

(1) பக்கங்களின் எண்ணிக்கை 8

(2) புதுக்கித் திருப்பிய நாள் 18/90

(3) ஆதாரங்குறிப்பவர் சுருக்கொப்பம்

தமிழ்நாடு ஆவணக் காப்பகம்.

தமிழ்நாடு அரசு

மேலுப்பி துறை

அரசாணை எண். 1878 SC அச்சகம்
மு. கோப்புத் தாள் எண். 198

நாள் : 20.7.1893

மடிக்கவோ கண்டபடி எனினவோ கூடாது

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GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

Read—again the following paper :—

G.O., dated 16th January 1893, Mis. No. 53 M., Local and Municipal.

Read—the following papers :—

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, 1st October 1892, No. 2042.

I have the honour to forward herewith plans and estimates in connection with a water-supply scheme for the town of Coimbatore.

2. The present water-supply of Coimbatore is derived from wells which are sunk either through morambu or in gneissic rock or through both. The waters generally are extremely hard; the amount of nitric acid (as ammonia) is usually high. The tanks in and around Coimbatore are badly supplied with water and ordinarily are not suited by position or elevation to afford a supply to the town. Nor does there seem any chance of any works being executed which would bring a supply sufficient to keep the tanks full or partially so; even if such a work was accomplished it is likely that the water would have to be pumped from somewhere in or adjacent to the Noyel valley as in the following scheme.

3. After an examination of the town, it was considered that the most likely quarter from which a fairly pure and certain supply of water could be secured would be from the valley of the Noyel river. This river is a perennial stream, but at times the supply flowing through it is extremely small. The river runs about 2 miles distant from the town and a survey of the river for some miles along its course showed that the best position for obtaining water would be just above the Vellalore anicut at the head sluice of the Kunnymoothoor channel. There is always more water in the river just above the anicut than at any other practicable point for offtake.

4. The point is above any village or collection of huts for some miles and the site selected is a favorable one for the works proposed to be erected.

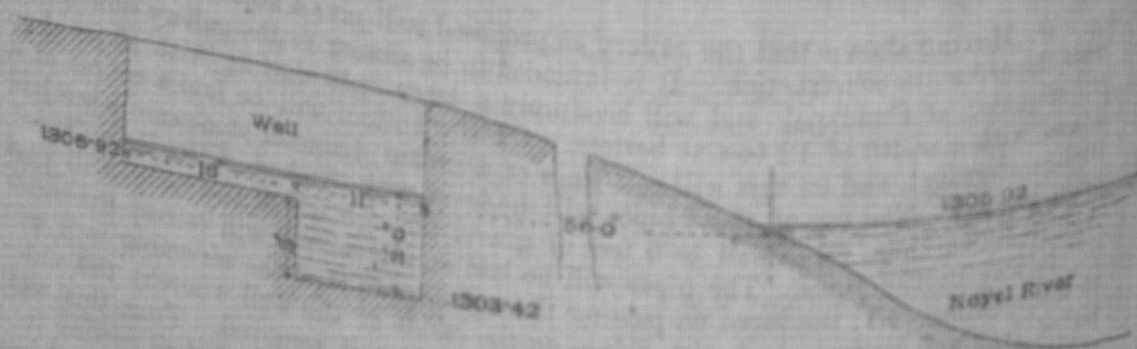
5. Samples of water were drawn from the river and wells on the bank thereof with the following result. Columns 1, 2 and 3 were analyses in January 1891 and column 4 shows the results of analysis in May 1892. It will be noticed that all samples are marked bad or suspicious, but the Chemical Examiner says in a letter No. 574 of 20th June 1892. "Coimbatore water reported bad on account of the hardness and nitric acid. The permanent hardness is due to magnesium, and the nitric acid to what you report, viz., nitric deposits in the soil. As the nitric acid is therefore not derived from organic sources, it lessens to a very great extent its injuriousness and it may be almost entirely neglected in considering the quality of the water." The chlorine also comes from the soil and as ammonia is almost nil (*vide* column 4) the water would seem suited for a domestic water-supply. It should be explained that the first samples analysed were taken from the wells after the water had been standing without use for some time, whereas the analysis in column 4 is of water drawn from the well after it had been baled out and allowed to refill again several times.

		1	2	3	4
		Noyal river water.	Well water south of the Noyal anicut.	Well water west of the Noyal anicut.	Water from the well south of the Noyal river (Yodhary anicut).
Total solids	Grains per litre	0.540	0.510	0.490	0.470
Volatile solids	do.	0.080	0.070	0.110	0.090
Chlorine	do.	0.000	0.000	0.001	0.001
Total hardness	Clark's scale	12.000	11.500	17.500	12.500
Permanent hardness	do.	12.000	11.500	17.500	12.500
Free ammonia	Migrams per litre	0.200	0.210	0.000	0.000
Albomoid ammonia	do.	0.130	0.100	0.100	0.100
Nitric acid	do.	0.410	0.500	0.750	0.500
Apparent quality of the water as inferred from the results obtained on examination		Bad.	Bad.	Excellent.	Bad.

6. To show how superior this water will be to that in use in the jail where the wells are well protected and in constant use, I append the analyses of the water of three of the jail wells—

		District Jail well.	Main gate well.	Jail garden well.
Total solids	Grains per litre	1.500	1.700	1.800
Volatile solids	do.	0.220	0.190	0.210
Chlorine	do.	0.000	0.000	0.000
Total hardness	Clark's scale	12.000	12.000	12.000
Permanent hardness	do.	12.000	12.000	12.000
Free ammonia	Migrams per litre	0.100	0.100	0.100
Albomoid ammonia	do.	0.100	0.100	0.100
Nitric acid	do.	0.100	0.100	0.100
Apparent quality of the water as inferred from the results obtained on examination		Bad.	Bad.	Bad.

7. It is proposed to obtain the required supply from a filter gallery cut along side and parallel to the river, and in view of determining the length of this gallery experiments were made by pumping from a well or square tank which is at the site. The section of the well is thus—



The well was baled out completely twice and under the conditions in sketch rose in one experiment 3' 6" and the other 5' 5" in 12 hours. These experiments were made on 3rd and 12th June 1891, the driest time of the year. The length of the tank is 36 feet, so that the quantity of water with a maximum head of 5' 6" and an average of 1' 9" filtered into the tank was—

$$36' \times 36' \times 11' = 1586$$

$$0' 5' \times 36' \times 27' = 486$$

1,872 cubic feet.

or 52 cubic feet per lineal foot per 12 hours. The cross sectional form of the tank, however, is not a satisfactory one for experimental purposes, and to be on the safe side it is assumed that the water only rose 3 feet in 12 hours (that is to the level of the top of the bench), and the discharge under such assumption would be—

$$36' \times 3' \times 11' = 1,188 \text{ cubic feet.}$$

The average head for such discharge would be $\left(\frac{3.5+5}{2}\right) = 2$ feet, and from each lineal foot in length the discharge would be 33 cubic feet in 12 hours. On this basis the following calculation is framed:—

$$D = c \left[\frac{1}{2} \times A \sqrt{2gh} \right]$$

$$D = c \left[\frac{1}{2} \times 3 \times 1 \times 8 \sqrt{2} \right]$$

$$\frac{33}{12 \times 60 \times 60} = c \left[\frac{2 \times 3 \times 1 \times 8 \times 1.41}{3} \right]$$

$$c = .000061.$$

The gallery as designed will have a bottom level of 1,297.92. Taking the water level in the river at 1,305.00 and supposing that a difference of level of 3 feet is maintained between the water in the gallery and in the river, the head to which infiltration into the gallery is due will be 3 feet. Taking the co-efficient as above found we would have the discharge per foot per second—

$$D = .000061 \left[\frac{1}{2} \times 3 \sqrt{64 \times 3} + 4 \sqrt{64 \times 3} \right]$$

$$= .00506 \text{ cubic feet per second.}$$

$$= .30 \text{ cubic feet per minute.}$$

$$= 1.87 \text{ gallons per minute.}$$

The length of gallery proposed is 600 feet and would thus yield under the above conditions 1,122 gallons per minute; the supply required for Coimbatore is, however, only 552 gallons per minute. The quantity 1,122 gallons has been estimated on the basis of a 3 feet head, but the head can be increased to any extent up to 7 feet and the supply would be increased in proportion to the head; the length of the gallery will therefore be ample.

8. It should be pointed out that 552 gallons is the average demand per minute, a service reservoir being placed between the pumping main and the town and which will be hereafter described. This quantity has been fixed from the following consideration, viz., the population of the town at the census of 1881 was 38,967 and at the last census 46,362; this number has been increased to 52,000, and at 15 gallons per head as the daily allowance, the number of gallons per minute is 552 as above given.

9. Having shown that the gallery as proposed will give a sufficient yield, I may now describe its construction. It is intended to be similar to the gallery now under construction at Cuddapah and will be simply a large open cutting with slopes $\frac{1}{4}$ to 1 and with a width of 12 feet at bottom. On the bottom will be laid a course of 6 inches of gravel, and on this will rest lines of 6 inches diameter stoneware pipes laid open-jointed. The top of these pipes will be level with the bed of the River Noyal. Again above these pipes will be 5 feet of gravel through which the water will pass on its way to the pipes. The pipes will be laid on a level and will convey the water to a screening well; the pipes on passing through the walls of the screening well will be of iron and be furnished with valves on the inside of the well whereby the water can be shut off and the screens cleaned and any deposit removed. From this well proceeds a line of cast iron pipes which divides into two lines before passing into collecting reservoir. This reservoir is intended to allow the water to settle before flowing to the pumps and also to keep up a supply while the water was shut off at the screening chamber. It is, however, not considered that such an arrangement is absolutely necessary to the scheme and its omission at present is recommended.

10. If this reservoir is omitted the water will flow directly from the screening chamber to the pump well.

11. It is unnecessary to describe the engine and boiler house further than to say that the design is similar to others already submitted and sanctioned.

12. It is proposed to use Worthington engines and Babcock boilers, these giving the most economical results and costing little for repair.

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13. The water will be raised at the pumping station so as to pass through the main to the town and into a service reservoir above it.

14. It is found more economical in the case of Coimbatore to introduce a service reservoir instead of having a direct pumping scheme. The main is of very considerable length (11,000 feet) and only a very small portion of that length would be tapped under a direct scheme. It is therefore economical to lay a main to carry the average supply only; this necessitates a service reservoir, but the reduction in the size and cost of the main and the engines compensates for this item while greater certainty of supply is secured.

15. The water under the conditions proposed has to be raised 119 feet and the horse power required is $\frac{4.4 \times 119 \times 10}{33,000} = 19$, say 20 pump horse power. There will be three engines of 10 horse power each, so that there will always be 10 horse power or 50 per cent in reserve. This will allow of one engine being under repair.

16. The main from the pump to the service reservoir is 12 inches in diameter.

17. The service reservoir is situated above the highest portion of the town. The details of its construction are shown on sheet No. 5. It will contain one day's supply. The storage of a third of a day's supply is all that is required to compensate the varying demands during the day. There will therefore always be a reserve of two-thirds of a day's supply in the reservoir, and thus any inconvenience due to stoppage of machinery, a burst on the main, &c., will be obviated.

18. From the service reservoir the great main runs to the highest point in the town in Sukravapetta street and thence along that street as far as the Sessions Court, round which it turns and passes along the village of Uppilipolyam and thence *via* the travellers' bungalow until it meets the main coming in the opposite direction from Big Bazaar street.

19. From fountain No. 6 (see sheet No. 1) it would be possible to take a branch to a well somewhat near the jail where the water might be pumped and forced up to the jail by convict labour.

20. The sub-mains are laid over the town so as to feed fountains placed so that no house shall be more than 150 yards distant in a straight line.

21. The usual number of valves, hydrants, &c., have been provided for.

22. The following is an estimate of the cost of the scheme:—

Infiltration gallery	Rs.
Collecting reservoir	19,845
Engines and boiler house	25,307
Store and wood shed	31,161
Engine, boilers and pumps	2,000
Compensation and fencing	52,303
Wooden piles with iron fittings, &c., to support the pipes at the crossing of the Noyel river	11,534
Service reservoir	3,500
Supply and delivery of pipes	37,439
Laying and jointing pipes	1,41,229
	24,072
Add 15 per cent. for contingencies and cost of establishment	3,48,607
	62,393
Total	4,01,000

23. The total cost, it will be noted, is Rs. 4,01,000, but as before observed it is proposed to omit the construction of the collecting reservoir. The cost of this is Rs. 25,307, which with 15 per cent. added amounts to Rs. 29,000; the total proposed expenditure is therefore Rs. 4,01,000 — 29,000 = Rs. 3,72,000.

24. The cost of pumping for the present population of 46,562 will be, at 10 annas per million gallons per foot high, Rs. 18,900 per annum.

25. On the assumption that Government will pay one-half of the cost of scheme, the amount payable per annum by the municipality would be—

	RS.
$\frac{3,72,000}{2} = 1,86,000$ at 5.96 per cent. = ...	11,086
Pumping	18,900
Repairs	2,000
Total	31,986

26. This, however, is a pumping scheme and one with an extraordinary high lift, and Government may therefore, with reference to G.O., Mis. No. 22 M., dated 5th January 1892, Local and Municipal, be inclined to consider whether a larger share than a moiety may not be contributed.

27. There does not seem to be any professional tax levied at Coimbatore; the house-tax stands at $7\frac{1}{2}$ per cent.; the water tax should yield about Rs. 8,200 yearly.

28. If the municipality begin pumping with only ten gallons per head, the cost of pumping would be reduced by about one-third.

29. The estimated cost of pipes and machinery has been based on exchange at 1s. 1d. and freight at the present law rates, pipes, &c., to be landed at Calicut. Any rise in exchange would lower the estimate to some extent, but on the other hand the cost of freight may rise.

30. A nearer approximation can be made of the cost only when the scheme is sanctioned and the pipes and machinery ordered.

No. 370.

Referred to the Chief Engineer, Public Works Department, for remarks.

FORT ST. GEORGE,
18th October 1892.

(Signed) D. W. G. COWIE,
Ag. Asst. Secretary.

To the Chief Engineer, Public Works Department,
with plans and estimates.

From J. A. JONES, Esq., MEM. INST. C.E., F.R.S.E., Sanitary Engineer to Government, to the Chief Engineer, Public Works Department, dated Fort St. George, 10th December 1892, No. 2845.

In reply to your No. 5212 C., dated the 9th instant, I have the honour to inform you that my reasons for locating the filtration gallery at Coimbatore on the right bank of the Noyel are first the difference of the value of the land which will have to be acquired, the whole of the left bank being valuable coconut topes, whereas the site selected is practically open land of little value; secondly, that there would be no means of delivering either the materials for construction or afterwards engine stores, fuel, &c., if the site were on the left bank, as there is no road available and the construction of a road would cost a great deal of money. So also would a bridge at the site from one side of the river to the other. If you anticipate danger to the main it could be laid as a syphon but this is to be deprecated I think.

Note by the Chief Engineer, Public Works Department.

The proposals made by the Sanitary Engineer for supplying the town of Coimbatore with water seem in the main judicious.

2. The quantity of water to be taken from the Noyel is only about what would suffice for the irrigation of 100 acres, and much of it would not appear as surface flow or be available for irrigation purposes.

3. From an engineering point of view it would be much better to place the infiltration galleries and pumping station on the left instead of on the right bank of the river; the reasons which have lead the Sanitary Engineer to adopt the latter site are stated in his letter No. 2845, dated 10th December 1892. It will be well, however, before the works are commenced, to arrive at the extra cost that would be entailed by the location of the works referred to on the left bank of the river and to consider carefully whether such extra cost will not be worth incurring to save the extra cost of maintenance and the extra risk which, taking the main across the river, will entail.

4. Subject to the above remark, the Sanitary Engineer's proposals are recommended for sanction.

MADRAS,
23rd December 1892.

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

No. 5488-C.

Forwarded to the Local and Municipal Department with reference to endorsement in that department, No. 870, dated 18th October 1892.

24th December 1892.

(Signed) G. T. WALCH,
Ag. Secy. to Govt., P.W.D.

To the Local and Municipal Department,
with papers, in original, returned.

Order—dated 16th January 1893, Mis. No. 53 M., Local and Municipal.

Before final orders on the subject are passed, the Sanitary Engineer will be requested to report approximately how his estimates will be affected by the adoption of the suggestion contained in paragraph 3 of the Chief Engineer's note.

(True Extract.)

(Signed) A. T. PRINGLE,
Assistant Secretary.

To the Sanitary Engineer, with plans and estimates.

READ—also the following paper:—

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, 29th May 1893, No. 1096.

Coimbatore Water-supply.—With reference to G.O., dated the 16th January 1893, Mis. No. 53 M., Local and Municipal, I have the honour to enclose a comparative statement showing that the cost of the head works on the Coimbatore side of the Noyel will be less by about Rs. 300, but in fact may be taken as if they were the same. But this result is arrived at by taking a very much reduced quantity of the more expensive land, viz., 6 acres against 30 acres. This latter quantity is unnecessary and has been entered in the original estimate by error. If 6 acres were acquired in each case, the suggestion of the Chief Engineer would, however, be the more expensive by Rs. 900.

2. It has been found possible to make use of an unmetalled existing road as part of the approach to the pumping station so that the extra cost on this account is only Rs. 2,761 and not so much as expected.

3. The chief objection to the change is that the filtration gallery cannot be so well placed as on the original site owing to its being on the concave side of the river bend (this is seen best on the large scale plan of the head works) and I am doubtful whether the gallery ought not now to be made longer.

4. As, however, the first thing which should be done before any other works are commenced is to excavate the gallery and test the supply obtainable, the length entered in the estimate may, for the present, remain.

5. As I have worked out the cost of the Chief Engineer's proposals in detail, I send the revised estimates and also return the plans on which these proposals have been shown.

ORDER—dated 17th June 1893, No. 790 M., Local and Municipal.

Communicated to the Municipal Council, Coimbatore.

(True Extract.)

J. F. PRICE,
Chief Secretary.

To the Chairman, Municipal Council, Coimbatore,
through the Collector.
„ Public Works Department.
„ Sanitary Engineer (with plans and estimates).

Exd. C. A. Muniswamy.

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Govt. of {1893} Madras.

LOCAL AND MUNICIPAL

No 1878 W of 20 July 1893.

Recorded.

(Sd.) J. A.

W.

Issued

Recd.

Encl.

G.O., 17th June 1893, No. 790 M.

JUNE.

Water-supply Scheme.

Communicating to the Municipal Council,
Coimbatore, papers relating to the — for the
town.

Sr. W. W. W. W.
Ch. Engr. for Irru.

With order