
to be adopted, but
there cannot be a
consensus of opinion
in B. I. R. R. that
the portion of the work
must be secured by
a tender better supply
than an intercepting
law I carry the
damages away from
the L. R. R. & discharge
beyond its port.

Here I am I am

On examination of the
papers & plans sub-
mit to the letter in the
President - of the Oklahoma
Municipality No 58 of
the 26 letters I have
no hesitation in giving
my strong support to the
so called scheme No 1
amounting to \$86,000
in providing stone
lined drains in the
Pittah

In various accounts
of the Executive Engineer
in adopting stone in
preference to cement
are promised those which
I fear I in vain urged
on the Oklahoma Municipality

(See my memo of
3^d Nov. 1880 paras
13 to 23 printed with
D.D. 28. December 1880
No 2953 W) with the
validity of which I
still consider incon-
-testable

My remarks on
house connections &
the sumptuous foul state
of the back yards (paras
6 to 10 of the same memo)
are also I consider
applicable in this
case

With these few obser-
-vations I might have
close my remarks were
it not that I find both
the Medical Officer and
the President are naturally
anxious that this scheme
good in itself, should
only be regarded as
just one of the much

The intentions. and
as it is evident that
the Council will not be
able to effect these
improvements. I consider
the health of this
important Sanitation
from in course. Given
with a loan. but that
a large grant from
State funds must be
tender of the vitally
important project
is to be carried out
I think we must have
a complete scheme
with the 1st 2nd 3rd 4th 5th 6th 7th 8th 9th 10th 11th 12th 13th 14th 15th 16th 17th 18th 19th 20th 21st 22nd 23rd 24th 25th 26th 27th 28th 29th 30th 31st 32nd 33rd 34th 35th 36th 37th 38th 39th 40th 41st 42nd 43rd 44th 45th 46th 47th 48th 49th 50th 51st 52nd 53rd 54th 55th 56th 57th 58th 59th 60th 61st 62nd 63rd 64th 65th 66th 67th 68th 69th 70th 71st 72nd 73rd 74th 75th 76th 77th 78th 79th 80th 81st 82nd 83rd 84th 85th 86th 87th 88th 89th 90th 91st 92nd 93rd 94th 95th 96th 97th 98th 99th 100th 101st 102nd 103rd 104th 105th 106th 107th 108th 109th 110th 111th 112th 113th 114th 115th 116th 117th 118th 119th 120th 121st 122nd 123rd 124th 125th 126th 127th 128th 129th 130th 131st 132nd 133rd 134th 135th 136th 137th 138th 139th 140th 141st 142nd 143rd 144th 145th 146th 147th 148th 149th 150th 151st 152nd 153rd 154th 155th 156th 157th 158th 159th 160th 161st 162nd 163rd 164th 165th 166th 167th 168th 169th 170th 171st 172nd 173rd 174th 175th 176th 177th 178th 179th 180th 181st 182nd 183rd 184th 185th 186th 187th 188th 189th 190th 191st 192nd 193rd 194th 195th 196th 197th 198th 199th 200th 201st 202nd 203rd 204th 205th 206th 207th 208th 209th 210th 211th 212th 213th 214th 215th 216th 217th 218th 219th 220th 221st 222nd 223rd 224th 225th 226th 227th 228th 229th 230th 231st 232nd 233rd 234th 235th 236th 237th 238th 239th 240th 241st 242nd 243rd 244th 245th 246th 247th 248th 249th 250th 251st 252nd 253rd 254th 255th 256th 257th 258th 259th 260th 261st 262nd 263rd 264th 265th 266th 267th 268th 269th 270th 271st 272nd 273rd 274th 275th 276th 277th 278th 279th 280th 281st 282nd 283rd 284th 285th 286th 287th 288th 289th 290th 291st 292nd 293rd 294th 295th 296th 297th 298th 299th 300th 301st 302nd 303rd 304th 305th 306th 307th 308th 309th 310th 311th 312th 313th 314th 315th 316th 317th 318th 319th 320th 321st 322nd 323rd 324th 325th 326th 327th 328th 329th 330th 331st 332nd 333rd 334th 335th 336th 337th 338th 339th 340th 341st 342nd 343rd 344th 345th 346th 347th 348th 349th 350th 351st 352nd 353rd 354th 355th 356th 357th 358th 359th 360th 361st 362nd 363rd 364th 365th 366th 367th 368th 369th 370th 371st 372nd 373rd 374th 375th 376th 377th 378th 379th 380th 381st 382nd 383rd 384th 385th 386th 387th 388th 389th 390th 391st 392nd 393rd 394th 395th 396th 397th 398th 399th 400th 401st 402nd 403rd 404th 405th 406th 407th 408th 409th 410th 411th 412th 413th 414th 415th 416th 417th 418th 419th 420th 421st 422nd 423rd 424th 425th 426th 427th 428th 429th 430th 431st 432nd 433rd 434th 435th 436th 437th 438th 439th 440th 441st 442nd 443rd 444th 445th 446th 447th 448th 449th 450th 451st 452nd 453rd 454th 455th 456th 457th 458th 459th 460th 461st 462nd 463rd 464th 465th 466th 467th 468th 469th 470th 471st 472nd 473rd 474th 475th 476th 477th 478th 479th 480th 481st 482nd 483rd 484th 485th 486th 487th 488th 489th 490th 491st 492nd 493rd 494th 495th 496th 497th 498th 499th 500th 501st 502nd 503rd 504th 505th 506th 507th 508th 509th 510th 511th 512th 513th 514th 515th 516th 517th 518th 519th 520th 521st 522nd 523rd 524th 525th 526th 527th 528th 529th 530th 531st 532nd 533rd 534th 535th 536th 537th 538th 539th 540th 541st 542nd 543rd 544th 545th 546th 547th 548th 549th 550th 551st 552nd 553rd 554th 555th 556th 557th 558th 559th 560th 561st 562nd 563rd 564th 565th 566th 567th 568th 569th 570th 571st 572nd 573rd 574th 575th 576th 577th 578th 579th 580th 581st 582nd 583rd 584th 585th 586th 587th 588th 589th 590th 591st 592nd 593rd 594th 595th 596th 597th 598th 599th 600th 601st 602nd 603rd 604th 605th 606th 607th 608th 609th 610th 611th 612th 613th 614th 615th 616th 617th 618th 619th 620th 621st 622nd 623rd 624th 625th 626th 627th 628th 629th 630th 631st 632nd 633rd 634th 635th 636th 637th 638th 639th 640th 641st 642nd 643rd 644th 645th 646th 647th 648th 649th 650th 651st 652nd 653rd 654th 655th 656th 657th 658th 659th 660th 661st 662nd 663rd 664th 665th 666th 667th 668th 669th 670th 671st 672nd 673rd 674th 675th 676th 677th 678th 679th 680th 681st 682nd 683rd 684th 685th 686th 687th 688th 689th 690th 691st 692nd 693rd 694th 695th 696th 697th 698th 699th 700th 701st 702nd 703rd 704th 705th 706th 707th 708th 709th 710th 711th 712th 713th 714th 715th 716th 717th 718th 719th 720th 721st 722nd 723rd 724th 725th 726th 727th 728th 729th 730th 731st 732nd 733rd 734th 735th 736th 737th 738th 739th 740th 741st 742nd 743rd 744th 745th 746th 747th 748th 749th 750th 751st 752nd 753rd 754th 755th 756th 757th 758th 759th 760th 761st 762nd 763rd 764th 765th 766th 767th 768th 769th 770th 771st 772nd 773rd 774th 775th 776th 777th 778th 779th 780th 781st 782nd 783rd 784th 785th 786th 787th 788th 789th 790th 791st 792nd 793rd 794th 795th 796th 797th 798th 799th 800th 801st 802nd 803rd 804th 805th 806th 807th 808th 809th 810th 811th 812th 813th 814th 815th 816th 817th 818th 819th 820th 821st 822nd 823rd 824th 825th 826th 827th 828th 829th 830th 831st 832nd 833rd 834th 835th 836th 837th 838th 839th 840th 841st 842nd 843rd 844th 845th 846th 847th 848th 849th 850th 851st 852nd 853rd 854th 855th 856th 857th 858th 859th 860th 861st 862nd 863rd 864th 865th 866th 867th 868th 869th 870th 871st 872nd 873rd 874th 875th 876th 877th 878th 879th 880th 881st 882nd 883rd 884th 885th 886th 887th 888th 889th 890th 891st 892nd 893rd 894th 895th 896th 897th 898th 899th 900th 901st 902nd 903rd 904th 905th 906th 907th 908th 909th 910th 911th 912th 913th 914th 915th 916th 917th 918th 919th 920th 921st 922nd 923rd 924th 925th 926th 927th 928th 929th 930th 931st 932nd 933rd 934th 935th 936th 937th 938th 939th 940th 941st 942nd 943rd 944th 945th 946th 947th 948th 949th 950th 951st 952nd 953rd 954th 955th 956th 957th 958th 959th 960th 961st 962nd 963rd 964th 965th 966th 967th 968th 969th 970th 971st 972nd 973rd 974th 975th 976th 977th 978th 979th 980th 981st 982nd 983rd 984th 985th 986th 987th 988th 989th 990th 991st 992nd 993rd 994th 995th 996th 997th 998th 999th 1000th

and ask proposals.

Memorandum
for the advice
I appoint a Com.
I determine with
the least possible
delay the Board that
is required. & I
ask the Ch. Eng.
I suggest names
with him as per
Pres. I think
the Com. & Pres.
Memorandum. B. I own
at least if not
both of the Pres.
Officers. The same
Com. & perhaps
the Ch. Eng. & the

more general use for
carrying away the whole
of the filth by means
of an intercepting sewer
which shall deliver below
the lower tank bank

To effect this object
a sewer (with pipes low-
er than existing one or two
miles from the Lake) if sum-
mery cost sufficient capacity
to discharge actual sewage
+ a certain amount of
flushing water might
be economically designed,
and associated with
this two other objects
of great importance to
Ostend and might be
estimated for the whole
to be treated as one scheme
and:

(1) the formation of a
reservoir in the valley
immediately below &
west of Government House
which should afford
an ample supply of
water to all the town

portions of Ostacumund
 including the Bazar, and
 the daily flushing of
 the main sewer as above
 (2) the reclamation of
 the greater portion of the
 upper part of the Lake
 east of the willow band
 which is becoming a very
 foul receptacle for all
 the sewage & which ere
 long must become very
 pestiferous.

No morning could I
 be convinced to better
 laid out than in a
 comprehensive scheme
 of this character which
 in my humble opinion
 will go further to insure
 the salubrity of the
 Queen of Hill Stations
 than anything else.

J. H. H.

Ostacumund
 Bazar

Hon to Huddleston

be on it. It will
 be that approx?
 It is all accomplished
 this report.

A reservoir &
 a supply for
 flushing the in the
 Bazar. & another for
 flushing the Bazar
 drains. are probably
 essential features of
 the complete scheme.

I am not sure that
 the further reclamation
 of the Lake is so
 important as it might be
 in general considerations.

J. H. H.

Notes by the
 members of Soc.
 committed with the
 Ostacumund
 improvement
 Scheme

N B The substance
 of these was embodied
 in the order issued
 to the Committee
 and passed

11/6/11 J. H. H.

I have considerable
 acquaintance with hill
 stations in Northern
 India. In that, therefore,
 knowing the locality
 under consideration,
 I can speak with
 confidence as to the
 desirability of all stations
 in the hills to be
 visited & especially
 and to the necessity
 of securing a good
 and plentiful supply
 of drinking water -
 and of securing any
 perfect & satisfactory
 arrangements.

During the last 10
 years the hill stations
 of Nepal, Mussoorie,
 Simla, Dehra, Saharan,
 Kussowlie

Dalhousie - Murmala
and Murree have
had epidemics of
cholera - and at each
it has found that
great improvements were
necessary both as
regards water and
conservation. -

at all a plentiful supply
of pure water is now
available, - the
drainage (especially
at Lynee Tel the only
one where there is a
lake) has been
considerably improved
and great attention has
been paid to latrine
arrangements - latrines
for native men and
women have been built
wherever they were found
necessary - and rows
of houses have been

required to construct
proper latrines for
those living on their
own estates, and accepting
for the house refuse -
this is all carried
away twice daily -
a certain quantity
is used for manure
purposes - the rest
is burnt -

Stable litter is
similarly dealt with.
I strongly recommend
Dotaacmand being
careful for, as it has been
found necessary
to take care for
stations in other
parts of India -
If any medical officer
has studied Sanitary
subjects as a specialty,
I should suggest that
he should be directed
to visit Dotaacmand,
and there consider

the report of Colonel
Sankey's Committee.
I would also suggest
that when Medical
Officers are appointed
to the civil charge
of Ootacamund, they
should be selected
as much for their
experience ^{of} and knowledge
of sanitary matters,
as for their skill
in the more general
subjects of their profession.
With regard to dealing
with the lake it might
be advisable to profit
of the experience gained
at Aynee Tal, where
some few years ago
the water of the lake
was getting rapidly so
foul that it was feared
it would affect the
health of the residents.

The lake is now, I believe,
in a satisfactory condition.
J.R. 6/12/01

Copy this in the Department
in memo to the effect. ^{from} Mr. Callaghan.

(1)

My recollections of Ootacamund are very vague
& I write with the great-
est diffidence.

If however it is neces-
sary to give an opinion
now, I would say

First, look after your
drainage. That is
obviously a most pressing
matter. We may at any
time have an epidemic
at Ootacamund which
may injure for years
its very reputation, as
a Sanatorium for all the
Central & Southern parts
of the Indian peninsula.

Secondly improve
your water-supply, which
much wants improving
though it is not quite
so urgently necessary to

(2)

improve it as to get
rid of the poison
which is stored up
in & around the town.

I think that the
distribution by pipes
is desirable. It will be
more costly; but much
safer ^{the work} & will be done
once for all. Sooner
or later there would
be a clamor against
the open channels.

As to the sufficiency
of the Catch drain
under the Tudor Estate
I can say nothing; but
there were two Medical
Men under the Sanitary
Commissioners on the
Committee. Have we
any means of getting
any more authoritative
opinion?

(3)

I never saw the lake
but once & do not
remember the appearance
of the ~~surroundings~~^{banks}; but
I see no prima facie
objection to gradually
lowering its level - very
slowly. The exposed
mud would soon be
covered by vegetation
& the natural action
might be quickened
by so many rapid by
flowing water would

If the lake can
be made quite
clear I would present
it - as one of the
most beautiful features in
the place.

As to the discharge
of the sewage into
the river I should

(4)

be inclined to
agree with my
honorable colleague
Mr Carmichael; but
I am told that
his proposal would
be costly & are
assured that the
amount of sewage
discharged into the
river is too small
to be of any hurt
to the water a few
miles below.

With this expression
of opinion ~~to~~ which I
found as I saw with the
greatest hesitation I
send them papers to

Council
Mrs

Dec 3/81

PS (5) (8)

Thank the Committee
most heartily; but I
venture to disagree in
total with their proposals
as to the duties to be
entrusted to Mr Jamieson.
If he has neglected his
work, let him be punished;
but the work which
the Committee propose
to assign to him is not
the proper work of
the Superintendent
of a Botanical
Garden. If he is a
good-natured & sensible
man he will help the
Society of Otorarua
in a hundred ^{horticultural} ways,
not exactly within the
scope of his duties, just
as Sir J. D. Hooker
helps people at home
but I can quite
understand his being

very ⁽⁶⁾ ~~indignant~~ if the
people about him showed
that they thought he
was only there to
be a cheap nursery-
man or consulting
landscape gardener.

I write under the
supposition that he
was sent out from
England to be a
Botanical gardener
& that he is paid
as a man of science.

I am far from
saying that it might
not be well worth
while to have a
^{consulting} Landscape gardener
attached to the Mani-
cipation of Otorarua
council. If a really
good man, he would
repay his salary ten
times over in the

(71)

marked water
which has been
would you
propose
MR

See
MR
L

READ the following:—

Letter from the President of the Ootacamund
Improvement Committee submitting Report
of Committee of 1881.

FOR ORDERS.

To save time the Report with printed Signatures
is circulated. The original, assented by the members
of the Committee, has to go a long round extending
from Ootacamund to Shooliswaran in the several
Signatures

W. S. Sankar
Colonel R. J.
Secretary to Govt. P. W. Department.

Thanks of course

The water supply is
of course the most important
part of the Scheme.

Below Shooliswaran there
is the place for a fine
Reservoir. It will cost
much if Govt. give Convoit
labour.

Marlimum Reservoir
must be always more
or less fouled. Genl. Baker
for S. legislation with

The thanks of Govt. are due
to the Com. for their Report.
It results in an estimate
proposed expenditure of
abt. ten lakhs of Rs.
of S. Govt. lakhs are pro-
posed to be a loan for
the Municipal. If the
provided by an increase
in consolidated tax on House
property of 1% on rental
for S. legislation with

like be necessary.
 & the bal. of 15 lakhs
 by equal grant of
 7 lakhs each from
 Imp. & Prov. funds.

The Status of Expenditure
 are
 Improvements N.
 Supply 2,55,000
 for Drainage 2,35,000
 Grant Imp. & Prov. 4,90,000
 Total 9,80,000

Adopt the work is
 very desirable. Probably
 it will be most economically
 attained by complete
 action at once. But
 I am not prepared to say
 that the work is necessary
 at once. The Govt. have
 proposed that the grant
 of 15 lakhs be spread over
 3 or 4 years. I doubt
 that period at all would
 be required for effecting

is constantly dumping
 his trees, & the rain water
 must percolate into the
 reservoir thro' the mounded
 ground. The proposed
 excavated catch drain
 is not certified by the
 Committee, as there is no
 remedy.

I see no necessity to lower
 the level of the lake. The stench
 from the fetid mud which kills
 us all. What is required is
 to pour more water into the
 lake - to deepen the upper
 portion, i.e. above the
 Willow Bank & create a
 current thro' the lake from
 East to West. The expense
 of reclaiming the Swamps
 above the Willow bank will
 be enormous; & the reclama-
 tion will be of no remuneration
 use. The present tea garden
 & tennis court & cricket ground
 suffice for recreation purposes.

Drainage.

I think he proposed
 to have a sewer to carry off
 the filth to discharge itself
 near the Native Cemetery,
 below the old Kennels,

very objectionable - It
 must always be in a stinking
 state, unless constantly flushed
 with water. The sewerage work
 proposed by Pykara river -
 Why not cut a canal - this
 was old Prohde's scheme -
 from the end of the lake to the
 Pondrette Farm, & barge
 your filth away.
 The surface drains, if laid,
 should be of course be of stone,
 & shaped.

Ploughing houses. These stand
 on a portion of the Tail Hill;
 the land is before Govt. pro-
 perty. Remove the Ploughing
 to Tandah, and the But-
 chers, Ploughers &c.
 must follow. No compensa-
 tion will be required.
 Abattoirs must be got
 from house, thro' Gen. Hyde-
 tion answers well at 100 ft.
 & is greatly used for abattoirs
 being built the Continent.

B.T. 26/11

the improvement.
 I think however that while
 approving the suggestion
 attention must be directed
 to the drainage
 essentials of these
 I consider the drainage
 is the most important
 & the most important
 the water supply.

As regards the first
 I think the better project
 should be taken in hand
 as speedily as possible.
 The cost under this
 more in this. I think
 as to the second. I think
 that the catch drains
 & the reservoirs &
 the extension of the
 catchment area. With
 the necessary fencing
 it will be carried out at
 once. But that the
 chert masonry pipes
 for supply & reservoir
 distribution with the
 themselves might be

postponed.

With these I will combine
the lowering of the Lake
level so as to drain the
water off above the
willow band. & show
of the area to land dry
being reclaimed.

And I will ask for
money to give us an
approximate estimate of
the cost of this work of
the Lake.

As far as I can make
it it might be

Drainage 2,35,000

Artificially 12,000

Water supply

2,47,000

say 2 1/2 lakhs. I think

must be added the
lowering of the level
of the Lake & the reclamation
of the land laid dry
above the willow
band. On the
margin of
the lower

Oct 11.
Oct 19
10.
No. 20 10-81

Ootacamund. Im-
provement Report
FOR ORDERS.

The Hon W Huddleston
The Hon D F Carmichael
The R. Hon the Governor

Lake St. Edmund.
As far as labor might
be made available for
this latter work I think
3 lakhs might cover
the immediate necessity
if an expenditure of
4 lakhs were made.
I think a very substantial
sum in advance of what
we have.

If of this amount a
grant in aid of 2 lakhs
were made by Imp. &
Gov. in equal shares
& gradually as required
for the works. The Income
might be called on
to accept the balance
charge. & a loan of
that amount might be
raised. I think probably
without any legislation.

To,

The Secretary to Government,
M. Department.

Chennai, 31st October 1881.

Sir,

In accordance with the Proceedings
of Government under date the 6th June
1881 No. 1408 W the subject of the improve-
ment of Ootacamund has been duly
considered by the Committee therein consti-
tuted, and I have now the honor to
present their Report for the orders of
His Excellency the Governor in Council.

I have the honor to be,

Sir,

Your Most Obedient Servant
C. W. Searkey Colonel R. G.
President of Committee.

29.
30/1

29/10

~~Mr. J.~~
Get up all
the copies &
carry the correc-
tions through.
If the matter is
still in type -
the Press should
be advised -

R.S.
B-12

No 2559

To.

7.11.81

N. A. Roupell Esq. C.S.

Ootacamund

Chepatk, 5 Nov/81

Sir,

I shall be obliged if
you will be so good as
to charge yourself with
obtaining the signatures
of the members of the
Committee at Ootacamund
to the accompanying Report,
after which it may be re-
turned to me through Major
Mead Rls. at Coimbatore.

I have the honor to be

Sir,

Your most Obedient Servt

Dear Roupell
I find Roupell has
not returned for circuit
yet so send on Report
by your direct - Wm.
returned by Mead Rls
W. F's Signature

C. W. Lambey Col. Rls.

R.S.
5/11/81

Kodappamund Water Supply 1881

(2)

No.	Name & Description of House.	approximate no. of persons inhabiting such house & premises.	Drinking water										water for domestic purposes.					Information or remarks on existing supply of water for drinking & other domestic purposes.					
			How obtained					If from Wells					If from Springs						How obtained				
			European	Native	Wells	Spring	Catching & storing in tank	From supply channel	Number	approx. depth.	on premises or here	Sufficient	on failing how long	on premises or here	Sufficient	on failing how long	Wells		Springs	Catching & storing in tank	From supply channel	any stream or pond	
49	Church Chambers (N. Smith)	100	469	25	35																	applied to have pipes laid from water supply channel but the enormous sum of Rs 200 for a few yards of pipe was required as an advance	
50	Charing cross cottage (Mr Richter)	7	10		0																	But the water from the spring in the tank is sometimes muddy	
51	Hempstowe / T. Browning, typist	2	12		0		1																
52	Burton cottage / do	2	20		0																		
53	Garden Cottage / Marutha (Pellam)	3	1				1															From experience think 3 the houses in 00th could be furnished with spring water on the premises at Rs 25 per house.	
54	Melrose Cottage (Mr. Boesinger)	4	3		1																	Reasoned. The town supply channel are sometimes dry.	
55	Hiram Lodge (E Atkins)	25	11	0	2			0	2		yes											The water from channel is exceedingly dirty especially during	
56	Boyle club (The Secretary)	30	120		1																	Rainy weather can severely be used for bathing when the ground is cultivated the water fails.	
57	Grace Cottage (Mr. Abraham)	4	15	0				0			yes												
58	Matthamstow / Col. Clementson	6	40		1																	The stream running through the grounds is unfit for drinking or domestic purposes.	
59	Streamside Cottage / Mr Hereford	10	5	1				1	12	on	yes											The public supply is muddy & otherwise very impure. It runs in a deeply cut unprotected channel below the graveyard	
60	Bramley lodge / Mr (Cordell)	6	7		1																	a few feet from the Coffins & just a little below them so as to make the filtration certain. For drinking water most people are at the mercy of some neighbour -	
61	Klangollem (Mr Friend)	13	14	1	1		1	1	2	on	yes		1	no	3m								
62	Ludlow Hall (Major General Baker)	7	73		1																		
63	Hill view. / Mr. Allen	4	4	1				1															
64	Walsham Cottage (Mr. Hubbard)	4	2	1				1	10	on	yes												
65	Bombay castle / Frankie	8	10	1				1	30	on	yes												
66	Dean Cottage (M. Stewart)	5	3	1				1	40	on	yes												
67	Balfour Cottage (Mr Atkinson)	6	4		0																		
68	Summingdale (Mr. Bavelay)	8	6		0																		
69	Saline Cottage (Mrs. Morrison)	3	3	0				1		off													
70	St Joseph's Hospital (Native Doctor)		20	1				1	12	on	yes												
71	Clemwood (Lt. Flanagan)	4	15		0		1																
72	Kaity Lodge / Mr. (Rigg)	2	4		1																		
73	Bailey House (do)	4	40		1																		
74	Greenfield Cottage (Ramaiah)		10	1				1	15	on	yes												
75	Oxton House	10	7		0																		
76	Stones Cottage { Mr Davis }	2	4		0																		
77	Old Boyle Cottage Mr Holden	10	8		1																		
78	Larrington House / Mr. Madden	8	10		0	1																	
79	New Cottage (Chinnaswamy)			0				0	25	off	no	3m											
80	Eller Cottage / Mr. Pitton	7	10	0				0		off	yes												
81	European Mission (The sailor)	61	7	1			1	40				3m											
82	Billiard Room / Mr Schmidt	0	0	0				0															
83	West Down's (Rev. Frohman)	4	12	0				0															
84	Templeton Lodge / Major West	4	10		0																		
85	Clarendon Hall / McCarrig Co	7	30			1																	
86	The Commissioner's Office	15	39		0		1																
87	Sunnyside / Mr Williams	2	5	0				0	35	off	yes												
88	Charing cross villa / do	5	3	3				3	30	on	yes												
89	Bombay House (Mrs. E. E. E.)	3	6				1																
90	Hillside cottage (Mr. Kelly)	8					1																
91	Woodville (Mrs. Milson)	3					1																
92	Hill view (Mr. McAlpin)	6	20	0				0															
93	Mount Stuart (Col. Skellone)	6	12		1																		
94	Sandrock / Mr. McAlpin	3	20	1				1	6	on	yes												
95	Layton Park. / Mr. Wapshare	2	12	1				1	6	on	yes												
96	Perey Cottage (Dr. Mr. J. Office)			0				0															
		483	1126	49	59			12							19	28		34					

Applied to have pipes laid from water supply channel but the enormous sum of Rs 200 for a few yards of pipes was required as an advance. But the water from the spring with the timber pipe is sometimes muddy.

From experience think 3 the houses in Ooty could be furnished with spring water on the premises at Rs 25 per house. The town supply channel are sometimes dry. The water from channel is exceedingly dirty especially during heavy weather can scarcely be used for bathing when the ground is cultivated the water fails.

The stream running through the grounds is unfit for drinking or domestic purposes. The public supply is muddy & otherwise very impure. It runs in a deeply cut unprotected channel below the graveyard a few feet from the Coffins & just a little below them so as to make the filtration certain. For drinking water most people are at the mercy of some neighbour.

Supply from water channel uncertain - suggests pipes.

+ From a channel coming from old Ooty unfailing
+ From a stream coming from Kodappamund - see remarks in dry weather the channel supply fails & the lanterns are put to great inconvenience.

It would be a great convenience if the public channel was piped through this property and a small cistern constructed at a point above the house, with a small pipe to bring water down to the stables. This could well be done at the owner's expense - suggests & shobies being prevented using stream running behind the house. vide remarks.

Water supply fair, but not useful except to a certain portion of the town people. Has applied to have the water from channel conveyed to house by pipes.

The 2 wells for domestic uses on the premises dry up in the hot weather. Water for domestic purposes from stream coming from Kodappamund. From stream flowing from foot of Gards. Water supply - unsatisfactory.

Great inconvenience in obtaining drinking water

Bad supply.

No.	Name & Description of House	Approximate No of persons inhabiting each house or premises		Drinking water										Water for domestic purposes				Any remarks for house-keeping			
		European	Native	How obtained				If from Wells				If from Springs		How obtained							
				Wells	Springs	Catching Rain	Supply Channel	No	Depth	Impurities on shore	Sufficient	If falling how long	Impurities on shore	Sufficient	If falling how long	Wells	Springs		Catching Rain	Supply Channel	
97	Lower House (Tramjee)	483	1126	49	59		12										19	28	34		
98	Elm Hill (do)				1		"	"	"	"	"	1	"	"	"	"	1	"	"	"	"
99	Southwick (do)			"	"	"	1	"	"	"	"	"	"	"	"	"	"	"	1	"	"
100	Kandal Cottage (do)			"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
101	Leslie Cottage (do)			"	1	"	"	"	"	"	"	"	on	"	"	"	"	"	"	"	"
102	Lakeside (do)			"	1	"	"	"	"	"	"	"	on	"	"	"	"	"	1	"	"
103	Mill House (do)			"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
104	Pepbrook (do)			"	1	"	"	"	"	"	"	"	off	"	"	"	"	1	"	"	"
105	Haverhill (Mr. Browning)	2	8	"	1	"	"	"	"	"	"	"	off	"	"	"	"	"	1	"	"
106	Rosemont (do)	17	26	"	1	"	"	"	"	"	"	"	on	yes	6 ft	"	"	"	1	"	"
107	Albert Cottage (Mr. Dias)	2	"	1	"	"	"	1	"	off	yes	"	"	"	"	"	"	"	1	"	no
108	Oakenud (Mr. Woodhouse)	7	10	1	"	"	"	1	"	on	yes	"	"	"	"	"	"	"	"	"	"
109	Salmon House (Mr. Paulson)	3	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	no
110	Beverly (Mr. Robinson)	4	2	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	no
111	Church Cottage (Mr. Hernandez)	5	4	-	1	-	-	-	-	-	-	-	off	no	3 ft	-	-	-	1	-	no
112	New Cottage (Rapu Maistry)	"	13	1	-	-	-	1	12	on	-	6 ft	-	-	-	-	1	-	-	-	no
113	Landdown (Mr. Sinclair)	2	15	1	1	-	-	1	45	on	no	falling	off	yes	-	-	1	1	-	-	no
114	Woodside (Mr. McKelley)	9	50	-	1	-	-	-	-	-	-	-	off	no	-	-	-	-	1	-	-
115	Woodville (Rev. Pearce)	8	7	-	1	-	-	-	-	-	-	-	x	-	-	-	1	-	-	-	-
116	Wood End (do)	8	7	-	1	-	-	-	-	-	-	-	x	-	-	-	1	-	-	-	-
117	Elm Hill House (Mr. Cl. Master)	12	28	-	1	-	1	-	-	-	-	-	1	yes	-	-	-	-	1	-	yes
118	Mowbray House (Col. Bayton)	6	12	-	1	-	-	-	-	-	-	-	1	yes	-	-	-	-	1	-	no
119	House Infirmary	4	40	-	1	-	-	-	-	-	-	-	off	-	-	-	-	-	-	-	no
120	Glencrook (Mr. McEwen)	2	7	-	1	-	-	-	-	-	-	-	off	yes	-	-	1	-	-	-	no
121	Lushington Hall (do)	2	21	-	1	-	-	-	-	-	-	-	off	-	-	-	-	-	x	-	no
122	Woodland (Jagirdar of Amce)	-	50	-	1	-	-	-	-	-	-	-	on	yes	-	-	1	-	-	-	yes
123	Upper Shillenger (Mr. Oshanghama)	8	32	-	1	-	-	-	-	-	-	-	on	yes	-	-	1	-	1	-	yes
124	Boy Bank (Mr. Clark)	6	12	1	-	-	-	1	-	off	-	-	-	-	-	-	-	-	1	-	yes
125	The Cedars (Mr. Roupell)	3	28	1	-	-	-	1	-	off	yes	-	-	-	-	-	-	-	1	-	yes
126	Shedden House (Mr. White agent)	3	7	-	1	-	-	-	-	-	-	-	on	yes	-	-	1	-	-	-	-
127	Hope Cottage (Mr. Saylor)	7	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
128	Cranbury Cottage (Mr. Emm)	6	4	1	-	-	-	1	-	off	-	-	-	-	-	-	-	-	1	-	yes
129	The Brewery (The manager)	1	1	2	1	-	-	2	10	on	yes	-	on	no	Libra	-	1	1	-	-	-
130	Bricks Memorial School	40	20	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	no
131	Devonshire House (Mr. Croley)	13	12	-	1	-	-	-	-	-	-	-	off	yes	-	-	1	-	-	-	-
132	Mountain Cottage (Mr. Scott)	1	2	-	1	-	-	-	-	-	-	-	off	yes	-	-	1	-	-	-	-
133	Greenwood Cottage (Col. Scott)	4	6	1	-	-	-	1	-	on	yes	-	-	-	-	-	1	-	-	-	no
134	Blackwood House (do)	9	8	1	-	-	-	1	-	off	yes	-	-	-	-	-	1	-	-	-	no
135	Bella Vista (Col. Thatcher)	3	9	-	1	-	-	-	-	on	yes	-	on	yes	-	-	2	-	-	1	yes
136	Belmont (Col. Beddome)	3	20	1	-	-	-	1	3	off	yes	-	-	-	-	-	-	-	1	-	no
137	Cluny (Mr. Lecot)	4	20	-	1	-	-	-	-	off	-	off	off	-	-	-	-	-	1	-	no
138	Boy Cottage (Mr. Brown)	7	13	1	-	-	-	1	20	on	yes	-	-	-	-	-	1	-	-	-	no
139	Nellmore (do agent)	6	4	-	1	-	-	-	-	-	-	-	on	yes	-	-	-	-	1	-	no
140	Hopeville (do)	2	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	no
141	Cabin Cottage (do)	5	3	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
142	Lakeside House (do)	9	3	1	-	-	-	1	-	on	-	Summer	-	-	-	-	-	-	1	-	-
143	Police Station (Mr. Short)		10	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
144	Police Lines (do)																				

water supply liable to contamination. would suggest pipes being laid wherever channel is open. I have seen people sitting beside the channel & washing themselves. This is a daily occurrence on the channel leading to Bombay castle & the Telegraph office -

Water Supply insufficient. From domestic purposes for piping stream.

Has laid pipes into the house which get choked suggest grates across channel. Inconvenience from no water on premises. Application made to Municipality for a supply pipe but the cost Rs 200 found to be rather excessive. Water in well failed apparently from the growth of Eucalypti & other trees in vicinity.

* already answered by letter.

* do

vide lengthy remarks.

Stream behind house supplies the than drinking purposes but is really an open sewer.

* From a water course originating near Sodabatta

vide remarks.

Supply channel water not fit for drinking & stops in summer. Suggests pipes.

There is a great nuisance committed daily by the natives in washing dirty clothing in the channel that supplies the Govt. Council Chambers & there appears to be no check as no inspectors come in this direction.

Water from supply channel required

The drinking water is good & always clear.

Name and description of House.	Approved number of persons including household members		Drinking water									
	European	Native	How obtained					If from wells			If from Springs	
			Wells	Springs	Catchment	Supply	Channel	No.	Depth	Pressure on tank	Supply	Cost
5 Withington (Mr. Brandt)	717	1997	65	85		19		1	15	on	1 ft	"
6 Linond House (Mr. Dawson)	2	6	1	"	"	"	1	"	"	on	1 ft	"
7 Cravenese (do)	3	8	"	1	"	"	"	"	"	yes	on	yes
8 Walpole Cottage (do)	3	9	1	"	"	"	1	35	on	yes	-	-
9 Rosewood (do)	3	8	"	1	"	"	"	"	"	"	on	yes
10 Whitmore Cottage (do)	2	4	"	1	"	"	"	"	"	"	on	yes
11 Watbury villa (do)	2	4	1	"	"	"	1	12	on	yes	1 ft	"
12 Watbury House (do)	2	8	1	"	"	"	1	25	on	yes	1 ft	"
13 Gable Cottage (Col. Scott)	3	22	"	1	"	"	"	"	"	yes	off	yes
14 Shorham Hotel (Mr. Dawes)	1510	10	1	1	1	"	1	1'	off	yes	"	on yes
15 Stable Buildings (Mr. Atkinson)	"	16	"	"	"	"	"	"	"	"	off	-
16 Elizabeth Cottage (do)	7	2	1	"	"	"	"	15	off	yes	off	-
	755	1900	72	90		19					12	
17 Harrow on the Hill	6	10	"	1	"	"	"	"	"	"	off	no
18 Harrowton Lodge	3	10	1	"	"	"	"	10 ft	on	yes	-	"
19 Glenbury	7	9	"	1	"	"	"	"	off	yes	off	yes
20 Commercial Hall	4	16	1	"	"	"	"	12	on	yes	-	-
21 Kew Cottage	5	7	"	1	"	"	"	"	"	"	off	yes
22 Chamrook Villa	3	12	"	1	"	"	"	"	"	"	off	yes
23 Brownall's Rectory House	2	7	"	1	"	"	"	"	"	"	off	yes
24 Mount Carmel	3	7	"	1	"	"	"	"	"	"	off	yes
25 Cuprin Villa	3	16	"	1	"	"	"	"	"	"	off	yes
26 Castleacre	6	30	3	"	"	"	"	24	on	yes	-	"
27 Green Cottage (Belmont)	6	6	1	"	"	"	"	12 ft	on	no	6 in	-
28 Longwood Hotel	35	16	1	"	"	"	"	20 ft	on	no	6 in	-
29 West Dorcas	6	6	"	"	"	"	"	-	-	no	6 in	-
30 Harrow Lodge	1	6	"	"	"	"	"	"	"	yes	no	-
			79	97								
Villages												
Melkoocherry	900	13	"	"	"	"	13	"	"	"	"	"
Bazara (upper & lower)	3138	92	"	"	"	"	92	"	"	"	"	"
Agraham	400	27	"	"	"	"	27	"	"	"	"	"
Vandipettah	600	3	"	"	"	"	3	"	"	"	"	"
Nandol	1680	17	"	"	"	"	17	"	"	"	"	"
		152										

Water for domestic purposes					Any source How long	Information or Remarks
How obtained	Wells	Springs	Catchment	Supply		
	25	42		9	no	
	"	1	"	"	"	
	"	1	"	"	"	
	"	1	"	"	no	
	"	1	"	"	no	
	"	1	"	"	no	
	"	1	"	"	no	
	1	"	"	"	no	
	"	1	"	"	no	
	"	"	"	1	no	
	1	"	"	1	no	+ 9 mile statement
	1	"	"	"	"	
	28	50		59		
	"	1	"	"	no	also from the Lake for domestic purposes
	"	"	"	"	no	water obtained from a well on Enamply land, water abundant
	1	"	"	"	no	water for domestic purposes obtained from a stream near the compound & sometimes from the stream
	"	"	"	1	no	The owner would prefer a supply from the supply channel
	"	"	"	1	no	No pipes, Channel open
	"	"	"	1	no	
	"	"	"	7	no	
	"	"	"	"	-	water for domestic purposes obtained from Lake
	"	"	"	"	-	Do Do Do - from stream 1/2 mile off
	1	"	"	"	no	drinking water obtained from a stream 1/2 mile off
	1	"	"	"	no	drinking water obtained from the Club
	13	"	"	"	"	
	92	"	"	"	no	Lake water used for domestic purposes also.
	27	"	"	"	"	
	3	"	"	"	"	
	17	"	"	"	"	