1486.

L. & M.
9,000-3-3-96.

Local & Munl. (1896) Department.

MISCELLANEOUS.

G.O., No. 583 M

DATED 31st March 1896

[Despatch Abstract.]

Water-supply.

Communicating, with remark, to the Municipal Council, alicut, the proceedings of the Sanitary Board on the subject of adopting Mananchira tank as the source of Calicut ---- scheme.

G.O. No. 5-85 M
31-3-96.

B

On 10th September 1890 the Calicut Municipal Council was asked by the Sanitary Engineer to Government what steps the Council proposed to take to secure the introduction of water supply and a proper system of drainage into the Municipality. On the 14th October 1890, the Sanitary Engineer submitted a report to Government regarding the water supply and drainage of Calicut. He said therein :—

> "Water for drinking and other purposes is chiefly obtained from private wells, of which there is one in almost every compound and garden. There is a fine public tank the water of which is said to be good. It is used by the people to a certain extent, but not such an extent as to cause sufficient influx of spring water into the tank daily. To prevent the stagnation and deterioration of water in any tank there ought to be a regular and sufficient draught on it so as to keep the feeding springs in action and thereby renewing the water in the tank. It is feared that there is not sufficient draught on the tank to enable it to maintain the purity of the natural water. It appears that the tank has not been cleaned throughly within the recollection of man. It is believed that such neglect must have deteriorated the water of many of the fine old tanks in this country. The mere operation of pumping a tank dry occasionally and letting it fill again will tend to the maintenance of the quality of water.
>
> * * * * *
>
> There is no doubt that the subsoil is capable of yielding a good potable water everywhere within the town except the Moplah wards, and the purity of water in wells and tanks can be maintained

if the more crowded portions of the town are drained and proper care taken of the wells and tanks themselves. But it is almost hopeless to expect the improvement of water in wells in the Moplah wards. The soil is here so far contaminated already and the water level is so little below the surface of the ground, that drainage of the place, though preventing the further progress of mischief, would be powerless in eliminating the causes of pollution that already exist in the soil. Any source of water supply for the Moplahs should be beyond the limits of the Moplah wards and the best place to look for a supply of water from wells or tanks would be the ridge running through the town the ground being high the water here is less liable to contamination than low-lying lands.

The Mananchira tank previously mentioned in this report is situated on this ridge and lies to the north-east of the Moplah qarters. The quality of the water is pronounced to be good. But not much use is made of the tank by the people. Because in the greater part of the town people have got private wells yielding good water, and the only portion of the population that need the use of a public water supply do not make use of the tank as it is far from their houses and according to their custom their women do not go out. The only way to induce these people to use a better water would be to bring the water to their doors by means of pipes. With a source of supply so close to hand as the Mananchira tank, the question of distributing of good water by pipes through the Moplah wards is neither a difficult one nor one that would require a large outlay.

Neither there appears to be any doubt whatever about the sufficiency of this single tank to supply not only the population of the crowded portions but even of the whole town if that should be desired. To this report is attached a sketch giving the section and plan of the Mananchira tank. The area of the water spread of the tank at the ordinary monsoon water level is 490'×475'. At this level the depth of water in the tank is 19ft. 9 inches. The lowest summer water level is 10 ft. 3 inches above the

bottom of the tank and at this level its area is 440'×425'=187,000 square feet. The contents of the tank for each foot of depth below the lowest summer water level is 187,000 cubic feet=1,168,750 gallons. The population of the whole town is 57,000 and allowing ten gallons per head per day the daily consumption will be 570,000 gallons, so that even during the dry months of the year only ½ a foot depth of water need be pumped out to give an ample supply of water to the whole town, and this without counting the percolation into the tank during pumping. This percolation will probably be so small quantity and looking to the large area for percolation it may be safely surmised than even when the full necessary quantity of water is being pumped from the tank no appreciable effect will be produced on the surface level of the water, and that when the tank is lowered within a safe limit below the line of saturation the yield will be many times the quantity required for the whole town.

It is not necessary to go into any further details of this scheme until Government approve of the suggestions made, and the council are willing to adopt the proposals set for in this report. To enable the council to form some idea of the probable cost of the water supply scheme, it may be mentioned here that the area of the town to be served by the scheme may be assumed to be 1¼ square miles with a population of 30,000 and the cost of the scheme will be somewhere between Rs. 75,000, and Rs. 1,00,000."

2. The report of the Sanitary Engineer was forwarded to the Council by Government on the 8th December 1890 with the request that Government might be furnished with the views of the Council on the suggestions of the Sanitary Engineer. The Council was especially to consider whether the scheme by the supply of pure water to the whole or a part only of the town should be taken up at first or whether the drainage project should be given precedence, and, in either case, the Council should report what steps it proposed

to take, both towards the drawing out and carrying up of the schemes and towards the provision of the necessary funds.

3. Both the above communications were communicated to the District Medical and Sanitary Officer for an expression of his opinion. He was of opinion that the scheme for the supply of pure water to the town by means of pipes was more urgent than the drainage scheme, and, accordingly, recommended, that early steps might be taken to carry out the former project.

4. The Sanitary Engineer made an inspection of the town in July 1891. Regarding the question of water supply he made the following remarks :—

“*Water Supply.*—This in the same quarters of the town already referred to is exceedingly bad and indeed how could it be otherwise seeing that it is derived from the wells and tanks which must receive a large portion of the sewage from the surrounding areas. Much matter must pass into the wells throuh the porous laterite lining of which they are composed and I find generally the water in the well standing at surface level far above the ordinary subsoil water level shewing that they are receiving surface drainage and of course the sewage matters dissolve or settle in the wells to be drawn from them again along with the water supply of the people.

The tanks are some of them exceedingly foul, at this period one would have expected their waters to be diluted to a considerable extent but their state is exceedingly disgusting, there is no less expressive word which can suitably describe their state. There is one tank named Kuttichira Kolum to the south of the Moplah quarters near one of the large Mosques to which many persons resort (for bathing it is supposed to be used) which is in an exceedingly bad state and I consider that it is an urgent duty

on the part of the Municipality to pump out this tank; its waters are thick and green, it smells most offensively when standing some distance away from it and it is surrounded by the houses of a large population. It ough to be pumped out at once. I feel sure that its continuance in its present state must be decidedly a danger to the health of those who use or live adjacent to it. Some minor tanks are in much the same condition. If the Kutticherra Kolum is not a public tank, then the council have full powers under the Municipal Act to cause the owner to clean it and so with the other tanks.

I believe that water supply is a more urgent question than drainage but looking to the small area in which there is urgent necessity for both they, I think, should be dealt with together.

There does not seem to be any other possible source of water supply except the Mananchira Kolum referred to in the report embodied in G. O. dated 8th December 1890 No. 1871 M. Mis. Local and Municipal, and as it is adjacent to the town, the distribution works ought not to cost a large sum nor will pumping be expensive as the tank is on a ridge.

Before embarking on the scheme it is advisible to ascertain how much water can ordinarily be obtained from the tank during the dry season and it is therefore desirable that some experiments should be made during the ensuing dry season, say in March or in April next. The Chairman will, if Government approve, probably be able to arrange for this being done. Two or three days pumping would probably be a sufficient test and the total cost would be Rs. 45 plus the cost for the loan of the engine and pumps and setting them up; as to the charges for which the Chairman will be able to report when asking for the necessary allotment of funds.

I have addressed the accompanying letter to the Chairman of the Council and if funds for undertaking the necessary levels &c. are provided, I shall arrange to put the work in hand as soon as possible.

5. In August 1891, the Municipal Council was of opinion that its present financial condition did not admit of any expenditure being incurred towards drainage and water supply schemes and that the matter was to lie over for the present. On a perusal of those papers His Excellency the Governor in Council felt himself unable to agree with the Council.

The report of the Sanitary Engineer, the Government said, afforded ample proof that sanitation called for immediate action on the part of those responsible. Government directed that a provision of Rs. 700 should, in any case, be made in the Budget for 1892-93 for the purpose of preparing the necessary survey and taking the levels as desired by the Sanitary Engineer in his letter to the Chairman dated 25th July 1891 No. J/14. On the 26th April 1892 the Government was informed by the council that "it considered water supply to be of secondary importance as the supply in the town was fair and what indeed, imperative at present the drainage." It resolved, therefore, to request Government to direct the Sanitary Engineer to take the necessary levels and prepare an estimate for the drainage scheme. The Government obtained the opinions of the Sanitary Engineer, of the Sanitary Commissioner and of the Collector and was of opinion that the water supply was to precede drainage. The levels of the town were taken in 1893. On the 8th November 1894 the Sanitary Engineer, with the approval of Government, proposed to take up the water supply of Calicut during 1895.

6. On the 29th October 1894, the Sanitary Engineer of Government enunciated his proposals in regard to the water supply scheme. He says "When I inspected Calicut on the 10th and 11th October 1894, I visited Poloor Hill about 3 miles from Calicut where the laterite crops out. There are several springs at the foot of this Hill and any wells that are sunk in this rock would, I think, yield a pure supply. As to the quantity, that can only be proved by experiment.

The Poloor Hill scheme will cost not less than 4 lacs of Rupees. If the finances of the Municipality do not permit this scheme being undertaken at present, nor for some years to come, I would recommend that the Mananchira tank be tested with regard to its yield, with the view of making it the source of supply as a temporary measure for the Moplah quarters, until such time as the Municipality can find necessary funds for a larger scheme. * * * * The cost of the whole work would be from Rs. 75,000 to Rs. 1,00,000." To investigate the Poloor Hill scheme a sum of Rs. 3,000 would be required. If the larger scheme cannot be financed, Rs. 500 were asked for testing the yield of the Mananchira tank.

7. As the preparation of the scheme is one proposed to be dealt with in 195-96, the council was asked to decide this point at a very early date. The above proposals were referred to the District Medical and Sanitary Officer and the Collector for favor of their opinions. Against the proposal to make the Mananchira tank the source of supply for the whole or part of the town, the District Medical and Sanitary Officer entertained the strongest objections. He said that the Albumenoid ammonia in pure and wholesome water should be under 0·0050 centigrams per litre.

Albumenoid ammonia from the Mananchira tank sent for analysis disclosed 0·200 milligrams per litre. The tank is surrounded by houses and is opento any and every pollution. Germs of any sort might be found in one corner, while none might be found elsewhere. Hence, any analysis must be rather vague as to the general state of the water. His personal opinion was that the scheme was an error, he was also doubtful if the tank would last out to demand for even a couple of months.

8. The Sanitary Commissioner offered the following remarks regarding the proposal to utilize the Mananchira tank for the future water supply:—

* * * * *

"So far as it could be ascertained from these papers, the Sanitary Engineer has decided to utilize the Mananchira tank for the future water supply. Before deciding upon this source, I think certain matters should be investigated. The amount to be delivered, namely, ten gallons per head, would not suffice to induce the complete closure of the wells in the contaminated sub-soil it is intended to replace. I am, however, aware that the amount is calculated to be susceptible of increase. The Mananchira tank is apparently fed by a special stratum of water under pressure confined between two impervious strata, one of which has been penetrated, *as well as from the ordinary sub-soil water,* seeing that the masonry lining cannot be regarded as impervious. Taking the slope of the surface to represent the probable flow of the sub-soil water towards its outlet—the sea—it will be found that the Mananchira tank drains the "F" Division of the town, where of probably 3,000 houses, only 300 can be said to have arrangements for the removal of the night-soil and rubbish. On pumping upon this source and causing a depression of the water-level, the sub-soil water will no longer flow simply from the direction of Division "F"

wards the sea, but will flow inwards from all directions—the eater the depression the greater being the circular area drained; ithin this area may certainly be included the dhobies' tank, which s for many years been employed for washing clothing of the abitants, and is distant but 250 yards from the Mananchira k.

The water from the tank, so far as I could ascertain, has t been analysed by a professional chemist. A specimen should sent to the Chemical Examiner for favour of examination. ranting, however, the water reaches the Mananchira tank in good emical condition, it does not follow that it may not convey isease germs from the contaminated soil; and granting that it ow be in good condition, it does not follow that it will continue o. To reach the tank, the water has to pass through sandy and ateritious soils which would aid in rendering it pure; but whilst he stratum thus passed through may serve for years as an efficient filter, there is no possibility, as in the case of artificial filters, of removing material that has become choked; whilst the rapid fluctuation of sub-soil water to which Calicut is subject must at all times diminished the possibility of this action being efficient. The houses in Calicut, it must be remembered, are undergoing increase from year to year; thus the survey map of 1874 conveys an incomplete idea of the area covered by dwellings.

Under these circumstances, I consider that the sub-soil water should, *if it be possible to do otherwise* not be drawn upon for the supply of Calicut. That there is a store of water immediately below the first water stratum seems very likely from the conditions found in the Mananchira tank, where the well at the side shows a level of one foot less than that of the tank. What, therefore, I think should be done before any scheme is finally arranged is to make exploratory borings for the purpose of ascertaining more as to sub-soil conditions, and especially of ascertaining whether impervious stratum of clay underlies the previous upper stratum on which water now exposed by surface wells is supported. If this be found to be the case bored or driven wells could be used within the interior of the town; or even the Mananchira tank site might be employed, if by iron cylinders or other measures the sub-soil water were excluded. Failing this being proved, and it being found necessary to depend upon the sub-soil water, it would be requisite to select an area sufficiently removed from the town to guarantee the purity of the sub-soil. Such a place being secured, it would be possible by a series of driven or bored wells to obtain the necessary supply; for I believe it may be assumed without argument that the sub-soil water of Calicut is present in such enormous quantities, that there could be no question as to the possibility of obtaining any amount that may be required, were efficient measures provided for gathering it.

It is, of course, just possible that instead of striking upon a rich store of water, lignite beds which have been found both at Beypore and Cannanore, may be struck; but the presumption given by the condition of the Mananchira tank is sufficiently good to warrant the small depth of exploration required in several places—the total depth of the tank being only 20 feet.

I need hardly add that in consideration of the filthy condition of the sub-soil in the crowded parts of Calicut, I regard the early provision of a safe water-supply as essential. If any reason further than the fearful mortality of cholera in 1890 were required to prove the necessity, I would point to the frequency with which the population is effected with elephantisis—a disease which has been amply proved to depend upon certain physiological processes connected with the life history of the *filaria sanguinis hominis*, in which the musqito dying upon water exposed to air takes its part

* * *

9. The Collector's views are given below.

* * *

"I have the hour to express my doubt as to whether the Mananchira tank has feeding springs sufficient to keep the water always up to a certain level. During the last 3 months the level of the water has been falling and now the water falls from day to day.

Moreover the situation of the tank in the middle of the town and surrounded on all sides by parambas where people defoecate and throw rubbish is, I think sufficient to condemn the scheme, for the surrounding sub-soil being contaminated the sub-soil water cannot be pure.

These questions can be settled if the tank is pumped thoroughly dry once or twice. I would suggest, however, that if the tank be used as a source of supply, the present steps should be removed entirely, the public prevented from entering the tank as they do at present and that pumps or buckets worked by pullies be placed at the four corners of the tank."

10. The proposals of the Sanitary Engineer were considered by a Sub-Committee of the Municipal Council with special reference to the views of the District Medical and Sanitary Officer, the Sanitary Engineer and the Collector. They were of opinion that the larger scheme of supplying the whole of the town with pure drinking water from an uncontaminated source of supply outside Municipal limits was preferable to the smaller scheme of supplying the Moplah quarters only. On 5th April 1895 the Council resolved by a majority that the question of water supply should be postponed until the matter of Mopla burial grounds is settled.

11. The orders of Government in regard to the question of Moplah burial ground have been received. There can be therefore no reason for delaying the disposal of the water supply scheme.

At my request Mr. A. R. Stuart a Civil Engineer who possesses experience of water supply projects at home prepared the following note on the subject which is extracted for the information of the Council.

"The Mananchira tank to be completely surrounded by a high wall or railing to prevent any access to the water by the inhabitants. In flows of surface soil water, if any, to be prevented by diverting drains.

A pumping station to be built at the side of the Chevayur road about 1,400 feet from the tank. This pumping station fitted with two complete sets of pumping plant consisting of two boilers and 2 direct acting steam pumps each set capable of independently delivering the required quantity of water daily. The boilers designed for burning wood fuel.

A reservoir to be built on the highest point near the Tank which is on the rising ground, 2,800 feet from the tank along the Chevayur road. The reservoir capable of containing one day's full supply of water.

The water to be drawn off from the reservoir through a cast iron main fitted with regulating valves and distributed through wrought iron pipes to stand pipes situated in selected parts of the town. Water supplied direct to any house to be charged for at a special rate.

The suggestions with regard to the Mananchira tank call for no explanation.

With regard to the pumping plant. The double sets of boilers and direct acting pumps are required so that there need be no failure in the water supply in the event of a break down or when repairs are required. It will be arranged that pumping take place at night so that the engines will not run for more than twelve hours a day. In that time storing the required quantity of water for the next day in the reservoir.

With regard to the delivery of water in the town. The stand pipes will be so placed that each will serve a certain area with water allowing 10 gallons for each person within that area. When required by the owners the water will be lead on directly to the houses. The Municipality in this case charging a special rate. For watering cattle &c. stone cisterns could be built under stand pipes."

Memo

12. On 10th April 1895 in G. O. No. 525 Government has referred the following letter from the Sanitary Engineer to Government to the Council for report.

I have the honor with reference to G. O. dated 8th November 1894 No. 1668 in Local and Municipal, to point out that Government ordered that a scheme for the water supply of Calicut should be one of the schemes to be submitted to Government this year. In the Chairmans letter embodied in G. O. dated 28th February 1895 No. 316 M Local and Municipal, he points out that the council decline to give funds for the purpose so that the preparation of this scheme must meantime remain in abeyance.

Three reminders have since been received.

T. VARADA RAO,
Chairman.

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G O.	No.	Department.	Date.
G.O.	1725 L.M. 9.10.96.						

[illegible] tanks that

S.E./6 23-7-94—1,000.

No. 2417

GOVERNMENT OF MADR

OFFICE OF SANITARY ENGIN

Fort St. George, 2[illegible]th Octob

CURRENT No.

From

R. E. ELLIS, Esq., Assoc. M. Inst. C.E.,
Acting Sanitary Engineer to Government,

To

The Chief Secretary to Government
Local & Municipal Departmen

Sir,

(1)

A

With reference to G. O. dated 23rd April 1894 No. 513 M, Local & Municipal, I have the honor to report on the remarks of the Sanitary Commissioner and the Chairman regarding the water supply scheme for Calicut as follows:—

2. No decision has been arrived at to use the Mananchera tank as a source of water supply. In a report to Government dated 25th July 1891 No. 7/16 Mr Jones wrote that there did not appear to be any other source of water supply and recommended that before embarking on the scheme it would be advisable to ascertain how much water could ordinar

ily be obtained from the Tank during the
ason by making experiments during 1892.
Municipal Council on the 1st August 1891
sed a resolution to the effect that there
e no funds, and no steps appear to have
n taken to test the yield as suggested
ugh the estimated cost was put down at
45/- plus the cost for the loan of the engines
d setting them up.

The analysis of the water asked for
y the Sanitary Commissioner has since been
ommunicated to Government, vide G.O. 24th
May 1894 No 649 M. Local & Municipal. Had the
ank been pumped out and the water again tested
some light would have been thrown on the
question of the purity of the supply.

4. The position of the Mananchera
tank is certainly not very desirable. It
would of course be much better to go beyond
the town for a source of supply. If the
Mananchera Tank derives its water from
below an impervious stratum of clay as
supposed by Dr King, and is not safe, I do
not quite understand how any of the water
in this stratum near the town would be safe
as

Mr Ellis has "mixed" my statements. I objected to the "mixing" of the subsoil water with water from the next stratum. If the latter were tapped and the former were excluded matters would be ~~not~~ no longer "mixed", and this is what I have contended for.

No doubt it would be of the greatest advantage to tap the next water bearing stratum if there be, as suspected, a distinct collection of water below the clay.

as that tank and all wells and tanks that
pierce the supposed impervious stratum
would be in direct communication with
the water in this stratum. If on the othe
hand the water in the stratum is safe the
Mananchera tank appears to be as good
a source as any other in the town; the wate
is certainly better than that derived from
private wells. The cheapest way to test the
quantity and quality of the supply in the
stratum where the Mananchera derives
its source is to pump from the tank as
suggested by Mr Jones, and there appears
to be no advantage of sinking other bore
holes in the town to the same stratum.

5. In paragraphs 29 to 32 of the Chairman's
report printed in G.O. under reference he
appears to have lost sight of Mr Jones'
request to have the water from the tank
pumped out.

6. When I inspected Calicut on the
10/11th October 1894 I visited Poloor Hill about
3 miles from Calicut where the laterite
crops out. There are several springs at
the foot of this hill and any wells that are
sunk

unk in this rock would, I think, yield a ure supply. As to the quantity, that can nly be proved by experiment.

1. The Poloor hill scheme will cost not ess than 4 lakhs of rupees. If the finances f the Municipality do not permit this scheme being undertaken at present nor for some years to come I would recommend that the Manancheri tank be tested with regard to its yield, with the view of making it the source of supply as a temporary measure for the Moplah quarters until such time as the Municipality can find necessary funds for a larger scheme.

8. Whatever pipes are laid as a temporary measure could form part of the larger scheme whenever that comes into existence. The engine house would be a corrugated iron shed of a semi-permanent nature. Portable pumps or engines could be bought at an advantageous price from the pumping plant used on the construction of the Trichinopoly + Tanjore Water works and the cost of the whole work would be from Rs 75,000 to Rs 1,00,000

9. The urgent need for water supply scheme for the Moplah quarters has been so fully explained in the Assistant Sanitary Engineer's letter embodied in G.C dated 8th December 1890, No 1871 M Mis, that it is unnecessary to repeat it here. The popular opinion about the water of the Manancheri tank is that it is good. It is used by the Europeans and Eurasians living near the tank. The Chemical analysis has not revealed any dangerous elements in the water. It bears a favorable comparison with the water used in Madras + Bombay.

The heads do not matter one jot. In any case, the question of the dangerous constituents can only be determined by a sanitary survey. The comparison should be made with "wholesome water" not the Madras comparison for Red Hills.

		usable water	Manancheri	Red Hills 1893	Bombay
					Tulsi + Vehar lakes 1891-92
Total Solids	Grms per litre	0·428	0·060	0·340	"
Volatile solids	do	0·043	0·020	0·090	"
Chlorine	do	0·043	0·005	0·056	"
Total hardness	degrees Clark	12°	0°·175	3°·675	"
Permanent hardness	do	4°	0°·175	0°·700	"
Free ammonia	Mlgrms per litre	·05	0·040	0·040	·002 to ·25
Albumenoid ammonia	do	·10	0·160	1·200	·08 to ·25
Nitric acid		5·00	trace	1·080	

It will be observed that the only impurity which is in excess of the standard fixed for 'usable' water is albumenoid ammonia, and the indications are that this impurity is of vegetable origin and therefore not very dangerous. That the water is not classed as good water from a Chemical Examiner's point of view, is not to be wondered at since people are allowed to dip pots into the water and wash them. This could be prevented. Even in its present condition, as stated before, the water is infinitely better than that used by the Moplahs.

Certainly not a safe deduction with free ammonia present such an extent, and in presence of an adverse sanitary survey.

10. To investigate the Poloor Hill Scheme, a sum of Rs 3000/ would be required and if the Council can afford the larger scheme they may be requested to provide that sum in the Budget of 1895/96. If the Council are not prepared to finance a scheme costing 4 lakhs they may be asked to provide Rs 500/- for testing the yield of the Mananchera Tank. As the preparation of the Scheme is one proposed to be dealt with in 1895-96, it is requested that the Council be asked to decide this point at a very early date.

I have the honor to be
Sir,
your Most Obed^t. Servant

R. E. Ellis

Ag: Sanitary Engineer to Gov^t.

ocal & Municipal Dep

CURRENT No. 2656 M

1894

From

The Ag: Sanitary Engineer
to Government

The Chief Secretary to Govt
Local and Munl. Dept.

No. 2243

CHIEF SECRETARY
30 OCT. 1894
GOVERNMENT OF MADRAS

Dated 29th
Desp. 30th
Recd.
} October 1894

Enc. —

Subject

Calicut Water Supply Scheme

Submitting his report
the remarks of the Sanitary
mmissioner and the Chairman
rding the ______

Cs.

No. 1193

Referred to the Municipal Council,
Calicut, for early report.

(By order)

Lionel Davidson
6.11
Ag. Assistant Secretary

V.R.
7/11/94
Faithfully
7th Nov 1894 }

CHAIRMAN,
8 - NOV. 94
CALICUT MUNICIPAL COUNCIL.

To,
The Chairman, Municipal Council, Calicut

S.E./6 23-7-94—1,900.

No. 813

GOVERNMENT OF MADRAS.

OFFICE OF SANITARY ENGINEER,

Fort St. George, 26th March 1895.

From

T. A. Jones, Esq., Mem. Inst. C.E., F.R.S.E.,
~~R. E. ELLIS, ESQ., ASSOC. M. INST. C.E.,~~
~~ACTING~~ SANITARY ENGINEER TO GOVERNMENT,

To

The Chief Secretary to Government
Local and Municipal Departmen

SIR,

I have the honor with reference to G.
dated 8th November 1894, No. 1668 M., Local an
Municipal, to point out that Government ord
that a scheme for the Water Supply of Calic
should be one of the schemes to be submitted
Government this year. In the Chairman's
letter embodied in G. O., dated 28th Februa
1895, No. 316 M. Local and Municipal, he po
out that the Council decline to give funds
the purpose so that the preparation of t
scheme must meantime remain in abeyan

I have the honor to
Sir
Your most obt Serv

Sanitary Engineer to

para 45

Local & Municipal Dept.
PR. CURRENT No. 1161 M

1895.

From

The Sanitary Engineer
to Government

The Chief Secretary
to Government,
Local & Munl. Dept.

No. 813

ed 26th
ed 27th } March 1895

27 MAR 1895

Subject

Calicut Water Supply Scheme

Pointing out to Government the preparation of ___ must meantime in abeyance as the Council to give funds for the pose.

No. 525 of 10-4-95

Referred to the Municipal Council, Calicut, for early report.

(By order)

W. Briggs

Ag. Assistant Secretary.

P.R.
5/4/95
For W. Dept.
10 April 1895 }

Appd.

Send copy of this.

I don't understand this Chairman on the San. Engr. Once or a remark &c. have been made in the Budget G.O., but it may clear up matters to get a report. Don't lose sight of this.

W. Briggs

To,
The Chairman M.C. Calicut.

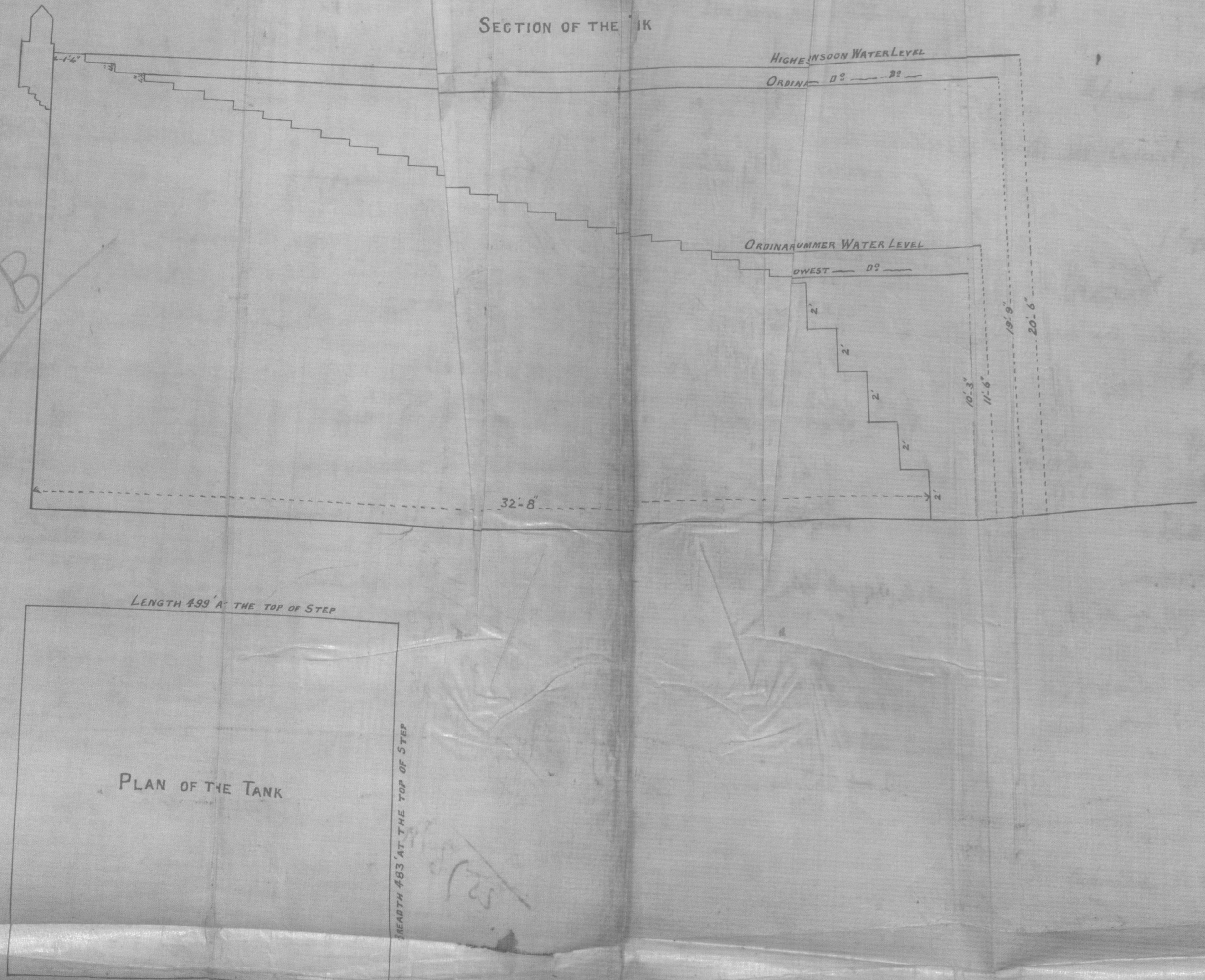
Despd. 10/4/95

B

of Param

PLAN AND SECTI
OF
ANANCHERA TANK
In the town of Calicut

B



Office of Sanitary Engineer
Fort St. George October 1890

B. Ch.

Asst to the Sanitary Engineer to Govt

3/3436 Mo 45
Cub a-4
Sa-23 25/56

11

29

I.

Application for allotment of Funds required by the Municipal Council of Calicut

Particular work or purpose.	Major and minor heads in the budget.	Amount provided for the work or purpose in the budget.	Amount subsequently allotted or transferred.	Amount now required, and the source from which it is to be met.	Necessity for the allotment.	Reference to previous correspondence.
1	2	3	4	5	6	7
		Rs.	Rs.	Rs.		
B For testing the yield of the mananchira tank.	Grant I. (Public works) New works water supply	nil	nil	Rs 500 – –	Vide remarks accompanying	Balance deducting the amounts sanctioned by Government in its orders dated 29 march 1895 No 567-M. and dated 29th July No 1206-M. [illegible] Rs 2332-3-

Municipal office
Calicut 8th October 1895

T. Varadarau
Chairman, Municipal Council.

No 915/1895

A (5)

Municipal office
Calicut 3rd october 18

Local & Municipal Department
CURRENT No. 3486 A.

From,

T. Varada Rao Esquire. S. C. S
Chairman, municipal council
Calicut

To

The Honorable J. D. Price. C.S.I. I.C.S
Chief Secretary to Government
Local and municipal Department
Madras

Thro The Revenue Divisional Officer

Sir,

With reference to your memorandum dated 10th April 1895 No 525 referring to the municipal council for report letter from the Sanitary Engineer dated 26th march 1895 No 813, I have the honor to submit for the information and orders of Government the following resolution passed by the municipal council at a meeting held on the 20th September 1895.

" On a careful consideration of the question, the council resolves to accept the scheme for the supply of water from the Mananchira tank. For the purpose of testing its yield, a sum of Rs 500/ will be sanctioned from the balance as suggested by the Sanitary Engineer to Government in his letter dated 29th October 1894 No 2417."

(No 2656 d/94)

2. This refers to the alternative scheme proposed by Mr Ellis in paras 7 and 8 of his letter quoted above. It will be observed that Mr Ellis puts down the cost of the whole work between Rs 75,000 and Rs 100,000/. The preliminary expenses for testing the yield of the tank is estimated at Rs 500/ which sum the Council was requested to provide in the Budget for 1895-96.

3. Government is aware that doubts were first raised by the Sanitary Commissioner in

Read

in 1894 (G.O. dated 23rd April 1894 No 513-M. Local and Municipal) regarding the sufficiency of water in the Mananchira tank to supply the whole town of Calicut and also the quality of the supply. These apprehensions were to a certain extent shared in by the Council at the time. The District Medical and Sanitary Officer (Surgeon Major H. L. C. Carruthers) and the Collector (Mr. H. Moberly) were strongly opposed to any scheme which involved the adoption of the Mananchira tank as the source of supply. The latter in his letter dated 23rd February 1895 No $\frac{26\text{-M}}{\text{Dis}}$ expressed doubts as to whether the Mananchira tank had feeding springs sufficient to keep the water always up to a certain level. He pointed out that during the months of December 1894, January and February 1895 the level of the water was falling steadily and at the time of his report the water fell from day to day. Referring to

Referring to the quality of the water he said the situation of the tank in the middle of the town and surrounded on all sides by parambas where people defaecate and throw rubbish was sufficient in his opinion to condemn the scheme. Dr Carruthers' opinion was to the same effect but far more strongly worded.

4 In view of the emphatic opinions of the Sanitary Commissioner, the District Medical and Sanitary Officer and the Collector, the Government is entitled to ask for explanation why the Council prefers the Mananchira scheme to that of obtaining water from a safe distance outside the town.

5. The Council after a careful consideration of the facts at present available has come to the

Conclusion

Read

Conclusion that objections on the scor of the insufficiency and impurity of the wate in the tank or of its bad quality cannot be sustained.

6 Taking first the quantity of the wate available in the tank – reference is requested to the *sketch giving the section and plan of the tank. The area of the water spread of the tank at the ordinary monsoon level is 490'x 475'. At this level the depth of water in the tank is 19 ft 9 inches. The lowest summer water level is 10 ft 3 inches above the bottom of the tank, and at this level its area is 440'x4 or 187000 square feet. Thus the contents of the tank for each foot of depth below the lowest summer water level is 187000 square feet equivalent to 1,168,750 gallons of water. The population of the town according to the last census is 66078, and allowing ten gallons per head, which is, I believe, the rate of allocation in Tanjore and Trichinopoly, the daily consumption will be 660780 gallons so that even during the dry months of the

* enclosed.

the year only .566 foot depth of water need be pumped out to give a sufficient supply of water to the whole town.

The Council is not at present ambitious to provide a correct scheme of water supply to the whole town which extends over an area of 13¼ square miles nor is it needed. The Subsoil in Calicut is capable of yielding a good potable water except in the crowded parts. In the A, G, and H divisions which Constitute the suburbs of the town, the purity of water in the wells is above question. The British troops stationed on the West Hill in the A division are supplied with drinking water from wells in the barracks and the European as well as the well-to-do native residents of that quarter depend for their supply on the wells in their own Compounds which are in general properly

taken

G.O. No. 583 M / 31-3-96.

taken care of. The contour of the ground slopes from the north towards the Kallai river which circles round the town proper. It is here that the soil is contaminated by cesspools and cemetries and the water level in the wet weather is only a foot or two below the surface of the ground. The use of water from wells in this locality should be interdicted. The G and H divisions lie outside the Kallai river. They are generally very sparsely peopled and the scattered houses belong to the richer classes of the native community who are accustomed to live in separate compounds. The well water in these Compounds is not liable to Contamination.

Even if water under a correct scheme of supply is made available to residents in the A, G, and H divisions there is little likelihood of its being used. Eliminating then the A, G and

H

the divisions, it may be assumed that the area of the town to be served by the scheme is 5¼ square miles with a population of 46,298 souls.

The conclusions arrived at by the Sanitary Engineer and concurred in by the Council regarding the sufficiency of supply to the whole town will apply with a greater force to a part of it.

7. Next as regards the quality of the mananchira water

The mananchira is a fine tank, situated on a ridge running through the town; the ground being high it is less liable to contamination than low lying lands in the neighbourhood, the water of the tank is held in very good repute in the town, the popular opinion being that the water is wholesome. It is used by the Europeans living on the beach and the Eurasians in the neighbourhood.

The

The Hospital is supplied by the tank. Such of the moplas as can afford to pay obtain the mananchira water from water carriers. The Guzerati and Parsi merchants make use only of the mananchira water.

In 1893–94 when a few cases of cholera appeared in the mopla quarters the mananchira water was distributed gratis to the inhabitants of the houses where the disease broke out in addition to the usual precautions of disinfection of houses and destruction of soiled clothes. The water of the tank was submitted for analysis twice.

Chemical analysis has confirmed the opinion held by the public. In the table below is given the comparison of the results of the analysis with the quality of the Red Hills water at Madras and the Tulsi and Vehar lakes supply at Bombay.

	Usable water	Narandhia	Red Hills 1893	Bombay Tulsi & Vehar lakes 1891–92
Total solids Grms per litre	0.425	0.060	0.340	"
Volatile solids Do	0.043	0.020	0.090	"
Chlorine Do	0.043	0.005	0.056	"
Total hardness degrees Clark	12°	0°.175	3°.675	"
Permanent hardness "	4°	0°.175	0°.700	"
Free ammonia mgrms per litre	.05	0.040	0.040	"
Albumenoid ammonia "	.10	0.160	1.200	.002 to .25
Nitric acid	5.00	trace	1.080	.08 to .25

The comparison is on the whole to the credit of the local tank. The amount of albumenoid ammonia is returned at 0.160 which is much less than that of the Red Hills water and is slightly in excess of what Mr. Ellis says "usable water" ought to contain. The tank has been conserved to a limited extent, that is, people have not been permitted to bathe or wash their clothes in

in it. They freely dip their pots into the water and sometimes wash them there. The tank is also liable to pollution by thousands of birds and passing bursts of wind. Storm water rushes into the tank during the monsoon from the shallow side drains. All this could be prevented. The steps which are built all round may be entirely removed and the tank surrounded by a high wall or railing to prevent any access to the water. The flows of surface soil water may be prevented by diverting drains. A thin net easily procurab in Calicut spread over the tank as a canopy will prevent birds from fouling the water.

Admitting that the water in the tank is at present in good chemical condition the Sanitary Commissioner argues that it does not follow that it will continue so.

The sandy and lateritious soil through which the water now passes to reach the tank may serve for years as an efficient filter but in process of time it may become clogged and there is no possibility as in the case of artificial filters of removing the material that has become choked. This objection the Council considers can be overcome by puddling the sides of the tank with concrete so as to render them impervious.

This will not in any way affect the depth of the water in the tank for, according to the Sanitary Commissioner's own showing the tank is fed in addition to the percolation from the subsoil by a special stratum of water under pressure between two impervious strata one of which has been penetrated.

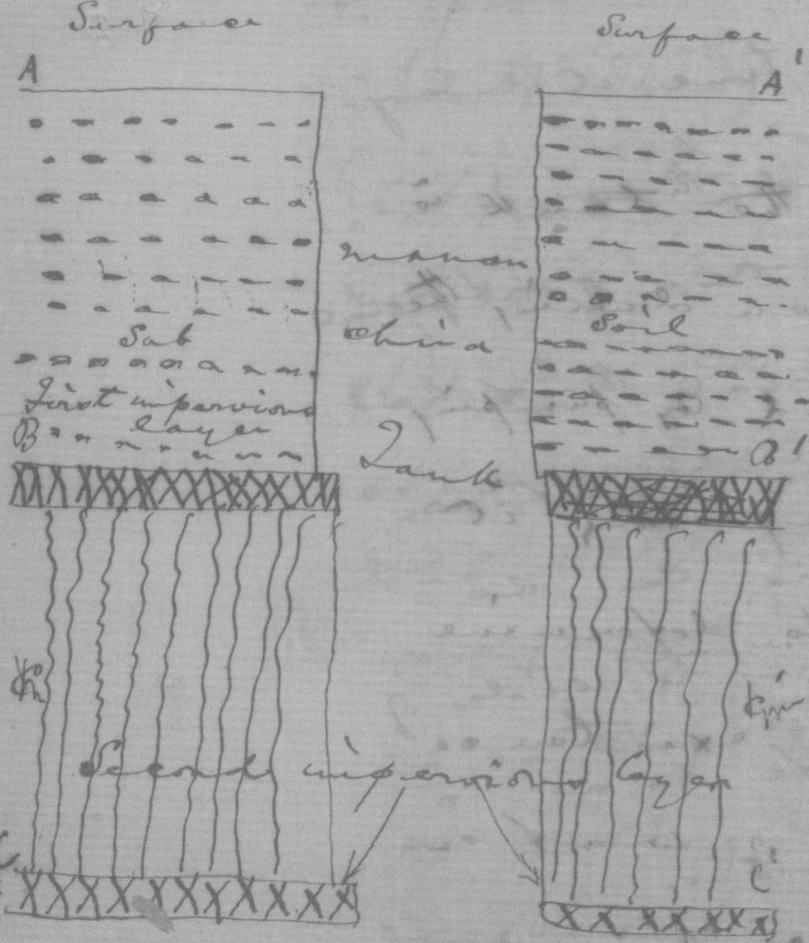
The

R. No 5834 D
31-5-96.

SURVEY OFFICE
29 OCT 1907
MADRAS

The accompanying diagram will

make my meaning clear.



The water percolate into the tank thro the Subsoil AA', & should be prevented from passing into the tank and this it is believed can be effected by puddling the sides of the tank so far as they lie in the section of AA', BB'.

The store of water between the two impervious layers BB' and CC' must be absolutely pure, and being under pressure will force itself into the tank where the water in the upper section

The is pumped out. Thus there will th e in the tank an unceasing supply of water free from contact with the subsoil -

The depth of the tank is b ly 196ft. 9 inches. even during the po onsoon months and by pumping out the water completely, it would be easy to determine whether there is in existence the lower stratum of water suspected by Dr King.

8. Persons well acquainted with the environs of the town of Calicut declare that it would be impossible to find an area large enough or conveniently near the town where the purity of the subsoil can be guaranteed. Towards the north and almost up

---

G.O. No 583 M of 31-5-96 Read

15 P

up to the edge of the Korapuzha river 5 miles away, it is one large area of paddy land. Towards the South up to the Beypore river the conditions are extremely similar. To the east we have little hills rising amidst cultivated paddy lands.

9. In deciding which of the two schemes the Council could adopt, the consideration which finally weighed with it was the expense of one against the other. The Palur Scheme it was estimated would cost 4 lakhs of rupees while the Mananchira tank scheme would entail the expense of only a quarter of that sum. Counting upon a grant of one half the amount from the Provincial Funds it would be necessary to raise the balance (2 lakhs of rupees) by a loan. At an interest of 4 percent per annum the annual payment for interest and sinking fund

would amount to Rs 14700/ and this would continue to be an annual charge on the municipality for 20 years. This the Council is unanimously of opinion a burden which it can ill afford to take upon itself at present.

10. I regret the delay in submitting this report. Ever since the receipt of Mr Ellis's letter on the 8th November 1894 with the orders of Government, I have constantly kept the question of water supply before the Councillors' attention. The matter was posted for discussion on as many as 7 occasions.*

* 17. 11. 94
28. 2. 95
5. 4. 95
26. 4. 95
9. 5. 95
30. 5. 95
20. 7. 95

It was referred to a Sub Committee for consideration on the financial aspect. On the 5th April 1895 the Council

resolved

Read

resolved by a large majority that the question of water supply should be deferred until the matter of mopla burial grounds is disposed of. A very large section of the Council held the opinion that a scheme for the drainage of the town should be given precedence. The local body is willing to take any steps which might bring in its wake the imposition of additional taxes in the shape of a water rate. I beg to submit for the information of Government 6 copies of a memorandum containing a summary of all the papers in connection with the matter under report.

11. Now that the Council has made up its mind upon the question I venture to request Government to direct the Sanitary Engineer

to arrange at an early date to test the yield of the tank and also to ascertain whether there is a pure and sufficient store of water under the first impervious layer. If the Sanitary Engineer is unable to depute an officer for the purpose, I beg to suggest that Mr. A. R. Stuart whose assistance I availed myself of and who is quite competent to undertake the work may be employed for the purpose. There will be no difficulty also in procuring locally a centrifugal or pulsometer pump with an engine or a boiler to empty the tank.

I have the honor to be,
Sir,
Your most obedient Servant

T. Varada Rao
Chairman

Read

Extract from the Proceedings of the Municipal Council, Calicut at a Meeting held on the 20th September 1895

Present

I. Varada Rao Esquire. S. C. S. Chairman
H. W. Brown Esquire
M.R.R. Cowverjee Ardeshir Avargal
" K. Krishnan Nair "
" D. Ganapat Rao "
" A. Subramania Iyer "
J. J. Srinivasagam Pillay Esquire
B. de. Rozario Esquire
M.R.R. O. A. Krishna Menon Avargal
R. F. Austin Esquire
M.R.R. N. Subramania Iyer Avargal
" I. N. Appu Nedungadi "

A (b)

1. Read again papers regarding the water supply scheme for Calicut.

Resol:- On a careful consideration of the question, the Council resolves to accept the scheme for the supply of water from the Mananchira tank for the purpose of testing its yield a sum of Rs 500/ will be sanctioned from the balance as suggested by the Sanitary Engineer to Government in his letter dated 29th October 1894 No. 2417.

(Sd) T. Varada Rao
Chairman

(True Extract)

T. Varadarao
Chairman

Sub 57
San 10/56

Endst on No. 23/1m 95

Submitted

2. The quality and yield of the Mananchira tank should be tested by pumping out the water and letting it fill again. If the result proves to be favourable, I beg strongly to recommend the Council's proposal to use the Mananchira tank as a source of water supply.

3. I agree with the Chairman that there is no need to supply A. G. and H Divisions ~~supply~~ with water from this tank.

4. The Moplah quarters and Jali are much crowded within

Read

(8) / 198

A/

Forwarded

R Vaumbe

Calicut } for Collector
1-11-95 }

the closing of the shallow burial grounds in various parts of the Moplah quarters and with the supply of wholesome drinking water, the general health of the town should considerably improve.

6. The question has been pending for a long period and the Council was not in favour of any scheme of water supply. The credit of convincing the Council of the importance of the matter is due to the Chairman.

Lakshminathacharya

Head Qr Dy Collr

15-10-95 }
Calicut }

JH
17-10

CHIEF SECRETARIAT
NOV 1895
GOVERNMENT OF MADRAS

Local & Municipal Dept.
CURRENT No. 3436 M

Office of Sanitary Commissioner with the Government of Madras
No. 2264 S
22 NOV 95

TO BE RETURNED WITH REPLY.

20 P 48

8 11/10/95

From.

The Chairman
Municipal Council
Calicut

To

The Chief Secretary
to Government
Local and Municipal Depts.
Madras
Thro' the Revenue Dt. Offr
Dated 3rd October 1895
Despatched 9th October 1895
Recd

Endst 3 Lr. 3 + C.M. 2656 M of 94

15/3/96
23

Subject

Water Supply Scheme

Requesting to sanction Rs 500/ for testing the yield of the Mananchira tank.

(with endorsement)

X (9) No. 1669

Referred to the Sanitary Board for early remarks.

(By order)
W. W. Phillips
Ag. Assistant Secretary

V.R.
21/11/95

Fort St. George
21st November 95

To

The Sanitary Board

[50—24-4-95.]

GOVERNMENT OF MADRAS.

69

SANITARY BOARD OFFICE.

Branch. 715 M

GENERAL SANITATION ~~DEPARTMENT~~.

27 P

Proceedings of the Sanitary Board, No. $\frac{2}{S.B.P.}$, dated 24th February 1896.

Col. D. McH. Campbell R.E. President
SURGEON-LT.-COL. W. G. KING, M.B., C.M., D.P.H., AG. SANITARY COMMISSIONER, MADRAS.
J. A. JONES, ESQ., M.I.C.E., F.R.S.E., SANITARY ENGINEER TO GOVERNMENT.
Members

A (10)

READ the following:—

Endorsement No. 1669 dated 21st November 1895, Local and Municipal Department, referring for remarks resolution of the Municipal Council Calicut requesting sanction for Rs 500 for testing the yield of the Mananchira Tank.

The Board is of opinion that before the question of the advisability of using the Mananchira Tank as a source of water-supply can be determined by it, it is necessary that an exploratory boring, well, or excavation, be made in the immediate proximity of the tank. By this means, it would be possible

Read

to ascertain whether there exists, as suspected, water of good quality. Should this prove to be the condition of affairs it will remain to determine the quality and quantity of this source, and the feasibility of measures providing for the exclusion of the subsoil water. With this information before it, the Board would be in a position to advise finally as to the adoption of the Manancheera Tank scheme, or the alternative proposed by Mr. Ellis, late Acting Sanitary Engineer.

W G King.
Surgn. Lt. Col.
Secy (Genl. Sanitation Branch)
Sanitary Board

To

The Chief Secretary
to Government
Local & Municipal Deptt.

715 M

M.S. Local and Municipal DEPARTMENT.

From

SURN.-LT.-COL. W. G. KING, M.B., C.M., D.P.H.

SANITARY COMMISSIONER FOR MADRAS,

To

THE Chief Secretary
to Government
Local & Municipal

No. 2/S.B.P.

Dated 24th
Despatched 25th } February 1896.
Received

C. No 2656 M of 1894
& 3436 M of 1895

ENCLOSURES.

CHIEF SECRETARY
25 FEB 1896
GOVERNMENT OF MADRAS

Subject.

Forwards Proceedings of the Sanitary Board on the resolution of the Municipal Council Calicut requesting Sanction of Government for Rs 500 for testing the yield of the Manancheera Tank.

300—16-11-95.

C. No 2656 M of 94
" 1106 M of 95
" 3436 M of 95
" 715 M of 96

C.S.
Wise

Order No. 583 Muni &
31-3-96

The Sanitary Boards Proceedings will be communicated to the Munl. Council, Calicut, with the request that early steps may be taken to furnish the information required by the Board.

F.R.
24/3/96

W.W.S.
26-3-96

30/3/96.

To
The Chairman M.C. Calicut
The Sanitary Board
- Sanitary Engineer

Despd. 2/4/96

6/3 a. 24.3.96

Press
Please strike off 10 copies after the receipt of the diagram
8/2e 1/11/07

~~See gains on p 7~~

No. 583 M., 31ST MARCH 1896.
GOVERNMENT OF MADRAS.
LOCAL AND MUNICIPAL DEPARTMENT.

READ—the following papers :—

I

Letter—from R. E. ELLIS, Esq., ASSOC. M. INST., C.E., Acting Sanitary Engineer to Government.
To—the Chief Secretary to Government, Local and Municipal Department.
Dated—the 29th October 1894.
No.—2417.

With reference to G.O., No. 513 M., dated 23rd April 1894, Local and Municipal, I have the honour to report on the remarks of the Sanitary Commissioner and the Chairman regarding the water-supply scheme for Calicut as follows :—

2. No decision has been arrived at to use the Mananchíra tank as a source of water-supply. In a report to Government, dated 25th July 1891, No. T./15 Mr. Jones wrote that there did not appear to be any other source of water-supply and recommended that before embarking on the scheme it would be advisable to ascertain how much water could ordinarily be obtained from the tank during the dry season by making experiments during 1892. The Municipal Council on the 1st August 1891 passed a resolution to the effect that there were no funds, and no steps appear to have been taken to test the yield as suggested though the estimated cost was put down at Rs. 45 *plus* the cost for the loan of the engines and setting them up.

3. The analysis of the water asked for by the Sanitary Commissioner has since been communicated to Government—*vide* G.O., No. 649 M., dated 24th May 1894, Local and Municipal. Had the tank been pumped out and the water again tested some light would have been thrown on the question of the purity of the supply.

4. The position of the Mananchíra tank is certainly not very desirable. It would of course be much better to go beyond the town for a source of supply. If the Mananchíra tank derives its water from below an impervious stratum of clay as supposed by Dr. King and is not safe, I do not quite understand how any of the water in this stratum near the town would be safe as that tank and all wells and tanks that pierce the supposed impervious stratum would be in direct communication with the water in this stratum. If on the other hand the water in the stratum is safe the Mananchíra tank appears to be as good a source as any other in the town; the water is certainly better than that derived from private wells. The cheapest way to test the quantity and quality of the supply in the stratum where the Mananchíra derives its source is to pump from the tank as suggested by Mr. Jones, and there appears to be no advantage of sinking other bore holes in the town to the same stratum.

5. In paragraphs 29 to 32 of the Chairman's report printed in Government order under reference he appers to have lost sight of Mr. Jones' request to have the water from the tank pumped out.

6. When I inspected Calicut on the 10th and 11th October 1894, I visited Pólúr hill about three miles from Calicut where the laterite crops out. There are several springs at the foot of this hill and any wells that are sunk in this rock would, I think, yield a pure supply. As to the quantity, that can only be proved by experiment.

No. 583 M., 31st March 1896.

7. The Pólúr hill scheme will cost not less than 4 lakhs of rupees. If the finances of the Municipality do not permit this scheme being undertaken at present nor for some years to come, I would recommend that the Mananchíra tank be tested with regard to its yield with the view of making it the source of supply as a temporary measure for the Mappilla quarters until such time as the Municipality can find necessary funds for a larger scheme.

8. Whatever pipes are laid as a temporary measure could form part of the larger scheme whenever that comes into existence. The engine-house would be a corrugated iron shed of a semi-permanent nature. Portable pumps or engines could be brought at an advantageous price from the pumping plant used on the construction of the Trichinopoly and Tanjore water-works and the cost of the whole work would be from Rs. 75,000 to Rs. 1,00,000.

9. The urgent need for water-supply scheme for the Mappilla quarters has been so fully explained in the Assistant Sanitary Engineer's letter embodied in G.O., Mis. No. 1871 M., dated 8th December 1890, that it is unnecessary to repeat it here. The popular opinion about the water of the Mananchíra tank is that it is good. It is used by the Europeans and Eurasians living near the tank. The chemical analysis has not revealed any dangerous elements in the water. It bears a favourable comparison with the water used in Madras and Bombay :—

—		Usable water.	Mananchira.	Red Hills, 1893.	Bombay.
					Tulsi and Vehar lakes, 1891-1892.
Total solids	Grms. per litre.	0·428	0·060	0·340	....
Volatile solids	Do.	0·043	0·020	0·090	....
Chlorine	Do.	0·043	0·005	0·056	....
Total hardness	Degrees-clark.	12°	0°·175	3°·675	....
Permanent hardness	Do.	4°	0°·175	0°·700	....
Free ammonia	Ml. grms. per litre.	·05	0·040	0·040	·002 to ·25
Albumenoid ammonia	Do.	·10	0·160	1·200	·08 to ·25
Nitric acid		5·00	Trace	1·080	....

It will be observed that the only impurity which is in excess of the standard fixed "for usable" water is albumenoid ammonia, and the indications are that this impurity is of vegetable origin and therefore not very dangerous. That the water is not classed as good water from a Chemical Examiner's point of view is not to be wondered at since people are allowed to dip pots into the water and wash them. This could be prevented. Even in its present condition, as stated before, the water is infinitely better than that used by the Mappillas.

10. To investigate the Pólúr hill scheme a sum of Rs. 3,000 would be required and if the Council can afford the larger scheme they may be requested to provide that sum in the budget of 1895-1896. If the Council are not prepared to finance a scheme costing 4 lakhs they may be asked to provide Rs. 500 for testing the yield of the Mananchíra tank. As the preparation of the scheme is one proposed to be dealt in 1895-1896, it is requested that the Council be asked to decide this point at a very early date.

II

Memorandum No. 1193 C., dated 7th November 1894.

Referred to the Municipal Council, Calicut, for *early* report.

(By Order.)

L. Davidson,
Ag. Assistant Secretary.

To the Chairman, Municipal Council, Calicut.

III

Letter—from J. A. Jones, Esq., mem. inst., c.e., f.r.s.e., Sanitary Engineer to Government.
To—the Chief Secretary to Government, Local and Municipal Department.
Dated—the 26th March 1895.
No.—813.

I have the honour, with reference to G.O., No. 668 M., Local and Municipal, dated 8th November 1894, to point out that Government order that a scheme for the water-supply of Calicut should be one of the schemes to be submitted to Government this year. In the Chairman's letter embodied in G.O., No. 316 M., Local and Municipal, dated 28th February 1895, he points out that the Council decline to give funds for the purpose, so that the preparation of the scheme must meantime remain in abeyance.

IV

Memorandum No. 525, dated 10th April 1895.

Referred to the Municipal Council, Calicut, for early report.

(By Order.)

W. Francis,
Ag. Assistant Secretary.

V

Letter—from T. Varada Rao, Esq., Chairman, Municipal Council, Calicut.
To—the Chief Secretary to Government, Local and Municipal Department (through the Revenue Divisional Officer).
Dated—the 3rd October 1895.
No.—915.

With reference to your memorandum, dated 10th April 1895, No. 525, referring to the Municipal Council for report letter from the Sanitary Engineer, dated 26th March 1895, No. 813, I have the honour to submit, for the information and orders of Gorvernment, the following resolution passed by the Municipal Council at a meeting held on the 20th September 1895.

> "On a careful consideration of the question the Council resolves to accept the scheme for the supply of water from the Mananchíra tank. For the purpose of testing its yield, a sum of Rs. 500 will be sanctioned from the balance as suggested by the Sanitary Engineer to Government in his letter, dated 29th October 1894, No. 2417."

2. This refers to the alternative scheme proposed by Mr. Ellis in paragraph 7 and 8 of his letter quoted above. It will be observed that Mr. Ellis puts down the cost of the whole work between Rs. 75,000 and Rs. 1,00,000. The preliminary expenses for testing the yield of the tank is estimated at Rs. 500, which sum the Council was requested to provide in the budget for 1895–96.

3. Government is aware that doubts were first raised by the Sanitary Commissioner in 1894 (G.O., No. 513 M., Local and Municipal) dated 23rd April 1894, regarding the sufficiency of water in the Mananchíra tank to supply the whole town of Calicut and also the quality of the supply. These apprehensions were to a certain extent shared in by the Council at the time. The District Medical and Sanitary Officer (Surgeon-Major H.St.C. Carruthers) and the Collector (Mr. H. Moberly) were strongly opposed to any scheme which involved the adoption of the Mananchíra tank as the source of supply. The latter in his letter, dated 23rd February 1895, Dis. No. 26 M., expressed doubts as to whether the Mananchíra tank had feeding springs sufficient to keep the water always up to a certain level. He pointed out that during the months of December 1894, January and February 1895 the level of the water was falling steadily and at the time of his report the water fell from day to day. Referring to the quality of the water he said the situation of the tank in the middle of the town and surrounded on all sides by parambas where people defoecate and throw rubbish was sufficient in his opinion to condemn the scheme. Dr. Carruthers' opinion was to the same effect but far more strongly worded.

4. In view of the emphatic opinions of the Sanitary Commissioner, the District Medical and Sanitary Officer and the Collector, the Government is entitled to ask for explanation why the Council prefers the Mananchíra scheme to that of obtaining water from a safe distance outside the town.

5. The Council after a careful consideration of the facts at present available has come to the conclusion that objections on the score of the insufficiency and impurity of the water in the tank or of its bad quality cannot be sustained.

6. Taking first the quantity of the water available in the tank—reference is requested to the sketch giving the section and plan of the tank—the area of the water-spread of the tank at the ordinary monsoon level is 490′ × 475′. At this level the depth of water in the tank is 19 feet 9 inches. The lowest summer water level is 10 feet 3 inches above the bottom of the tank, and at this level its area is 440′ × 425′ or 1,87,000 square feet. Thus the contents of the tank for each foot of depth below the lowest summer water level is 187,000 square feet equivalent to 1,168,750 gallons of water. The population of the town according to the last census is 66,078 and allowing ten gallons per head, which is, I believe, the rate of allocation in Tanjore and Trichinopoly, the daily consumption will be 660,780 gallons to that even during the dry months of the year only. Five hundred and sixty-five feet depth of water need be pumped out to give as ufficient supply of water to the whole town.

The Council is not at present ambitious to provide a correct scheme of water-supply to the whole town which extends over an area of 13¼ square miles, nor is it needed. The sub-soil in Calicut is capable of yielding a good portable water except in the crowded parts. In the A, G and H divisions which constitute the suburbs of the town, the purity of water in the wells is above question. The British troops stationed on the west hill in the A division are supplied with drinking-water from wells in the barracks and the European as well as the well-to-do native residents of that ~~of water~~ quarter, depend for their supply on the wells in their own compounds which are in general properly taken care of. The contour of the ground slopes from the north downwards the Kallai river, which circles round the town proper. It is here that the soil is contaminated by cesspools and cemeteries and the water level in the wet weather is only a foot or two below the surface of the ground. The use of water from wells in this locality should be interdicted. The G and H divisions lie outside the Kallai river. They are generally very sparsely peopled and the scattered houses belong to the richer classes of the native community who are accustomed to live in separate compounds. The well water in these compounds is not liable to contamination.

Even if water under a correct scheme of supply is made available to residents in the A, G and H divisions, there is little likelihood of its being used. Eliminating then the A, G and H divisions, it may be assumed that the area of the town to be served by the scheme is 5¼ square miles with a population of 46,293 souls.

The conclusions arrived at by the Sanitary Engineer and concurred in by the Council regarding the sufficiency of supply to the whole town will apply with greater force to a part of it.

7. Next as regards the quality of the Mananchíra water: The Mananchíra is a fine tank, situated on a ridge running through the town; the ground being high it is less liable to contamination than low-lying lands in the neighbourhood. The water of the tank is held in very good repute in the town, the popular opinion being that the water is wholesome. It is used by the Europeans living on the beach and the Eurasians in the neighbourhood. The hospital is supplied by the tank. Such of the Mappillas as can afford to pay obtain the Mananchira water from water-carriers. The Guzeratti and Parsi merchants make use only of the Mananchira water.

In 1893–1894 when a few cases of cholera appeared in the Mappilla quarters, the Mananchíra water was distributed gratis to the inhabitants of the houses where the disease broke out in addition to the usual precautions of disinfection of houses and destruction of soiled clothes. The water of the tank was submitted for analysis twice.

Chemical analysis has confirmed the opinion held by the public. In the table below is given the comparison of the results of the analysis with the quality of the Red Hills water at Madras and the Tulsi and Vehar lakes supply at Bombay:—

—		Usable water.	Mananchíra.	Red Hills, 1893.	Bombay: Tulsi and Vehar lakes, 1891–1892.
Total solids	Grams per litre.	0·428	0 ·060	0 ·340	....
Volatile solids	Do.	0·043	0 ·020	0 ·090	....
Chlorine	Do.	0·043	0 ·005	0 ·056	....
Total hardness	Degrees clark.	12°	0°·175	3°·675	....
Permanent hardness	Do.	4°	0°·175	0°·700	....
Free ammonia	Ml. grams per litre.	·05	0 ·040	0 ·040	·002 to ·25
Albumenoid ammonia	Do.	·10	0 ·160	1 ·200	·08 to ·25
Nitric acid		5·00	Trace.	1 ·080	....

The comparison is on the whole to the credit of the local tank. The amount of albumenoid ammonia is returned at 0·160 which is much less than that of the Red Hills water and is slightly in excess of what Mr. Ellis says "usable water" ought to contain. The tank has been conserved to a limited extent; that is, people have not been permitted to bathe or wash their clothes in it. They freely dip their pots into the water and sometimes wash them there. The tank is also liable to pollution by thousands of birds and passing bursts of wind. Storm water rushes into the tank during the monsoon from the shallow side drains. All this could be prevented. The steps which are built all round may be entirely removed and the tank surrounded by a high wall or railing to prevent any access to the water. Inflows of surface soil water may be prevented by diverting drains. A thin net easily procurable in Calicut spread over the tank as a canopy will prevent birds from fouling the water.

Admitting that the water in the tank is at present in good chemical condition the Sanitary Commissioner argues that it does not follow that it will continue so. The sandy and lateritious soil through which the water now passes to reach the tank may serve for years as an efficient filter, but in process of time it may become clogged and there is no possibility as in the case of artificial filters of removing the material that has become choked. This objection the Council considers can be overcome by puddling the sides of the tank with concrete so as to render them impervious.

This will not in any way affect the depth of the water in the tank; for according to the Sanitary Commissioner's own showing the tank is fed in addition to the percolation from the subsoil by a special stratum of water under pressure between two impervious strata one of which has been penetrated. The accompanying diagram will make my meaning clear.

A Proof with diagram will be sent for approval when returned from the Survey office.

The water percolating into the tank through the subsoil $A A^1$, $B B^1$ should be prevented from passing into the tank and this, it is believed, can be effected by puddling the sides of the tank so far as they lie in the section of $A A^1$, $B B^1$.

The store of water between the two impervious layers $B B^1$ and $C C^1$ must be absolutely pure and being under pressure will force itself into the tank where the water in the upper section is pumped out. Thus there will be in the tank an unceasing supply of water free from contact with the subsoil.

The depth of the tank is only 19 feet 9 inches even during the monsoon months and by pumping out the water completely it would be easy to determine whether there is in existence the lower stratum of water suspected by Dr. King.

8. Persons well acquainted with the environs of the town of Calicut declare that it would be impossible to find an area large enough or conveniently near the town where the purity of the subsoil can be guaranteed. Towards the north and almost up to the edge of the Korapuzha river five miles away, it is one large area of paddy land. Towards the south up to the Beypore river the conditions are extremely similar. To the east we have little hills rising amidst cultivated paddy lands.

9. In deciding which of the two schemes the Council could adopt, the consideration which finally weighed with it was the expense of one against the other. The Pólúr scheme it was estimated would cost 4 lakhs of rupees while the Mananchíra tank scheme would entail the expense of only a quarter of that sum. Counting upon a grant of one half the amount from the Provincial funds, it would be necessary to raise the balance (2 lakhs of rupees) by a loan. At an interest of 4 per cent. per annum the annual payment for interest and sinking fund would amount to Rs. 14,700 and this would continue to be an annual charge on the Municipality for twenty years. This the Council is unanimously of opinion a burden which it can ill afford to take upon itself at present.

* 17th November ~~1904.~~ 1894/
28th February 1895.
5th April ,,
26th ,, ,,
9th August ,,
30th ,, ,,
20th September ,,

10. I regret the delay in submitting this report. Ever since the receipt of Mr. Ellis' letter on the 8th November 1894 with the orders of Government, I have constantly kept the question of water-supply before the Councillor's attention. The matter was posted for discussion on as many as seven * occasions. It was referred to a sub-committee for consideration on the financial aspect. On the 5th April 1895 the Council resolved by a large majority that the question of water-supply should be deferred until the matter of Mappilla burial-grounds is disposed of. A very large section of the Council held the opinion that a scheme for the drainage of the town should be given precedence. No local body is willing to take any steps which might bring in its wake the imposition of additional taxes in the shape of a water-rate. I beg to submit, for the information of Government, six copies of a memorandum containing a summary of all the papers in connection with the matter under report.

9/

11. Now that the Council has made up its mind upon the question, I venture to request Government to direct the Sanitary Engineer to arrange at an early date to test the yield of the tank and also to ascertain whether there is a pure and sufficient store of water under the first impervious layer. If the Sanitary Engineer is unable to depute an officer for the purpose, I beg to suggest that Mr. A. R. Stuart whose assistance I availed myself of and who is quite competent to undertake the work may be employed for the purpose. There will be no difficulty also in procuring locally a centrifugal or pulsometer pump with an engine or a boiler to empty the tank.

ENCLOSURE.

Extract from the Proceedings of the Municipal Council, Calicut, dated 20th September 1895.

* * * * *

Read again papers regarding the water-supply scheme for Calicut.

Resolution No. 1.—On a careful consideration of the question, the Council resolves to accept the scheme for the supply of water from the Mananchíra tank. For the purpose of testing its yield a sum of Rs. 500 will be sanctioned from the balance as suggested by the Sanitary Engineer to Government in his letter No. 2417, dated 29th October 1894.

Endt. No. 23-M., dated 15th October 1895.

Submitted.

2. The quality and yield of the Mananchíra tank should be tested by pumping out the water and letting it fill again. If the result proves to be favourable, I beg strongly to recommend the Council's proposal to use the Mananchíra tank as a source of water-supply.

3. I agree with the Chairman that there is no need to supply A, G and H divisions with water from this tank.

4. The Mappilla quarters and Tali are much crowded with the closing of the shallow burial-ground in various parts of the Mappilla quarters and with the supply of the wholesome drinking-water the general health of the town should considerably improve.

5. The question has been pending for a long period and the Council was not in favour of any scheme of water-supply. The credit of convincing the Council of the importance of the matter is due to the Chairman.

T. M. Swaminatha Aiyar,
Head-quarters Deputy Collector.

Forwarded.

H. Moberly,
Collector.

1st *November* 1895.

V

Memorandum No. 1669, dated 21st November 1895.

Referred to the Sanitary Board for early remarks.

(By Order.)

W. W. Phillips,
Ag. Asst. Secretary to Government.

To the Sanitary Board.

VI

Note by the Sanitary Board, No. 2-SB.P., dated 24th February 1896.

Read—Endorsement No. 1669, dated 21st November 1895, Local and Municipal Department, referring for remarks resolution of the Municipal Council, Calicut, requesting sanction for Rs. 500 for testing the yield of the Mananchira tank.

The Board is of opinion that before the question of the advisability of using the Mananchira tank as a source of water-supply can be determined by it, it is necessary that an exploratory boring, well, or excavation, be made in the immediate proximity of the tank. By this means it would be possible to ascertain whether there exists, as suspected, water of good quality. Should this prove to be the condition of affairs, it will remain to determine the quality and quantity of this source, and the feasibility of measures providing for the exclusion of the sub-soil water. With this information before it, the Board would be in a position to advise finally as to the adoption of the Mananchira tank scheme, or the alternative proposed by Mr. Ellis, late Acting Sanitary Engineer.

(True Extract.)

W. G. King, Lieut.-Col., I.M.S.,
Secretary, Sanitary Board.

To the Chief Secretary to Government, Local and Municipal Department.

Order—No. 583 M., dated 31st March 1896.

The Sanitary Board's Proceedings will be communicated to the Municipal Council, Calicut, with the request that early steps may be taken to furnish the information required by the Board.

(True Extract.)

J. F. Price,
Chief Secretary.

To the Chairman, Municipal Council, Calicut.
,, Sanitary Board.
,, Sanitary Engineer.

Forwarded to the

(By Order.)

Registrar.

G.O., No. 583 M., 31st March 1896.

MISCELLANEOUS.

Water-supply.

Communicating, with remarks, to the Municipal Council, Calicut, the proceedings of the Sanitary Board on the subject of adopting Mananchira tank as the source of Calicut — scheme.

When given for copying
When copied
When examined
When signed
} 189 .

READ AGAIN G.O., No. DATED 189 ,							
CURRENT No.							
ENCLOSURES TO C. No.							
ORDER OF GOVERNMENT	A	A	A	A	A	A	A
LETTER OF GOVERNMENT.							
STATEMENT WITH DITTO.							
PAPERS NOT FILED UP, BEING MEANT FOR DESPATCH IN ORIGINAL.							

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~~No. 73-1874 (12th Feb. B. 174-178 (page 4)~~ DEPARTMENT.

Paper taken out of the Records from the charge of the Referencer.

~~Press~~ Miscellaneous ~~Routine~~ No. 583 M., dated 31st March 190 1896.

Date taken out.	For what purpose.			Initials of clerk taking the paper or of attender.	Date returned.	Initials of attender.
	Department.	C. No.	Year.			
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