

Local & Munl. (1896) Department.

PRINTED.

G.O., No. 65. M

DATED 11 January 96

[Despatch Abstract.]

Cochin water supply and boring apparatus.

Informing with remarks
the Municipal Council, Cochin, that Government is not prepared to
continue the experimental boring at Cochin, that if it desires to
continue the work it must do so at its own cost and that the
existing apparatus will be placed at its disposal.

BACK PAPERS.

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

FURTHER PAPERS.

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

DEPARTMENT.

Papers to be read in proceedings:—

Again G.O., dated 20.7.95 189, No. 1159 M
 Again G.O., dated 21.1.95 189, No. 93 M
 Current No. 3075 M of 1895, dated 8th Oct., from San. Engineer
 " " 2552 M " 1895, " 10th Aug., " P. W. S
 " " 3022 M " 1895, " 3rd Oct., " do
 3667 M do 20th Oct. do

ORDER. N. 65 M 8/11-1-96

As the experimental boring at Cochin has not ^{so far, resulted} ~~produced any results~~ in procuring a water supply for the town, as the expenditure up to date, including the cost of the apparatus, has exceeded Rs 13000, the Govt. is not prepared to continue the experiment any further. The Municipal Council will therefore be informed that if they ^{it seems to} ~~wish~~ to continue the boring with a view to obtaining a water supply, they must do so at their own cost, but and that the existing apparatus will be placed at their disposal. The depth reached at present is 325 ft. & some of the boring rods have been broken: it is estimated that it will cost another Rs 5000 to continue the boring to a depth of

400 ft., beyond which the existing ^{blue} ~~apparatus~~ ^{would not be effective} ~~is incapable of doing work~~ ^{the removal of the apparatus to Madras}

2. As it would entail considerable expenditure to remove the apparatus to Madras, the Govt. considers that for the present, at any rate, ~~the~~ it ~~apparatus~~ should remain where it is, but, as this course ^{will involve} ~~entails~~ a monthly expenditure ^{on account} ~~for the pay~~ of watchmen to look after it, the Sanitary Engineer ^{be requested to} with report on the 30th June ^{next} how matters stand, & what he would propose to do, in case no further use ^{could be} ~~is~~ found for the apparatus.

(from orders)
WWD 6.1.96

3. The other schemes ~~for a water supply~~ ^{which have been proposed, at present} for Cochin are considered ~~unfeasible~~ ^{unpracticable} owing to their great cost & the question of where ~~could be~~ ^{could be} ~~obtained~~ ^{must therefore be postponed until} funds are available.

15/1/96.

To
Chairman, M.C., Cochin ✓
Coll. of Malabar ✓
San. Engineer ✓
P.W. Dept. ✓
Fin. Dept. ✓

Dupd. 7/2/96

Cochin water supply
Boring apparatus

FROM ORDERS.

C. S.
PS

[G. 24.]
200-5-10-95.

DEPARTMENT.

Papers to be read in proceedings:—

- (2) Again G.O., dated 20th July 1895, No. 1159 M.
- (1) Again G.O., dated 21st Jan'y. 189, No. 93 M.
- (3) Current No. 2552 M of 1895, dated 6th Aug, from Public Works Dept.
- (4) " " 3032 M " 1895, " 3rd Oct, " do
- (7) " " 3075 M " 1895, " 8th Oct, " Sanitary Engineer to Govt.

ORDER.

Ref: 1646
16/11/95

The above papers will be forwarded D.P.W. with the request that the ~~to the~~ Chief Engineer, who will be ~~may be asked~~ requested to give his opinion as to whether he thinks it advisable to leave the present Cochin boring apparatus where it is, or whether he would pull it up, supply the missing rods, & then keep it in store to be put to whatever use it may hereafter be thought advisable; in the latter case whether he thinks considers the Sanitary Eng'r. estimate of Rs 1200 for raising it & carrying it to Madras reasonable

(from orders)

WWD 5/11/95

Dupd. 16/11/95

To The Public Works Dept.
with papers in original & her

Cochin Water Supply & Sewing
apparatus.

3022 m

FROM ORDERS.

C. S.

1646
95

LOCAL AND MUNICIPAL DEPARTMENT.

Again G.O., dated

Current No. 3075 m. of 1895, dated

Current No. of 189 , dated

189 , No.

8^o October from the Sanitary Engineer to Govt.
from the

FOR ORDERS.

Please see the notes and
orders in G.O. No. 93. m. Dated 21st Jan-
ary 1895.

2. From the Sanitary En-
-gineer's letter read above, it will
be seen that the proposal to supply
Cochin with water from the main-
land opposite to it is clearly be-
-yond the means of the Municipal
Council, even if liberal aid be given
by Government, and that the scheme
for conveying water from Alwaye
by means of pipes or by "water in
bulk" steamers, and the Conden-
-sation scheme are also financially
impracticable.

3. The Sanitary Engineer
is therefore of opinion that the scheme
of deep boring is the only practicable
one for supplying Cochin with good
water, and strongly recommends
that it should be continued even

The Sanitary Engineer's description
of the first scheme in G.O. 1628 m
3. 11. 94.
led to the inference that water
could probably be found close to
the backwater on the mainland. It
now turns out that there is none
for 10 miles from the backwater.

to a depth of 2,000 feet. Mr. Jones does not say what such an experiment would cost, but from the Sanitary Engineer's letter in G.O. No 1628 m, dated 3rd November 1894, it will be seen that the cost of boring to a depth of 600 feet with steam machinery would amount to Rs 16,700.

1. A. 11/10/95
Cochin is probably worse off for good water than almost any town in South India. Please see San. Commr's Inspection Notes in G.O. 90 m. under head "Water supply". At the same time the Govt cannot afford to give anything for the experiment proposed & the whole cost of this wd. have to be met from Provincial. Dr. King considers that the progress made so far is ^{most} encouraging (page 4. of the G.O. just quoted) & Mr. Jones seems very sanguine. May estimates for borings to various depths be called for? The first requisite wd. be a completely new apparatus from England, - please see linked file, - but as Cocarato has already been asked whether it could try boring for an artesian

As stated in the linked file, it is probable that we shall have to debit this Cochin boring with the whole cost of the boring apparatus, in which case the expenditure will have exceeded Rs 13,000. I am not prepared to go in for any more such experiments - the Govt. should find the money itself.

2/11/95

Supply, & Maoulipatam will probably undertake a similar experiment, they might justly be asked to pay a share of the cost of the kit.

31/10/95

Cochin water supply.

3075 m
FOR ORDERS.

Resubmitted with the linked file
as the questions in the two files
are now practically the same.

WHP
7/12/95

LD
20/12/95

I adhere to my note of

2/11/95

WHP

23/12/95

LOCAL AND MUNICIPAL DEPARTMENT.

Again C., dated 1159 m. dated 1895, No. 20th July 1895.

Current No. 2552 m. of 1895, dated

10th August

from the Public Works Department.

Current No. 3022 m. of 1895, dated

3rd October

from the Do.

FOR ORDERS.

So far as I am concerned, the
C.E. seems to think that if it is
desired to go to a greater depth than
400 feet a new apparatus will have
to be got out from home. If this is so,
the inference is that the
existing apparatus is useless, or,
in other words, that its cost must be
added to the other expenditure on the
Cochin boring, making a total of
over Rs 13000! Please ask
the C.E. whether he would leave
the apparatus where it is or
whether he would pull it up, supply
the missing rods, & then keep it
in store for whatever use it may
hereafter be thought advisable to
put it to; & in the latter case,
whether he considers the S.E.'s esti-
mate of Rs 1200 for raising
it & carrying it to Madras rea-
sonable. It seems a great deal
to spend on the object & it is quite
possible that the whole apparatus
had better be abandoned, on the prin-
ciple of the first loss being the least
loss. Let the C.E. have all the
information & get his advice on the
whole question. This we have
not yet had.

WHP

2/11/95

In para. 4 of G.O. No. 866 m.
dated 20th May 1895, the Government
referred to the Sanitary Engineer for
remarks certain observations of the
Sanitary Commissioner regarding the
insufficiency of the plant now in use
for aesian-well-lifting apparatus.
The Sanitary Engineer in reply
stated that the apparatus now used
was suitable for depths of 400 feet,
but that if greater depths were to
be attempted some additional machinery
and plant would be necessary. He
added that in any case, to replace
the plant lost at Cochin, 120 feet
of boring rods & screws be required.
On this, the Chief Engineer was
asked to state whether there was any
necessity for supplementing the present
boring apparatus and whether the
rods &c to replace what had been
lost should be got out from England

3022 1000 2

[The page contains extremely faint, illegible handwriting, likely bleed-through from the reverse side.]

31/10/85

Machine for boring apparatus at

Cochin.

FOR ORDERS.

H.M.

LOCAL AND MUNICIPAL DEPARTMENT.

Again G.O., dated 10.11.59 m. 1895, No. 20 July 1895.

Current No. 2552 m. of 1895, dated

Current No. 3022 m. of 1895, dated

" 3667 m. " "

10th August from the Public Works Department

3rd October from the Do.

28th November from the Do.

FOR ORDERS.

Please see the notes and orders on the first two of the currents read above, and the Chief Engineer's reply (last current) to the reference made on them.

The apparatus may be left where it is as recommended - If course can be found for it elsewhere the question must arise whether it is worth while to send even Rs 12-12-0 p.m. for the care of what is practically of no use to anyone - Let the San Eng'g report (say) on June 30 how the position stands

23/12/95

The C.E. is of opinion that the boring plant should be left at Cochin at any rate for the present. This will entail a monthly expenditure for watchmen etc, estimated by San Eng'g at Rs 12-12. The Local Council has declined to try boring experiments - at present the only chance of the apparatus proving useful to any other place is that Mesulipatam will try boring. If therefore the boring at Cochin is abandoned, it will probably mean a loss of Rs 13,000, as no result has been achieved. The boring has reached a depth of 325 ft, & water of a kind has been obtained, said by

2222 m
 2022 m
 2022 m

20/12/55!

49

The foot considers

ans to the Boring apparatus
at Leochia

FOR ORDERS.

H.M.

LOCAL AND MUNICIPAL DEPARTMENT

Again G.O., dated 20th July 1895, No. 1159 M.

Current No. 2552 M. of 1895, dated 10th August from the Public Works Dept.

Current No. of 189 , dated from the

FOR ORDERS.

Please see the notes and
orders in G.O. dated 20th July 1895
No. 1159 M.

2. In reply to this order,
the Chief Engineer states that he
does not consider the addition pro-
-posed by the Sanitary Engineer
to the boring apparatus at pre-
-sent necessary, and that when
it becomes necessary, it will pro-
-bably be better to obtain a com-
-plete apparatus from England.

V.R.
14/8/95

N. Refce 1193
26/8/95

The C.E. will be requested
to report whether the 120 feet of
boring rods referred to in para. 8. of
the San. Engineer's letter can be
obtained locally of sufficiently good
quality, or should be indented for from
Europe.

14.8.95

To the Chief Engr. P.W.D.

24/8/95

Pres
Point this

*Additions to the Boringatta
at Cochin.*

FOR ORDERS.

2552 m

*1193
24-8-95*

*W
X. M*

*Copy to dup:
X. B
22/8*

No. 3724^C

Government of Madras.

Local & Municipal Dept.
CURRENT No. *3667 m*

PUBLIC WORKS DEPARTMENT.

MEMORANDUM.

130

Dated Madras, *28-November* 1895.

Memorandum from the Local and Municipal Department,
No. 1646 dated 16th November 1895.

Note by the Chief Engineer, P.W. Department, dated
26th November 1895:-

The undersigned considers that for the present at
all events, the apparatus should remain where it is.

(Signed) John Pennycuik, Col., R.E.,
Chief Engineer, P.W. Dept.

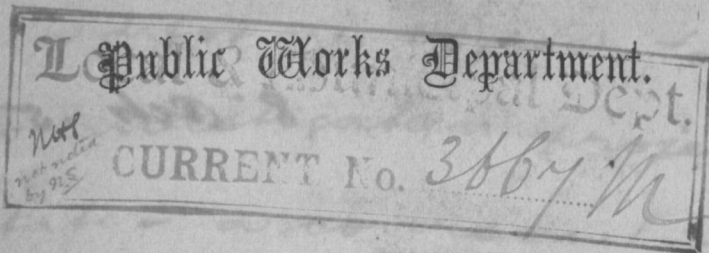
Transferred to the Local and Municipal Department
with reference to its memo No. 1646 dated 16th November 1895,
the enclosures of which are herewith returned.

John Pennycuik
Colonel, R.E.,

Secretary to Government, P.W. Dept.

The Local & Municipal Dept., with
6 enclosures.

1895.



No. 3724 C

Dated 28 1895

Despatched

Received 29 NOV. 1895

SUBJECT.

Transferring note by
the Chief Engineer A.W.D.
stating that the boring
apparatus at Cochin
should remain where
it is.

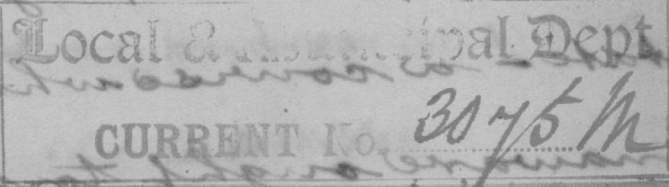
S. E. 6-9-95-1,000

GOVERNMENT OF MADRAS.

No. 2956

OFFICE OF SANITARY ENGINEER,

Fort St. George, 8. Oct. 1895.



From

J. A. JONES, Esq., MEM. INST. C.E., F.R.S.E.,

SANITARY ENGINEER TO GOVERNMENT,

To

The Chief Secretary to Government,
Local & Municipal Department

SIR,

With reference to G.O. dated
21st January 1895, No. 93 W, L & M, I
have the honor to report as follows:
2. I visited Cochin in September
and was fortunate enough to find
the British Resident there from whom
& Capt. Dawson, Asst. Resident, I
obtained much assistance; indeed
it had been arranged through the
Dewan of Cochin that Mr. Hudson
the Chief Engineer, should be asso-
ciated with me in my enquiries
for this the thanks of Government
are due to the Government of
Cochin and the more so that

no

no permission had been previously asked for an officer to be allowed to investigate a project in a native state - a course which I was unaware ought to have been adopted.

3. With Mr. Hudson I proceeded inland as far as the laterite hills where fresh water is to be found. The nearest point where we considered water in sufficient quantity might probably be available is near the Rajah's Hill Bungalow some miles east of Tripundrum and about 10 miles from Ernaculum - this town being separated from Cochin by a backwater of two miles. There are several small backwaters between Ernaculum & the Hill Bungalow.

4. Mr. Hormusji Koroji in his letter embodied in G.O. of 2 November 1894, No. 1628 Dn, L & Dn, was evidently under the impression that the laterite was near the surface

The Asst. Secy.
Supt. of Public Works
The Engineer
could be found just
across the backwater

surface in Ernaculum, but ^{the} outcrop is as above stated 10 miles from Ernaculum, so that there would be little difference in the depth to be bored at Ernaculum or Cochin to meet the laterite.

5. At the point indicated, Mr. Hudson & I considered that an experimental well might be sunk to test the yield, and that if this was satisfactory a gallery might then be formed across the valley meeting at either side the bases of the laterite hills forming the valley referred to. The site is marked on the accompanying map. To carry out such an experiment would cost about Rs 58,00 calculated as follows.

Sinking well, 25 feet deep	Rs 1,250
Curb including rods, carriage etc and erection	1,000
Cement concrete in curbs	40
Laterite steining for the 20' diameter well	1,200
Cement plastering	675
Rails	280
Sundries	14
	460
Loan of pump testing yield & other cost of experiments	1,200
	Rs 5,800

The cost of pumping is also shown

This would be more expensive than the scheme noted, because

the distance is greater.

(2) Supply from allways by properly designed water in bulk steamers.

(3) By condensation.

(4) The bored well scheme already in hand.

It is unnecessary to do more than refer to the allways scheme as it would entail the expenditure for $4\frac{1}{2}$ miles more pipe and 36 feet more lift than the scheme estimated, and the Cochin Government's share would be somewhat less owing to the omission of Tripundrum.

As to proposal (2), self propelling hopper barges to carry 300 tons cost about £5,000 each - supposing the supply to Cochin were to be limited to $7\frac{1}{2}$ gallons of say $\frac{17600 \times 7\frac{1}{2} \times 10}{2240} =$

589, we should require say 2 such barges = 10,000 or say Rs 180,000 - and there would be an additional charge for pumping machinery in each - this we might put down at Rs 30,000 or say in all Rs 2,40,000.

11. Pumping the above quantity of water in & out daily would cost - Rs 12,000 per annum. A service tank at sufficient elevations would cost Rs 20,000. The cost of transit might be taken at Rs 40 daily or Rs 14,600 per annum.

12. Supposing that Government in the case of Cochin went so far as to supply the barges and that the Municipality had to provide and maintain the remainder of the scheme, the annual cost to the town would work out as follows.

Pumping cost as in para: 11	Rs 12,000
Transit charges	14,600
Interest on $\frac{Rs}{51750}$ at distribution cost including contingencies at 5.96 per cent	3,084
Repairs & maintenance of pipes	1,000
Establishment	1,000
	Rs 32,184

This is much more expensive than the first scheme put forward even after a grant of Rs 2,40,000 to the Municipality.

6. mit condensation (3) is the next proposal.
ath Suppose in this case the supply is
tto limited to $7\frac{1}{2}$ gallons per head and
sh that 17,600 people are to be supplied.
ny. The total would then be 132,000 gallons
ow daily.

3. er 1 set of apparatus to produce 12,000
in 8 gallons daily costs £4,000, therefore for
na $132,000 = 4,000 \times \frac{132}{12} = £44,000$ at day
na Rs 7,92,000; this, without taking into
as account that it requires $4\frac{1}{2}$ lbs of
wood to produce 16 lbs or 1.6 gallons of
condensed water, places the plan of
condensation altogether out of
reach.

13. There then still remains the
plan of a deep boring, and I must
record my deep regret as also
that of many people in Lochin
that Government have been
advised to give up the attempt
to procure water in this way.

14. Undoubtedly the chemical
analysis of the water so far as
we have gone is not good, but
even

100
even that analysis I am far from
being satisfied with, and Mr Lock is
also anxious to see some further
attempt made with regard to the
existing bore to secure good water.
I have drunk the water - it tastes good
and is pleasant, it is certainly better
water than any other in Lochin. The
water stands in the bore pipe 1 to 2
feet above ground, and it seems
a matter of the greatest regret that
what I believe, and I think I have
shown, to be the only practical
scheme should have been stopped
on the report of the Geological
Department who do not profess
to have any basis whatever to go
on for their advice. It was stated
that rock might be many thousands
feet below the surface, but we
don't want to reach rock - we
already have the water above
ground. Impervious beds of clay
are just as good as rock.

15. I have asked Mr Lock to
have

have fresh samples of the water submitted to analysis after a longer time of pumping and at the same time to submit samples to the Government Bacteriologist of the N. W. Provinces, Professor Hankin - this will be a true test, and even then it is possible to purify the water by filtration - probably Anderson Process would render it perfectly safe. It is now perfectly palatable.

16. I therefore, in view of all the facts I have stated, strongly urge Government not to abandon the bore scheme but to persevere even to 2,000 feet which is not at all a great depth. The scheme has not had a fair trial, and now that it is really the sole hope of Cochin I think that no effort should be spared to make it a success.

17. meantime until I hear from Government, I will not act on any order which may be passed in the interval

115946
20.7.95
+ not in the file

110
3
41
interval in reference to my letter of 19th June 1895 regarding the removal of the apparatus and purchase of new apparatus which is still unanswered.

I have the honor to be

Sir,

Yours most obedt. Servt

H. J. M.

Sany. Engr. to Govt.

lbb

Local & Municipal Dept.

CURRENT No. 3075

From

The Sanitary Engineer
to Government

To

The Chief Secretary
to Government
Local & Municipal Dept.

No. 2956

Dated 8
Sept 9
Received 9 OCT. 95 } October 1895

Enc. 2 (one plan)

Subject

P.W. No. 3/95
9065/95

Cochin Water Supply

Submitting his
report as to the impracticability of obtaining a
water supply for Cochin
upon the mainland opposite
to Cochin & urging
Government not to abandon
the bore scheme for reasons
stated.

No. 2863C

Local & Municipal Dept.

Government of Madras.

CURRENT No. 3075

PUBLIC WORKS DEPARTMENT.

MEMORANDUM.

Dated Madras, 3rd October 1895.

With reference to memo. from the
Local and Municipal Department No.
1193 dated 24 August 1895, the undersigned
has the honor to state that it will be more
satisfactory to obtain the boring rods
in question from England.

C. H. R. D. R. R.

Under Secretary to Govt. P. W. Dept.

The Local & Municipal Dept.

Appendix.

rough estimate of infiltration works, engine stone etc at site near Rajahmilla Bangalore pipes for the conveyance of water to Tripundivaram, Ammaluram, and British Cochin allocated.

Approximate cost of proportion works.		British Cochin Government	
Infiltration Works			
Engine stone etc including erection	105,600	176:274	4,1300
Engine & Boiler stone and its appendages	46,800	do	18,800
Pipes from infiltration to Tripundivaram Branch	102,960	do	40,260
Pipes from Tripundivaram Branch to Ammaluram Branch	163,020	176:244	68,020
Pipes from Ammaluram Branch to Backwater	8,580	176:172	4,300
Pipes for Backwater	11,9640	176:172	60,500
British Cochin main line	51,480	—	51,480
Distribution works in Cochin	45,000	—	45,000
Total			348,290
Contingencies			53,250
Total			401,540
Annual cost of pumping		14,064	176:274
			5,500
			8,564

Price
Sany. Engr. to Govt.

1895.

Public Works Department.
CURRENT No. 3022 M

No. 2863C
Dated 3-10-1895
Despatched
Received 4 OCT. 95

SUBJECT.

Boring apparatus at Cochin — Stating that it will be more satisfactory to obtain the boring rods from the — from England.

Received 9005/95
P.W. Engr. to Govt.

No. 2483C

38

Government of Madras.

PUBLIC WORKS DEPARTMENT.

& Municipal Dept.

MEMORANDUM.

CURRENT No. 2552M

Dated Madras, 10 August 1895.

Proceedings in the Local and
Municipal Dept. No. 1159 M. Misc of
20 July 1895.

Note by the Chief Engineer P.W. Dept.

The undersigned does not consider
that the increase is necessary at
present, when it becomes necessary,
it will probably be better to obtain
a complete apparatus from England.

(Sd) John Perrymanick. Col R.E.,
Chief Engineer, P.W. Dept.

Transferred

Transferred to the Local &
Municipal Department with reference
to C.O. dated 20 July 1895, No 1159
M. Mis.

James J. Clarke,
Secretary to Com. F. W. Dept.

To
The Local & Municipal Dept.

22

1895.

Public Works Department.

Local & Municipal Dept.

RE CURRENT No. 2552 M

No. 2483 C.
Dated 10th
Despatched 12 — } August 1895.
Received 12 AUG. 9

SUBJECT.

*Furnishing opinion
as to the necessity for
supplementing the boring
apparatus at Cochin.*

No. 65 M., 11TH JANUARY 1896.

GOVERNMENT OF MADRAS.
LOCAL AND MUNICIPAL DEPARTMENT.

READ—again the following papers:—

G.O., No. 93 M., dated 21st January 1895.

G.O., Mis. No. 1159 M., dated 20th July 1895.

READ—also the following papers:—

No. 2483-C.

Note by the Chief Engineer, Public Works Department.

[Proceedings in the Local and Municipal Department, Mis. No. 1159 M., dated 20th July 1895.]

The undersigned does not consider that the increase is necessary at present; when it becomes necessary, it will probably be better to obtain a complete apparatus from England.

(Signed) J. PENNYCUICK, Col., R.E.,
Chief Engineer, P.W.D.

10th August 1895.

Transferred to the Local and Municipal Department with reference to G.O., Mis. No. 1159 M., dated 20th July 1895.

(Signed) J. PENNYCUICK, Col., R.E.,
Secretary to Government, P.W.D.

To the Local and Municipal Department.

Reference No. 1193, dated 24th August 1895.

The Chief Engineer will be requested to give his opinion as to whether the 120 feet of boring rods referred to in paragraph 8 of the Sanitary Engineer's letter can be obtained of sufficiently good quality locally, or should be indented for from Europe.

(Signed) W. FRANCIS,
Ag. Under Secy. to Government.

To the Chief Engineer, Public Works Department.

No. 2863-C.

MEMORANDUM.

With reference to memorandum from the Local and Municipal Department, No. 1193, dated 24th August 1895, the undersigned has the honour to state that it will be more satisfactory to obtain the boring rods in question from England.

(Signed) C. H. B. BURLTON,
Under Secy. to Govt., P.W.D.

3rd October 1895.

To the Local and Municipal Department.

From J. A. JONES, Esq., MEM. INST. C.E., F.R.S.E., Sanitary Engineer to Government, to the Chief Secretary to Government, dated Fort St. George, 8th October 1895, No. 2956.

With reference to G.O., No. 93 M., dated 21st January 1895, I have the honour to report as follows.

2. I visited Cochin in September and was fortunate enough to find the British Resident there, from whom and Captain Dawson, Assistant Resident, I obtained much assistance; indeed it had been arranged through the Dewan of Cochin that Mr. Hudson, the Chief Engineer, should be associated with me in my enquiries—for this the thanks of Government are due to the Government of Cochin and the more so that no permission had been previously asked for an officer to be allowed to investigate a project in a Native State—a course which I was unaware ought to have been adopted.

3. With Mr. Hudson I proceeded inland as far as the laterite hills where fresh water is to be found. The nearest point where we considered water in sufficient quantity might probably be available is near the Rajah's hill bungalow some miles east of Tripundrum and about ten miles from Ernaculum—this town being separated from Cochin by a backwater of two miles. There are several small backwaters between Ernaculum and the hill bungalow.

4. Mr. Hormusji Nowroji in his letter embodied in G.O., No. 1628 M., dated 3rd November 1894, was evidently under the impression that the laterite was near the surface in Ernaculum, but the outcrop is, as above stated, ten miles from Ernaculum, so that there would be little difference in the depth to be bored at Ernaculum or Cochin to meet the laterite.

5. At the point indicated, Mr. Hudson and I considered that an experimental well might be sunk to test the yield, and that if this was satisfactory, a gallery might then be formed across the valley meeting at either side, the bases of the laterite hills forming the valley referred to. The site is marked on the accompanying map. To carry out such an experiment would cost about Rs. 5,800 calculated as follows:—

Sinking one well, 25 feet deep	Rs. 1,250
One curb including rods, carriage, &c., and erection	1,000
Cement concrete in curbs	46
Laterite steining for the 20 feet diameter well	1,200
Cement plastering	675
Rails	286
Sundries	143

Loan of pumps testing yield and other cost of experiments—sum .. 4,600

Total .. 5,800

6. If the experiment is to be made, it would be advisable to arrange with the Government of Cochin for Mr. Hudson to carry it out, and to this course he has no objection.

7. The question, however, is what will be the expense of the scheme even if the experiments were satisfactory. The work of laying pipes across two miles of backwater will be a difficult one and requires a specially-fitted barge and a steam dredger. I have in an appendix given a rough estimate of the work, and I do not believe it can be done for less—it includes the cost of pipes for the conveyance only of water to Tripoonitara, Ernaculum and Mattancherry and the share of the Cochin Government, if they agreed to a joint scheme, is also noted; in addition to this provision would have to be made for distribution works in these towns.

8. The cost of pumping is also shown and the shares allocated.

Supposing that Government made a grant of half the proportionate cost, the annual expenditure which the town of Cochin would have to meet would be —

	Rs.
$\frac{4,01,540}{2}$ at 5.96 per cent.	11,966
Pumping charges	5,500
Maintenance and repairs	1,000
Establishment	1,500
Total	19,966

9. It appears to me that (even if the Cochin Government agreed to join in the scheme) the figures show that the cost is much above what Cochin (British) could possibly meet even aided by a liberal grant from Government.

10. Should Government decide this to be the case there are three other schemes which present themselves—

(1) Supply from the Periyár river at Alwaye by pipes and pumping. This would be more expensive than the scheme noted, because the distance is greater.

(2) Supply from Alwaye by properly designed "water in bulk" steamers.

(3) By condensation.

(4) The bored well scheme already in hand.

It is unnecessary to do more than refer to the Alwaye scheme as it would entail the expenditure for $4\frac{1}{2}$ miles more pipe and 36 feet more lift than the scheme estimated, and the Cochin Government's share would be somewhat less owing to the omission of Tripundrum.

As to proposal (2) self-propelling hopper barges to carry 300 tons cost about £ 5,000 each—supposing the supply to Cochin were to be limited to $7\frac{1}{2}$ gallons or say $\frac{17,600 \times 7\frac{1}{2} \times 10}{2,240} = 589$ tons, we should require say two such barges = £ 10,000, or say Rs. 1,80,000, and there would be an additional charge for pumping machinery in each; this we might put down at Rs. 30,000, or say in all Rs. 2,40,000.

11. Pumping the above quantity of water in and out daily would cost Rupees 12,000 per annum. A service tank at sufficient elevation would cost Rs. 20,000. The cost of transit might be taken at Rs. 40 daily or Rs. 14,600 per annum.

12. Supposing that Government in the case of Cochin went so far as to supply the barges and that the municipality had to provide and maintain the remainder of the scheme, the annual cost to the town would work out as follows:—

	Rs.
Pumping cost as in paragraph 11	12,000
Transit charges	14,600
Interest on Rs. 51,750 or distribution cost including contingencies	3,084
at 5.96 per cent.	1,000
Repairs and maintenance of pipes	1,500
Establishment	
Total	32,184

This is much more expensive than the first scheme put forward even after a grant of Rs. 2,40,000 to the municipality.

Condensation (3) is the next proposal. Suppose in this case the supply is limited to $7\frac{1}{2}$ gallons per head and that 17,600 people are to be supplied, the total would then be 132,000 gallons daily.

One set of apparatus to produce 12,000 gallons daily costs £4,000, therefore for 132,000 = $4,000 \times \frac{132}{12} = £44,000$, or say Rs. 7,92,000; this, without taking into account that it requires $4\frac{1}{2}$ lb. of wood to produce 16 lb. or 1.6 gallons of condensed water, places the plan of condensation altogether out of reach.

13. There then still remains the plan of a deep boring, and I must record my deep regret as also that of many people in Cochin that Government have been advised to give up the attempt to procure water in this way.

14. Undoubtedly the chemical analysis of the water so far as we have gone is not good, but even that analysis I am far from being satisfied with, and Mr. Locke is also anxious to see some further attempt made with regard to the existing bore to secure good water. I have drunk the water, it tastes good and is pleasant, it is certainly better water than any other in Cochin. The water stands in the bore pipe one to two feet above ground, and it seems a matter of the greatest regret that what I believe, and I think I have shown, to be the only practical scheme should have been stopped on the report of the Geological Department who do not profess to have any basis whatever to go on for their advice. It was stated that rock might be many thousand feet below the surface, but we don't want to reach rock—we already have the water above ground. Impervious beds of clay are just as good as rock.

15. I have asked Mr. Locke to have fresh samples of the water submitted to analysis after a longer time of pumping and at the same time to submit samples to the Government Bacteriologist of the North-Western Provinces, Professor Hankin—this will be a true test, and even then it is possible to purify the water by filtration—probably Anderson Process would render it perfectly safe. It is now perfectly palatable.

16. I therefore, in view of all the facts I have stated, strongly urge Government not to abandon the bore scheme, but to persevere even to 2,000 feet which is not at all a great depth. The scheme has not had a fair trial, and now that it is really the sole hope of Cochin I think that no effort should be spared to make it a success.

17. Meantime, until I hear from Government, I will not act on any order which may be passed in the interval in reference to my No. 41-T. of 19th June 1895 regarding the removal of the apparatus and purchase of new apparatus which is still unanswered.

APPENDIX.

ROUGH estimate of infiltration works, engine house, &c., at site near Rajah's Hill bungalow, and pipes for the conveyance of water to Tripoonitara, Ernacolum, Mattancherry and British Cochin with the shares of the Cochin Government and British Cochin allocated.

	Approximate cost of works.	Proportion.	British Cochin.	Cochin Government.
Infiltration works..	Rs. 1,05,600	176 : 274	Rs. 41,300	Rs. 64,300
Pumps, boilers, &c., including erection ..	46,800	176 : 274	18,300	28,500
Engine and boiler house and its appendages ..	48,000	176 : 274	18,800	29,200
Pipes from infiltration to Tripundrum branch ..	1,02,960	176 : 274	40,260	62,700
Pipes from Tripundrum branch to Ernacolum branch ..	1,63,020	176 : 274	68,320	94,700
Pipes from Ernacolum branch to backwater ..	8,580	176 : 172	4,330	4,250
Pipes for backwater ..	1,19,640	176 : 172	60,500	59,140
British Cochin main line ..	51,480	..	51,480	..
Distribution works in Cochin ..	45,000	..	45,000	..
Total ..	6,91,080	..	3,48,290	3,42,790
Contingencies ..	1,04,670	..	53,250	51,420
Total ..	7,95,750	..	4,01,540	3,94,210
Annual cost of pumping ..	14,064	176 : 274	5,600	8,564

(Signed) J. A. JONES,
Sanitary Engineer to Government.

Reference No. 1646, dated 16th November 1895.

The above papers will be forwarded to the Public Works Department with the request that the Chief Engineer may be asked to give his opinion as to whether he thinks it advisable to leave the present Cochin boring apparatus where it is, or whether

he would pull it up, supply the missing rods, and then keep it in store to be put to whatever use it may hereafter be thought advisable; and in the latter case whether he considers the Sanitary Engineer's estimate of Rs. 1,200 for raising it and carrying it to Madras reasonable.

(Signed) W. W. PHILLIPS,
Ag. Asst. Secy. to Govt.

To the Public Works Department,
with papers in original (to be returned).

Note by the Chief Engineer, Public Works Department.

The undersigned considers that, for the present, at all events, the apparatus should remain where it is.

(Signed) J. PENNYCUICK, Col., R.E.,
Chief Engineer, P.W.D.

26th November 1895.

No. 3724-C.

Transferred to the Local and Municipal Department with reference to its memorandum, No. 1646, dated 16th November 1895, the enclosures of which are herewith returned.

(Signed) J. PENNYCUICK, Col., R.E.,
Secretary to Govt., P.W.D.

28th November 1895.

To the Local and Municipal Department, with six enclosures.

ORDER—No. 65 M., dated 11th January 1896.

As the experimental boring at Cochin has not so far resulted in procuring a water-supply for the town, and as the expenditure up to date, including the cost of the apparatus, has exceeded Rs. 13,000, the Government is not prepared to continue the experiment. The municipal council will therefore be informed that if it desires to carry on the boring it must do so at its own cost, and that the existing apparatus will be placed at its disposal. The depth reached at present is 325 feet, and some of the boring rods have been broken; it is estimated that it will cost another Rs. 5,000 to continue the boring to a depth of 400 feet, beyond which the existing plant would not be effective.

2. As the removal of the apparatus to Madras would entail considerable expenditure, the Government considers that for the present, at any rate, it should remain where it is, but, as this course will involve a monthly expenditure on account of watchmen to look after it, the Sanitary Engineer will be requested to report on the 30th June next how matters stand, and what he would propose to do, in case no further use can be found for the apparatus.

3. The other schemes which have been proposed are, owing to their great cost, impracticable and the question of water-supply to Cochin must then, for the present, be postponed.

(True Extract.)

J. F. PRICE,
Chief Secretary.

To the Chairman, Municipal Council, Cochin.
Collector of Malabar.

" Sanitary Engineer.
" Public Works Department.
" Financial Department.

Exd. Shaik Karim.

Gobt. of {1896} Madras.
LOCAL AND MUNICIPAL.

Issued

Recd.

Encl.

G.O., No. 65 M., 11th Jan. 1896.

JANUARY.

Cochin Water-supply and Boring
Apparatus.

Informing, with remarks, the Municipal Council, Cochin, that Government is not prepared to continue the experimental boring at Cochin, that if it desires to continue the work it must do so at its own cost, and that the existing apparatus will be placed at its disposal.

No. 65 M., 11th JANUARY 1896.

GOVERNMENT OF MADRAS.
LOCAL AND MUNICIPAL DEPARTMENT.

READ—again the following papers:—

G.O., No. 93 M., dated 21st January 1895.

G.O., Mis. No. 1159 M., dated 20th July 1895.

READ—also the following papers:—

No. 2483-C.

Note by the Chief Engineer, Public Works Department.

[Proceedings in the Local and Municipal Department, Mis. No. 1159 M., dated 20th July 1895.]

The undersigned does not consider that the increase is necessary at present; when it becomes necessary, it will probably be better to obtain a complete apparatus from England.

10th August 1895.

(Signed) J. PENNYCUICK, Col., R.E.,
Chief Engineer, P.W.D.

Transferred to the Local and Municipal Department with reference to G.O., Mis. No. 1159 M., dated 20th July 1895.

(Signed) J. PENNYCUICK, Col., R.E.,
Secretary to Government, P.W.D.

To the Local and Municipal Department.

Reference No. 1193, dated 24th August 1895.

The Chief Engineer will be requested to give his opinion as to whether the 120 feet of boring rods referred to in paragraph 8 of the Sanitary Engineer's letter can be obtained of sufficiently good quality locally, or should be indented for from Europe.

(Signed) W. FRANCIS,
Ag. Under Secy. to Government.

To the Chief Engineer, Public Works Department.

No. 2863-C.

MEMORANDUM.

With reference to memorandum from the Local and Municipal Department, No. 1193, dated 24th August 1895, the undersigned has the honour to state that it will be more satisfactory to obtain the boring rods in question from England.

3rd October 1895.

To the Local and Municipal Department.

(Signed) C. H. B. BURLTON,
Under Secy. to Govt., P.W.D.

From J. A. JONES, Esq., MEM. INST. C.E., F.R.S.E., Sanitary Engineer to Government, to the Chief Secretary to Government, dated Fort St. George, 8th October 1895, No. 2956.

With reference to G.O., No. 93 M., dated 21st January 1895, I have the honour to report as follows.

2. I visited Cochin in September and was fortunate enough to find the British Resident there, from whom and Captain Dawson, Assistant Resident, I obtained much assistance; indeed it had been arranged through the Dewan of Cochin that Mr. Hudson, the Chief Engineer, should be associated with me in my enquiries—for this the thanks of Government are due to the Government of Cochin and the more so that no permission had been previously asked for an officer to be allowed to investigate a project in a Native State—a course which I was unaware ought to have been adopted.

3. With Mr. Hudson I proceeded inland as far as the laterite hills where fresh water is to be found. The nearest point where we considered water in sufficient quantity might probably be available is near the Rajah's hill bungalow some miles east of Tripundrum and about ten miles from Ernacolum—this town being separated from Cochin by a backwater of two miles. There are several small backwaters between Ernacolum and the hill bungalow.

4. Mr. Hormusji Nowroji in his letter embodied in G.O., No. 1628 M., dated 3rd November 1894, was evidently under the impression that the laterite was near the surface in Ernacolum, but the outcrop is, as above stated, ten miles from Ernacolum, so that there would be little difference in the depth to be bored at Ernacolum or Cochin to meet the laterite.

5. At the point indicated, Mr. Hudson and I considered that an experimental well might be sunk to test the yield, and that if this was satisfactory, a gallery might then be formed across the valley meeting at either side, the bases of the laterite hills forming the valley referred to. The site is marked on the accompanying map. To carry out such an experiment would cost about Rs. 5,800 calculated as follows:—

Sinking one well, 25 feet deep ..	Rs.
One curb including rods, carriage, &c., and erection ..	1,250
Cement concrete in curbs ..	1,000
Laterite steining for the 20 feet diameter well ..	46
Cement plastering ..	1,200
Rails ..	675
Sundries ..	286
	143

Loan of pumps testing yield and other cost of experiments—sum .. 4,600

Total .. 5,800

6. If the experiment is to be made, it would be advisable to arrange with the Government of Cochin for Mr. Hudson to carry it out, and to this course he has no objection.

7. The question, however, is what will be the expense of the scheme even if the experiments were satisfactory. The work of laying pipes across two miles of backwater will be a difficult one and requires a specially-fitted barge and a steam dredger. I have in an appendix given a rough estimate of the work, and I do not believe it can be done for less—it includes the cost of pipes for the conveyance only of water to Tripoonitara, Ernacolum and Mattancherry and the share of the Cochin Government, if they agreed to a joint scheme, is also noted; in addition to this provision would have to be made for distribution works in these towns.

8. The cost of pumping is also shown and the shares allocated.

Supposing that Government made a grant of half the proportionate cost, the annual expenditure which the town of Cochin would have to meet would be —

	Rs.
$\frac{4,01,540}{2}$ at 5.96 per cent. ..	11,966
Pumping charges ..	5,500
Maintenance and repairs ..	1,000
Establishment ..	1,500
Total ..	19,966

9. It appears to me that (even if the Cochin Government agreed to join in the scheme) the figures show that the cost is much above what Cochin (British) could possibly meet even aided by a liberal grant from Government.

10. Should Government decide this to be the case there are three other schemes which present themselves—

(1) Supply from the Periyár river at Alwaye by pipes and pumping. This would be more expensive than the scheme noted, because the distance is greater.

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at 5.96 per cent. ..	1,000
Repairs and maintenance of pipes ..	1,500
Establishment ..	
Total ..	32,184

This is much more expensive than the first scheme put forward even after a grant of Rs. 2,40,000 to the municipality.

Condensation (3) is the next proposal. Suppose in this case the supply is limited to $7\frac{1}{2}$ gallons per head and that 17,600 people are to be supplied, the total would then be 132,000 gallons daily.

One set of apparatus to produce 12,000 gallons daily costs £4,000, therefore for 132,000 = $4,000 \times \frac{132}{12} = £44,000$, or say Rs. 7,92,000; this, without taking into account that it requires $4\frac{1}{2}$ lb. of wood to produce 16 lb. or 1.6 gallons of condensed water, places the plan of condensation altogether out of reach.

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15. I have asked Mr. Locke to have fresh samples of the water submitted to analysis after a longer time of pumping and at the same time to submit samples to the Government Bacteriologist of the North-Western Provinces, Professor Hankin—probably Anderson Process would render it perfectly safe. It is now perfectly palatable.

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17. Meantime, until I hear from Government, I will not act on any order which may be passed in the interval in reference to my No. 41-T. of 19th June 1895 regarding the removal of the apparatus and purchase of new apparatus which is still unanswered.

APPENDIX.

ROUGH estimate of infiltration works, engine house, &c., at site near Rajah's Hill bungalow, and pipes for the conveyance of water to Tripoonitara, Ernacolum, Mattancherry and British Cochin with the shares of the Cochin Government and British Cochin allocated.

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Pipes for backwater	1,19,640	176 : 172	60,500	59,140
British Cochin main line	51,480	..	45,000	..
Distribution works in Cochin	45,000	..	..	..
Total	6,91,080	..	3,48,290	3,42,790
Contingencies	1,04,670	..	53,250	51,420
Total	7,95,750	..	4,01,540	3,94,210
Annual cost of pumping	14,064	176 : 274	5,500	8,564

(Signed) J. A. JONES,
Sanitary Engineer to Government.

Reference No. 1646, dated 16th November 1895.

The above papers will be forwarded to the Public Works Department with the request that the Chief Engineer may be asked to give his opinion as to whether he thinks it advisable to leave the present Cochin boring apparatus where it is, or whether

he would pull it up, supply the missing rods, and then keep it in store to be put to whatever use it may hereafter be thought advisable; and in the latter case whether he considers the Sanitary Engineer's estimate of Rs. 1,200 for raising it and carrying it to Madras reasonable.

(Signed) W. W. PHILLIPS,
Ag. Asst. Secy. to Govt.

To the Public Works Department,
with papers in original (to be returned).

Note by the Chief Engineer, Public Works Department.

The undersigned considers that, for the present, at all events, the apparatus should remain where it is.

(Signed) J. PENNYCUICK, Col., R.E.,
Chief Engineer, P.W.D.

26th November 1895.

No. 3724-C.

Transferred to the Local and Municipal Department with reference to its memorandum, No. 1646, dated 16th November 1895, the enclosures of which are herewith returned.

(Signed) J. PENNYCUICK, Col., R.E.,
Secretary to Govt., P.W.D.

28th November 1895.

To the Local and Municipal Department, with six enclosures.

ORDER—No. 65 M., dated 11th January 1896.

As the experimental boring at Cochin has not so far resulted in procuring a water-supply for the town, and as the expenditure up to date, including the cost of the apparatus, has exceeded Rs. 13,000, the Government is not prepared to continue the experiment. The municipal council will therefore be informed that if it desires to carry on the boring it must do so at its own cost, and that the existing apparatus will be placed at its disposal. The depth reached at present is 325 feet, and some of the boring rods have been broken; it is estimated that it will cost another Rs. 5,000 to continue the boring to a depth of 400 feet, beyond which the existing plan would not be effective.

2. As the removal of the apparatus to Madras would entail considerable expenditure, the Government considers that for the present, at any rate, it should remain where it is, but, as this course will involve a monthly expenditure on account of watchmen to look after it, the Sanitary Engineer will be requested to report on the 30th June next how matters stand, and what he would propose to do, in case no further use can be found for the apparatus.

3. The other schemes which have been proposed are, owing to their great cost, impracticable and the question of water-supply to Cochin must then, for the present, be postponed.

(True Extract.)

for Chief Secretary.

To the Chairman, Municipal Council, Cochin.
Collector of Malabar.

" Sanitary Engineer.
" Public Works Department.
" Financial Department.

Exd. Shaik Karim.

Govt. of {1896} Madras.
LOCAL AND MUNICIPAL.

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Proof for approval.

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G.O., No. 65 M., 11th Jan. 1896.

JANUARY.

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Cochin Water-supply and Boring Apparatus.

Informing, with remarks, the Municipal Council, Cochin, that Government is not prepared to continue the experimental boring at Cochin, that if it desires to continue the work it must do so at its own cost, and that the existing apparatus will be placed at its disposal.

21st JANUARY 1895, No. 93 M., LOCAL AND MUNICIPAL.

GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

handling only

READ—again the following paper :—

G.O., dated 3rd November 1894, No. 1628 M., Local and Municipal.

ABSTRACT.—Referring to the Director of Geological Survey, for remarks, Assistant Sanitary Engineer's report regarding the Cochin experimental boring, and informing the Sanitary Engineer that his application for sanction of the excess expenditure, of Rs. 294-8-0 over the sanctioned amount, as also Rs. 12-12-0, monthly cost of watchmen whilst the boring apparatus remains in Cochin, will be considered in the Financial Department.

READ—also the following paper :—

From C. L. GRIESBACH, Esq., C.I.E., F.G.S., Director, Geological Survey of India, to the Chief Secretary to the Government of Madras, dated Calcutta, 19th December 1894, No. 2649.

In acknowledging your letter, No. 1628 M., dated 3rd November 1894, I have the honour to forward herewith a detailed statement with determinations of the various strata passed through in the Cochin experimental boring as far as the rocks can be determined from the specimens sent.

2. I regret that I am unable to offer any opinion which could guide you in this exploration for fresh water, as there are absolutely no data available which would entitle me to do so. It seems, however, most probable that the boring will have to be driven to a much greater depth before a pure supply of fresh water could be obtained, but it is an open question whether such would be met with much above the rock *in situ*, in which case the water stratum may possibly be thousands of feet below the surface.

3. The geology of Cochin has not been worked out, but it is almost certain that the alluvial strata increase in thickness away from the mainland and water should therefore be met with at a lesser depth from the surface there than in the town of Cochin.

4. In conclusion, I request you will be good enough to inform me whether you wish that the specimen trays of this boring should be returned to you or not.

ENCLOSURE.

Water-supply of Cochin.

Thickness of strata.	Details of boring.
4' Surface to 4 feet	Ferruginous and calcareous quartz sand.
26' 4' to 30'	Fine white sand with shells.
2' 30' to 32'	Black mud calcareous.
11' 32' to 43'	Sand darkened by carbonaceous matter and containing shells of lamellibranches.
51' 6" 43' to 94' 6"	Dark mud with fragments of shells.
5' 6" 94' 6" to 100'	Fine calcareous sand.
5' 100' to 105'	Mixture of dark clay and sand.
23' 105' to 128'	Black clay. Band of shells at 120'-125'.
10' 128' to 138'	Light colored clay with sand grains.
10' 138' to 148'	Dark colored clay with sand grains.
12' 148' to 160'	Coarse gravel.
8' 160' to 168'	Carbonaceous clay.
12' 168' to 180'	Clay becoming sandy at base with tubes of pyrites.
13' 180' to 193'	Sand and gravel (well rounded).
7' 193' to 200'	Clay with pyrites tubes.
17' 193' to 210'	Black clay with pyrites tubes.
5' 210' to 215'	Black carbonaceous clay.
10' 215' to 225'	Black carbonaceous clay, sandy.
35' 225' to 260'	Dark clay with resin in upper layers.
30' 260' to 290'	Coarse round gravel.
10' 290' to 300'	Dark colored coarse sand mixed with clay.
25' 300' to 325'	Coarse grey sand with pyrite twig probably not <i>in situ</i> .

ORDER—dated 21st January 1895, No. 93 M., Local and Municipal.

The papers read above appear to render it evident that the chances of discovering a sufficient supply of good water by further borings within the town of Cochin are not such as would justify additional expenditure from Provincial funds upon experiments there. The boring operations should therefore be definitely suspended, and the Sanitary Engineer will be requested to make arrangements to utilize elsewhere, or otherwise dispose of, the plant which is now lying in Cochin.

2. The various reports upon the water-supply of the town which are already on record show, however, that the only financially practicable method of improving its present unsatisfactory condition is the discovery of an under-ground supply in the neighbourhood, and the Sanitary Engineer will accordingly be requested to visit Cochin when the work which he has on hand will permit of his doing so and to report upon the suggestion made by the Assistant Sanitary Engineer at the end of his report printed in the Government Order read above that such a supply should be searched for upon the mainland opposite to Cochin and, if discovered, be conveyed across the backwater to the town. His report should contain information as to the depth at which water is found and the probable quantity which could be made available, with a rough estimate of the cost of taking it across the backwater.

(True Extract.)

E. GIBSON,
Ag. Chief Secretary.

To the Sanitary Engineer.
„ Chairman, Municipal Council, Cochin.
„ Collector of Malabar.
„ Financial Department.
Editors' Table.

Gobt. of {1895} Madras.
LOCAL AND MUNICIPAL.

Issued

Recd.

Encl.

G.O., 21st January 1895, No. 93 M.

JANUARY.

Cochin Experimental Boring.

Ordering, with remarks, that the — should be definitely suspended, and requesting the Sanitary Engineer to visit Cochin when the work which he has on hand will permit of his doing so and to report on the suggestion made by the Assistant Sanitary Engineer that a water-supply for the town should be searched for upon the mainland opposite to Cochin.

PR at copy sent to Press.

Returned for signature

patched in print.

I

DATE G.O. No. 189

DATE

RECEIVED No.

REFERS TO G. No.

OF GOVERNMENT

OF GOVERNMENT.

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