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G.O., No. 1640m

DATED 6/11/89

[Despatch Abstract.]

Coonoor water Supply Scheme

Approving with remarks the Scheme for supplying Coonoor with water from the Wellington valley, undertaking to make a grant of Rs 5000 from Provincial funds in aid of the Scheme, and requesting the Public works Dept to take the work in hand as soon

BACK PAPERS.

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

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.
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LOCAL AND MUNICIPAL.

Recd. } 1899 *Enclosures*

Regd. *Spare copies*

G.O., No. 1640 M., 6th November 1899.

NOVEMBER.

Coonoor Water-supply Scheme.

Approving, with remarks, the scheme for supplying Coonoor with water from the Wellington valley, undertaking to make a grant of Rs. 50,000 from Provincial funds in aid of the scheme, and requesting the Public Works Department to take the work on hand as soon as possible.

GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

READ—again the following paper :—

G.O., Mis. No. 2811 M., dated 16th December 1897.

Read—the following paper :—

Proceedings of the Sanitary Board, No. 729-S., dated 26th October 1897.

Read—the following papers :—

From J. A. JONES, Esq., MEM. INST. C.E., F.R.S.E., Sanitary Engineer to Government, to the Secretary, Sanitary Board, dated Fort St. George, 29th April 1897, No. 792.

Coonoor Water-Supply.

With reference to G.O., Mis. No. 1935 M., of 22nd November 1895, I have the honour to forward the following papers, plans, &c. :—

(1) Report on the scheme.
(2) Estimate.
(3) Statement showing comparative cost of previous and present schemes.
(4) Portfolio containing the following plans and sections :—
  (*a*) Survey showing site of proposed dam and service reservoir.
  (*b*) Plan and sections of dam across stream.
  (*c*) Line from spring head to service reservoir.
  (*d*) Plan and sections of service reservoir.
  (*e*) Plan showing pipe lines, fountains, valves, &c.
  (*f*) Section showing hydraulic gradients of pipes, main line.
  (*g*) Section showing hydraulic gradients of pipes, sub-main No. 1.
  (*h*) Plan showing proposed improvements to existing supply.
(5) A file of papers, viz.—
  (*a*) G.O., No. 2199 M., dated 11th December 1891.
  (*b*) G.O., Mis. No. 719 M., dated 21st April 1892.
  (*c*) G.O., Mis. No. 569 M., dated 29th March 1895.
  (*d*) Memorandum No. 1533, dated 18th September 1895.
  (*e*) Sanitary Engineer's letter No. 2789, dated 26th September 1895.
  (*f*) G.O., Mis. No. 1935 M., dated 22nd November 1895.

ENCLOSURE.

Coonoor Water-Supply.

REPORT accompanying plans and estimates for a new scheme of water-supply.

A scheme for the water-supply of Coonoor was sanctioned for execution in G.O., No. 2199 M., dated 11th December 1891, but on a representation by the Council, Government in its order Mis. No. 719 M., dated 21st April 1892, stated that its immediate execution would not be insisted upon.

2. The Sanitary Board having been asked in 1895 to report on the scheme for providing Coonoor with a water-supply, stated that the scheme was undesirable unless considerably extended at greatly enhanced cost and suggested an alternative scheme and the provision of Rs. 1,000 by the Municipal Council for its investigation. This money was supplied in 1895, the surveys were undertaken in 1896, and designs and estimates for the scheme were then begun and these are now completed and forwarded.

3. An experimental [illegible] year last and the [illegible] the Sanitary Board's resolution of the 5th September 1895 shows that, [illegible]ssary to [illegible] the scheme proposed in 1891 was a safer source than the Arvenghat valley [illegible]ggested by the Sanitary Commissioner, many additional works would have to be under- to make it a pure and suitable source of supply for Coonoor and that it would be desirable [illegible]nsider whether a supply could not be obtained at very little greater expense from the stream [illegible]ch now feeds the Wellington Cantonment.

4. This scheme has been investigated and it is the scheme which is now put forward for adoption, because from a comparative statement attached to this report it will be observed that after the scheme of 1891 has been modified and added to, as suggested in the Sanitary Board's resolution No. 2537 of 5th September 1895, the excess cost of the scheme now suggested is only Rs. 4,000. The revision of the Yedapalli scheme (including as it does additions to meet the cost of reserving land, fencing, stoneware piping through the tea estates and improvements to the existing channel with other increases due to a covered instead of an open reservoir, to cost of pipes and extra pipes to bring it in line with scheme now proposed) increases the estimate of 1891 from Rs. 80,000 to Rs. 1,09,800 as against Rs. 1,13,800 for the scheme now proposed.

5. There is no comparison between the one scheme and the other either in the purity of the source, the manner in which the water is conveyed or the area it commands; the new scheme is entirely superior in all these respects.

6. The last sheet, No. 8, in the portfolio of plans forwarded herewith shows the scheme of 1891 from its source up to the point where the pipe entered the town close to Sims Park and shows the length where the open channel would have to be piped, the land to be acquired around the springs, &c., and the drainage channel required to divert the drainage of Yedapalli village from the head of the supply. It has not been possible to estimate the cost of stopping Badaga cultivation along the supply stream; this would be a considerable amount and seeing that without the cost of diverting the stream from Elk Hill House (which would also reduce the supply) the estimates are so nearly on a par, the cost of this has not been estimated nor included. It is thought, however, that even apart from financial considerations, the great superiority of the one scheme over the other—a closed supply against an open unprotected one—cannot but recommend it to Government and the Council. No further comparison need therefore be instituted and it therefore but remains to describe the scheme now suggested for adoption.

7. It will be observed that, in Sanitary Board's resolution No. 2537 of 5th September 1895, while the suggestion was to obtain the supply for Coonoor from the same stream from which Wellington is supplied, it was noted that the Wellington channel was not received from a pure source, but that the conditions of the area of collection could be improved and rendered safe at small cost. The stream which passes down the Kóttagiri road valley is formed by the junction of two other streams; the Wellington supply above alluded to is taken from the branch entering the stream on the right bank and it is around the source of this branch that the area requires improvement. The source of the scheme proposed for Coonoor is the valley from which the branch entering the main stream on its left bank flows, and this valley is perfectly free from habitations of all descriptions and is probably one of the clearest valleys around Coonoor. The land consists chiefly of grass lands with some few topes and the only objection to the area is that the Wellington-Kóttagiri road passes through it, but even this is for a very short distance only and the road is so steep curving sharply round the hill that the chance of any drainage going into the stream above the point of offtake is extremely small and not worth consideration especially as the traffic is exceedingly limited.

8. The point of offtake, it will be observed, is placed above one of the feeders of the branch. This has been done because it has been found desirable to place here a small masonry dam to allow the offtake pipe to be always under water and because the valley very rapidly opens out below the place chosen for such dam. The site has also been selected in view of the fact that some day it may become necessary to erect a dam of some height to store water to provide against the diminished stream supply in the spring months. This at present is by no means necessary, and as the present scheme will supply the increased population of Coonoor with 20 gallons a head, while the stream sends down double that quantity, it will be many years before such a contingency will require to be considered. This opportunity may, however, be taken to state that, while the annual supply required for Coonoor at 20 gallons per head for 7,500 people is 8,760,000 cubic feet, a dam at this point would retain—

	Cubic feet.	Supply.
If 50 feet high	7,900,000 =	10 months.
If 40 „	4,650,000 =	6 „
If 30 „	2,276,000 =	3 „
If 20 „	816,750 =	$1\frac{1}{11}$ „

and the dam in no case would be of any great length. No such work is, however, for the present proposed nor is there any necessity for it.

9. The population of Coonoor at the last census was 6,049. The wo… a supply of 7,500 people with 20 gallons per head per diem half delivered … equals a supply of 15 gallons per head for 10,000 people half delivered in six h… gradients in Coonoor are so steep that whether the supply is 15 or 20 gallons a head make… little difference in the size of the pipes which are all of comparatively small diameter.

10. At the point of offtake it is proposed to construct a small dam 5 feet 7½ inches in heig… (*vide* sheet No. 2 of the plans). The top level of this dam will be coincident with the present maximum flood level; this dam is merely to keep the top of the 4-inch supply pipe to the service reservoir at an always sufficient depth below water.

11. The greatest rainfall registered at Wellington has been 4·90 inches in 24 hours. The discharge over the dam with this fall and from a drainage area, calculated at three-tenths of a square mile, taking the co-efficient of 675 by Ryves' formula, works out thus :—

$$D = C \sqrt[3]{M^2}$$

$$D = 675 \sqrt[3]{\cdot 09}$$

$$D = 675 \times \cdot 448$$

$$D = 302 \text{ C. ft. per second.}$$

and the length required for the dam (2 feet flowing over) would be—

$$L = \tfrac{2}{7} \times \frac{D}{d\sqrt{d}}$$

$$L = \tfrac{2}{7} \times \frac{302}{2\sqrt{2}} = \frac{604}{19{\cdot}01} = \text{say 30 feet.}$$

The dam has a level length of 29 feet 6 inches but has wings rising at the sides each 13 feet 6 inches in length and is therefore of ample length.

12. Another calculation has, however, been made from the data of the existing flood sectional area and the slope of the stream. This works out as follows :—

The area is 76·27 square feet.

$$\text{H.M.D.} = \frac{76{\cdot}27}{33{\cdot}75} = 2{\cdot}26$$

Slope of stream = 1 in 48.

$$V = C\sqrt{rs}$$

$$\text{and } C = \frac{1}{\sqrt{\frac{\cdot 00008534\ (2{\cdot}26 + 4{\cdot}1)}{2{\cdot}26}}}$$

$$= \frac{1}{\sqrt{\cdot 0002401604144}} = \frac{1}{\cdot 0154971} = 64{\cdot}52$$

Therefore

$$V = 64{\cdot}52 \sqrt{\cdot 047008}$$
$$= 64{\cdot}52 \times \cdot 217$$
$$= 14 \text{ feet per second}$$

and the discharge would be 76·27 × 14 = 1067·78, say 1,068 feet per second, and this discharge works out to a depth of 3·6 feet flowing over an anicut 29 feet 6 inches in length, but as the sides of the anicut extend 13 feet 6 inches on either side and the ends are 4 feet higher than the centre, there is ample length to take even this discharge. It is evident that the co-efficient adopted by Ryves for limited areas near hills is in this instance much too small.

13. A discharge of 1,068 feet per second would from an area of three-tenths of a square mile represent a fall of—

$$\tfrac{3}{10} \times 5{,}280 \times 5{,}280 \times \frac{X}{12} = 1{,}068 \times 60 \times 60$$

$$X = 6 \text{ inches per hour, which is a very large amount.}$$

A discharge of 4·9 inches in 24 hours from the same area equals only 40 feet per second.

14. The minimum flow of the stream is sufficient to supply the quantity required for Coonoor.

…5. An experimental weir was erected at the site of the proposed dam in the beginning of …y last and the lowest gauging received since that day—these are the dry months of the …uary to April)—shows the discharge to be ¾ inch over a weir 7 feet in length with a velocity …ach equal to 160 feet a minute or 2⅔ feet per second. For the purpose of determining …w the average velocity of approach has been taken at 2⅔ × ⅔ or ⅔ feet per second and the …scharge works out to 0·67505 cubic feet per second or daily.

0·67505 × 60 × 60 × 24 hours × 6¼ gallons = 364, 588 gallons daily, while as before shown for a population of 7,500 drawing 20 gallons per head will be only 150,000 gallons per diem. The quantity required will be during parts of the day double this, but the fluctuation is provided for by the service reservoir.

16. The dam is furnished with a scour pipe with valve which must be opened occasionally to clear any silting occurring at the back of the dam, the stream having a heavy grade of 1 in 48 at this point. A section of the stream above the dam is shown on sheet No. 3 of the drawings.

17. The water is taken from the front of the dam by a 3-inch pipe which passes round or rather through the extended wall of the dam and after passing through a sluice valve enters a chamber in which an equilibrium valve is placed (*vide* sheet No. 2). The object of this valve is to prevent the pipe between this point and the service reservoir ever flowing more than full or with pressure. The fall between the point of offtake and the reservoir is, in a distance of 5,800 feet, no less than 327 feet or a grade of 1 in 18, and the discharge of a 3-inch pipe flowing only full is 120 gallons per minute, while the supply required is 104 per minute, but the discharge must be regulated to the supply required by the sluice valve above the break pressure tank. Two overflows from this 3-inch cast-iron pipe are also provided for, one at about half the distance and the other just before the junction with the reservoir. This 3-inch pipe will be laid along the steep side of the hill which forms one side of the valley of the stream in the Wellington-Kóttagiri road valley and the pipe line has been so located that a fairly regular grade has been secured, though the line naturally winds round the various spurs in its course. Sufficient bends have been provided so that there should be little difficulty in laying this pipe.

18. In the original scheme the reservoir, as designed, was an open one. In this scheme, as the water is brought from its source in a closed pipe, the reservoir is a covered one. It has been placed on an open piece of land near the old Wellington-Kóttagiri road (*viâ* Bleak House) which gives facility for cartage of materials and erection, but its site has been determined chiefly of course with reference to the head required to supply the higher portions of Coonoor, and bearing this in view it has been placed as near Coonoor as possible. The nearer the service reservoir could be placed to Coonoor the less would be the cost of the main distributing piping because mains between the town and the service reservoir have to be proportioned to carry double the average, while those on the other side of the reservoir require to be of such dimensions as will carry the average demand only. It might have been placed further from the town and at a higher level, but this would have, while giving an increased grade and perhaps a very slightly reduced size of main, increased the length of the main and also the pressure on it; as this is already 300 feet in parts (crossing the Wellington race-course valley), I did not consider it an advisable alteration. It could have been placed very slightly lower and a little nearer the town, but this would have prevented the extension of the supply to some houses on the Coonoor Bleak House road which the Chairman considered it desirable should be included. Taking all circumstances into consideration, it is probably in the best situation for all purposes.

19. There is nothing novel in the construction of the reservoir itself except that in addition to being furnished with self-closing equilibrium inlet valves, it is also furnished with floating drainers which will take off the clearest water always. The reservoir is divided into two compartments and will contain 51,538 cubic feet or 322,112 gallons which is more than two days' supply.

20. The main from the reservoir passes directly down to the Wellington course and proceeds along the western side of that course until it meets the stream near the Victoria Bridge; thence it ascends the hill and meets the "Figure of Eight" road close to the McIvor Villa. At this point it branches into two, the eastern branch passing round the Sims Park with a branch to Stillbrook and following the "Figure of Eight" road to the library, taking in then both portions of the "Figure of Eight" road *via* Glenview Hotel. &c., the western branch passing between Bleak Heath and the new club, and thence *viâ* the Government reserve and Annalore Cottage to the hospital and through the main streets of the town. Thus the distribution portion of the scheme with the exception of minor details and the extension to Stillbrook is the same as in the former scheme, the plans for which have been before the Coonoor Municipal Council.

21. At two points as shown on the hydraulic section, two reducing pressure valves will be put in to bring down the pressure after crossing the summit levels to a reasonable amount. One minor detail altered is the substitution of Tylor's waste not taps for the Glenfield pattern of taps formerly provided; the former while they are more efficient for high pressures cost less than the latter pattern and are more economical as they close after a certain supply (2 to 3 gallons) and have to be again opened if more water is wanted.

22. The pipes estimated are for class A pipes suitable in their thickness for the high pressures in this scheme.

23. The following shows the length of the various sizes of piping and the num fountains, valves, hydrants, &c., provided :—

Cast-iron pipes turned and bored, spigot and faucet.					Sluice valves.					Reflux valves.	Pressure-reducing valves as per Fig. H., 58, page 31, section B of Glenfield's Catalogue.	Gunmetal stopcocks as per standard drawing No. 4.	Air valves.	Hydrants.	Copper standpipes.	Surface boxes for sluice valves.	Surface boxes for air valves.	Surface boxes for stop-cocks.	Surface box for 6" pressure-reducing valve.	Surface box for 2½" pressure reducing valve.	Pillar fountains.	Single wall tap fou
Size in inches.					Size in inches.																	
8	5	4	3	2½	8	5	4	3	2½	8	2½	5	2½	2	2½	2½	2½	..	..	..	..	..	..	..
Length in feet.					Number.																			
4,212	6,129	909	4,410	16,062	2	3	1	3	57	1	1	1	1	32	5	17	2	66	5	32	1	1	10	22

24. The following is an bstract of the estimate which amounts to Rs. 1,13,800. It was thought that the revised scheme would amount to Rs. 1,20,000, and thus in this view the following loans and grants were entered in the Provincial budget for 1897-98 :—

	Rs.
Loan	60,000
Grant	60,000
Total ...	1,20,000
Constructing dam across stream	1,170
Piping from dam to service reservoir	5,830
Laying and jointing pipes for service reservoir	2,740
Constructing service reservoir	27,300
Supply and delivery of pipes, &c.	56,200
Laying and jointing pipes, erecting fountains, &c.	15,100
Tools and plant and contingencies	5,460
Total ...	1,13,800

25. At present there are no funds for this work.

26. The annual charges of the scheme would stand as follow presuming that the Provincial budget will again contain similar figures to those above quoted :—

	Rs.
Interest and Sinking Fund—Rs. 56,900 × 5·783 at 4 per cent ...	= 3,290
Maintenance charges	= 2,500
Total ...	5,790

Note by Lieutenant-Colonel W. G. KING, M.B., I.M.S., C.I.E., Sanitary Commissioner for Madras, to the Secretary, Sanitary Board, dated 13th July 1897, No. 1415-S.

[*Reference*—Proceedings of the Sanitary Board, No. 370, dated the 10th May 1897.]

The Sanitary Engineer states that I suggested the Arvenghat valley as a source of supply for Coonoor. This is misleading. The report of the Sanitary Engineer, dated 25th March 1891, and embodied in G.O., No. 2199 M., of the 11th December 1891, contains the following statement :—"It would have been desirable to adopt this

...e (the Arvenghat valley) had the necessary works not been much too costly for ...vn of Coonoor." He therefore advised the Yeddapalli scheme and mentioned ... alternative as feasible. This scheme thereupon received the sanction of ...ernment. When, however, I inspected the Yeddapalli catchment area, I stated I ...onsidered it open to sanitary objection. In doing so I suggested that the only other alternative offered by the Sanitary Engineer and to which he had no objection to urge other than expense "should be further entered into"—*vide* Sanitary Commissioner's inspection notes, paragraph (i), embodied in G.O., No. 800 M., dated 6th March 1895. It was obviously not necessary for me, in the face of the Sanitary Engineer's Yeddapalli scheme having been actually sanctioned, to take the trouble of inspecting his other alternative till I knew Government would put this in abeyance. When this was accomplished, I did for the first time inspect the Arvenghat area which the Sanitary Engineer thought "it would have been desirable to adopt" had it not been a matter of funds, when I had no difficulty in coming to the conclusion that this source also was sanitarily unfit. The same investigation conducted in company with the Sanitary Engineer showed that other sources than the two mentioned by him were available.

2. The source now proposed is sanitarily unobjectionable, provided certain patches of Badaga cultivation be got rid of, the gum trees and brushwood within the catchment area of the storage reservoir be removed, and the small bund and drain of the Kóttagiri road be so repaired or altered as to prevent any surface washings from the road entering the storage reservoir. If it could be afforded, these precautions would be of more value if aided by the putting up of an iron wire-fencing in the easily accessible portions of the bowl-like depression. The whole catchment is small and should be absolutely under the control of the Municipal Council.

3. The water will be mixed—surface and spring water. The amount of organic matter and salts it will contain will vary from time to time. It is therefore *premature* to decide that the service reservoir should be covered, even granting that the water has been in the dark during conveyance through the pipe before arriving there. I advise therefore that the service reservoir should not be covered until the *experiment* has been tried as to the behaviour of the water in an uncovered reservoir; it is quite possible having regard to its composition that it *might* improve under exposure, but the factors are so uncertain it would not be safe to come to a conclusion causing expenditure.

4. The water of the spring should be submitted to the Chemical Examiner for analysis.

Resolution—No. 729-S., dated 26th October 1897.

The Sanitary Engineer's report gives the history of the project and the circumstances which have led to the present scheme being proposed.

2. The source of supply is the stream which now feeds the Wellington Cantonment; and the advantages of this scheme, as compared with that of 1891, which had been previously proposed, are discussed in paragraphs 4 to 6 of the Sanitary Engineer's report.

3. The Sanitary Commissioner considers the source now proposed to be unobjectionable from a sanitary point of view, provided certain patches of Badaga cultivation be got rid of, the gum trees and brushwood within the catchment area of the storage reservoir be removed, and the small bund and drain of the Kotagiri road be so repaired or altered as to prevent any surface washings from the road entering the storage reservoir. Iron wire-fencing is also suggested round a certain portion of the catchment area, provided the expense can be afforded. He also advises that the service reservoir should not be covered in to start with, and that the water of the spring should be submitted to the Chemical Examiner for analysis.

4. The works are designed for a supply of 7,500 * people with 20 gallons head per diem, half delivered in six h This equals a supply of 15 ga head for 10,000 people, half delivere six hours.

* The last census shows the population of Coonoor to be 6,049.

5. The following is an abstract of the estimate which amounts to Rupees 1,13,800 :—

	Rs.
Constructing a dam across stream	1,170
Piping from dam to service reservoir	5,830
Laying and jointing pipes for service reservoir	2,740
Constructing service reservoir	27,300
Supply and delivery of pipes, &c.	56,200
Laying and jointing pipes, erecting fountains, &c.	15,100
Tools and plant and contingencies	5,460
Total ...	1,13,800

6. The annual charges are estimated as follows :—

Interest and Sinking fund	3,290
Maintenance charges	2,500
Total ..	5,790

7. The Sanitary Board is of opinion that the project is a good one, and resolves to recommend it for the sanction of Government.

(True Extract.)

(Signed) R. PARSONS,
Secretary, Sanitary Board.

Order—Mis. No. 2811 M., dated 16th December 1897.

The plans and estimates will be forwarded to the Municipal Council of Coonoor for remarks and for report, as to how it proposes to finance the scheme, on the understanding that Government will be prepared to advance the required amount at 4¼ per cent. interest repayable in twenty years. The Government regrets that, in the present state of the finances, it cannot make any grant from Provincial funds towards the cost of this scheme, nor can it hold out a promise that any portion of the loan will be paid in the current or ensuing years. The Municipal Council should therefore consider whether, instead of delaying the scheme, it would not be better to borrow in the open market. A loan could, in all probability, be raised at 4½ per cent. without difficulty, provided its currency was put at thirty years.

2. In the meantime, the Sanitary Board is requested to obtain and send to the Chemical Examiner for analysis a specimen of the water from the proposed source of supply and report the result to Government.

(True Extract.)

(Signed) H. TREMENHEERE,
Ag. Secretary to Government.

To the Chairman, Municipal Council, Coonoor
(through the Collector of the Nilgiris).

„ Sanitary Board.

READ—also the following papers :—

From A. BUTTERWORTH, Esq., I.C.S., Acting Collector of the Nilgiris, to the Secretary to Government, Local and Municipal Department, dated 22nd December 1898, B. & G. No. 1247.

I have the honour to address Government in regard to the improvement of the water-supply of Coonoor Municipality — a matter which has been long under discussion and which, in the opinion of the Municipal Council, the residents of Coonoor and myself, demands early settlement.

2. The first correspondence on the subject to which I invite attention is the Sanitary Engineer's report embodied in G.O., No. 2199 M., dated 11th December 1891.

It will be observed that Mr. Jones, after first describing the sources whence Coonoor derives its water-supply, expressed an opinion that the best source is the Aravenghat river, but that the cost of supplying Coonoor from this source would be beyond the means of the municipality.

He then went on to consider the Yeddapalli stream, which is now the main source of supply to the town, and came to the conclusion that it could be so improved as to render it a safe and sufficient source. The Sanitary Engineer roughly estimated the cost of the improvements, which would be required, at Rs. 80,000. Mr. Jones' scheme was referred to the Chief Engineer who raised questions as to the correctness of Mr. Jones' calculations regarding the quantity of water available, but, after considering the Sanitary Engineer's reply, expressed his approval of the scheme.

Government also approved it, offered to advance the money at 4½ per cent. and directed the Chairman to report how the Municipal Council proposed to raise the sum of Rs. 4,768 required to meet the annual payment due on the loan.

3. The Chairman's report is contained in his letter, dated 27th February 1892, No. 511, from which it will be seen that the Council, while recognizing the expediency of improving the water-supply, demurred to providing the requisite funds by means of enhanced taxation.

Thereupon Government, observing that the Council was then carrying out a drainage scheme, stated that it would allow the water-supply scheme to be deferred (G.O., No. 719 M., dated 21st April 1892).

4. The matter seems to have dropped after that until, in paragraph 4 (5) of G.O., No. 861 M., dated 6th July 1894, Government directed the Council to reconsider the question of the water-supply.

The Chairman's reply is to be found in his letter, dated 6th October 1894, No. 200. It will be seen that the Council merely referred Government to its previous resolution and asserted that it could not find the money.

5. In October 1894, the Sanitary Commissioner inspected Coonoor and his remarks upon the water-supply will be found in paragraph 4 of his report read in G.O., No. 800 M., dated 6th May 1895. Dr. King considered that, as the Yeddapalli supply was liable to contamination at various points, it would be expedient to investigate the Aravenghat river as a source of supply.

In forwarding this report, the Chairman observed that the Council would, as funds permitted, pipe the existing water-supply channels—a promise which has not been fulfilled. So far as concerned the subject of water-supply, Government merely recorded these papers, the matter being under discussion separately.

6. In a letter, dated 8th March 1895, No. 252, the Collector addressed Government regarding the same subject.

Mr. Rees expressed the opinion that the piping of the Yeddapalli chan[illegible] in certain places is a matter of most urgent necessity and that it shoul[illegible] be disposed of before the small Vannarpet and Ottupatrai channels are taken in ha[illegible]. He observed that he was in favour of raising the water-tax in order to provide funds and suggested that the Sanitary Engineer should be called on to estimate the cost of piping the Yeddapalli and Vannarpet channels at the places where they are most exposed to contamination.

improvement is absolutely the worst that can be conceived in this country. It is very taking, because it enables local authorities to shut their eyes to facts for a certain period, after the style of the proverbial ostrich. But it is as absolutely rotten in practice. Men and their projects disappear with rapidity, to be succeeded by new men and new projects. The Collector of the Nilgiris and the Chairman of the Municipality of Coonoor of to-day having disappeared before one-third of the project is completed, it may be depended upon, in the natural course of events, that the whole expenditure would be regarded as wasted by the new man with the new idea. I hold that it would be an absolute mistake to accept any such tinkering of the nature suggested, *if current funds are to be increased by extra taxation*. I would, therefore, state that whatever has to be done should not be effected by instalments, but by raising a loan and effecting all that can be done within the means of the Municipality. I suggest the following course:—

(1) It should be definitely ascertained whether Government is prepared to exhibit any leniency toward this Municipality, on the ground that (*a*) its finances are very limited, (*b*) that its people already pay much more per head than elsewhere in the Presidency, and (*c*) that the death-rate from preventible diseases—notably dysentery —probably conveyed by water, demands urgent attention.

(2) If Government will not make any concession, it should be ascertained what the full amount is that the Municipality can raise on loan in the open market.

(3) The Sanitary Engineer should then be required to state what work could be fulfilled within the amount so ascertained. In coming to a conclusion on this point, he would understand that the scheme last prepared by him—bringing water from the Wellington side—is very decidedly preferable to Yeddapalle scheme under any circumstance, and that if economy is to be practised, it would be sanitarily safer to allow certain parts of the new scheme to be without piping than the Yeddapalle scheme. Thus a decision could be arrived at based on the best sanitary and economical reasons, under the unusual circumstances.

2. As regards the protection of the supply at Vanarpet, the necessity for action has been constantly pressed upon the Municipality by this office. This should be capable of ready attention from current funds. The same may be said of the gross pollution going on in the gutter, in which drinking-water passes down to the bazaar. In both cases earthenware pipes might be used in the short lengths concerned. In this connection, I think it must be held in mind that although the Collector, in his paragraph 4, speaks of remedying urgently-required defects, his proposals are by no means of the minor nature I here suggest. What he really means to do, is to adopt the Yeddapalle scheme by successive instalments, without ascertaining what funds can really be raised, and whether, if forced to adopt a scheme by instalments, it could not with equal financial economy and better sanitary results be applied to the Wellington scheme.

Office-note from J. A. JONES, Esq., Sanitary Engineer to Government, to the Secretary, Sanitary Board, dated Madras, 13th March 1899, No. 298.

[*Reference*.—Endorsement by the Sanitary Board, No. 48-S., dated 11th February 1899, referring for remarks certain proposals for the improvement of the water-supply of Coonoor.]

The undersigned fully concurs in the views expressed by the Sanitary Commissioner with regard to Mr. Butterworth's proposals for the improvement of the water-supply of Coonoor. The policy proposed to be pursued in respect to the improvement of the water-supply is one that will undoubtedly end as the Sanitary Commissioner supposes, and there can be no guarantee that this little by little system will ever be carried to its legitimate conclusion.

2. The Yeddapalle stream, which is now the main source of supply to the town, and the channel that conveys the water from the stream to the town are admittedly open to contamination.

3. In a comparative statement attached to the report on the Wellington stream scheme (*vide* Sanitary Engineer's letter to the Sanitary Board, No. 792, dated 29th April 1887), the cost is given of works considered necessary for the prevention or removal of the sources of contamination which the supply is liable to. These works are —

		Rs.
1.	Channel to divert the drainage of the village of Yeddapalle from the stream at its head	720
2.	Compensation for land	2,400
3.	Removal of village	900
4.	Fencing land acquired	2,000
5.	Piping the channel where it is liable to receive the drainage from tea-estates	7,000
6.	Improving the existing channel	400
	Total ...	13,420

Mr. Butterworth's present proposals practically amount to carrying out the above enumerated works with the exception of Nos. 3 and 4. He considers the fencing of the land not quite necessary and the removal of the village not essential. Omitting these two items, his proposals, if carried out, will cost Rs. 10,520, which is very nearly the sum Mr. Butterworth himself mentions in his letter.

4. Even if the improvements above indicated were carried out, the town supply will not be improved to any appreciable extent. The supply is infinitely more liable to contamination after it enters the town than it is during its passage to the town along the supply channel to which the above improvements relate, and unless the whole supply is piped throughout the town and unless the grosser impurities which it receives after its entering into the town are also eliminated, the improvements to the supply channel above the town will produce no appreciable improvements in the purity of the supply given to the consumer.

5. Mr. Butterworth states in his letter, No. 1247, dated 22nd December 1898, paragraph 11, that an increase of water and drainage tax from $2\frac{1}{2}$, which is what is now levied, to 5 per cent. will yield an enhanced income of nearly Rs. 4,500. Instead of spending this amount year after year in ineffective puny improvements on an insanitary supply, it would be far wiser to raise a loan, the interest and sinking fund of which would be covered by the amount of Rs. 4,500.

6. The undersigned considers that for a sum of Rs. 70,600 a very substantial portion of the Wellington stream scheme can be carried out, by omitting certain works the execution of which is not quite essential just at present, and which could be carried out whenever funds permit in future. The works referred to are (1) the service reservoir, (2) certain branch pipe-lines.

7. The object of a service reservoir is, first, to provide for the excess of maximum demand over the average, and, secondly, to hold a reserve in case of an accident to the supply pipe. As regards the first, it is not likely that the maximum supply as provided in the scheme will be demanded for many years to come, because the scheme provides for a population 25 per cent. in excess of the present population at 20 gallons per head per diem, and the supply pipe as designed is capable of delivering even in excess of this. The supply pipe above the reservoir is capable of delivering 120 gallons per minute, which without the adjunct of a reservoir, is equal to an average supply of 60 gallons per minute or 86,400 gallons per day. This will give a little less than 14 gallons per head per diem for the present population of Coonoor, which may be considered a fairly ample supply for the present. As regards the second object to be served by a reservoir, it is considered that its absence will not inconvenience the supply to any serious extent, as the supply pipe is only a little more than a mile long and being only 3 inches in size any break in the pipe can be readily detected and repaired in a few hours. For these reasons the construction of the reservoir may be deferred for some years. The omission of the reservoir will reduce the estimate by Rs 28,600.

improvement is absolutely the worst that can be conceived in this country. It is very taking, because it enables local authorities to shut their eyes to facts for a certain period, after the style of the proverbial ostrich. But it is as absolutely rotten in practice. Men and their projects disappear with rapidity, to be succeeded by new men and new projects. The Collector of the Nilgiris and the Chairman of the Municipality of Coonoor of to-day having disappeared before one-third of the project is completed, it may be depended upon, in the natural course of events, that the whole expenditure would be regarded as wasted by the new man with the new idea. I hold that it would be an absolute mistake to accept any such tinkering of the nature suggested, *if current funds are to be increased by extra taxation*. I would, therefore, state that whatever has to be done should not be effected by instalments, but by raising a loan and effecting all that can be done within the means of the Municipality. I suggest the following course:—

(1) It should be definitely ascertained whether Government is prepared to exhibit any leniency toward this Municipality, on the ground that (*a*) its finances are very limited, (*b*) that its people already pay much more per head than elsewhere in the Presidency, and (*c*) that the death-rate from preventible diseases—notably dysentery —probably conveyed by water, demands urgent attention.

(2) If Government will not make any concession, it should be ascertained what the full amount is that the Municipality can raise on loan in the open market.

(3) The Sanitary Engineer should then be required to state what work could be fulfilled within the amount so ascertained. In coming to a conclusion on this point, he would understand that the scheme last prepared by him—bringing water from the Wellington side—is very decidedly preferable to Yeddapalle scheme under any circumstance, and that if economy is to be practised, it would be sanitarily safer to allow certain parts of the new scheme to be without piping than the Yeddapalle scheme. Thus a decision could be arrived at based on the best sanitary and economical reasons, under the unusual circumstances.

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8. A further reduction of about Rs. 14,600 can be effected by omitting some of the pipe lines as shown on the accompanying tracing. The pipe lines shown by dotted blue lines may be omitted for the present, because the other pipe lines can discharge into existing channels after the water has passed beyond the points where it would be liable to pollution. By these omissions, the cost of the Wellington supply will be reduced from Rs. 1,13,800 to Rs. 70,600.

9. That this amount can be provided for by the Council there is no doubt, because, as Mr. Butterworth says, Rs. 4,500 per annum can be easily obtained without much additional taxation.

10. The sum of Rs. 70,600 represents for 30 years a payment of 6·5 per cent. annually to provide for sinking fund and interest at 5 per cent. or Rs. 70,600 × 6·5 = Rs. 4,589, which is almost the amount proposed by Mr. Butterworth.

11. The pipe lines omitted can afterwards be added to gradually until the system is as complete as originally designed—but meantime the supply would be delivered uncontaminated—only one portion of Coonoor would remain untouched, viz., those few houses on the high land near the taluk offices, and these are not supplied from the Yeddapalle stream.

Note by Lieutenant-Colonel W. G. KING, M.B., I.M.S., C.I.E., Sanitary Commissioner for Madras, to the Secretary, Sanitary Board, dated 20th July 1899, No. 1913-S.

[*Reference.*—Proceedings of the Sanitary Board, No. 259-S., dated 12th May 1899, *re* Coonoor water-supply.]

Query (*a*).—No huts exist within the area from which the water will be taken in the Sanitary Engineer's scheme. It is incorrect to regard this scheme as having anything to do with the Wellington valley. The water from that area is not received and passes below the pipe line.

Query (*b*).—No analysis of the water has been made. This should be effected now. It need hardly be said that as the area is perfectly clean, with the exception of a road running through part of it—the drainage from which can be diverted—there is no reason to doubt that water not only chemically of good quality but free of human contamination can be safely reckoned upon. It is presumed anything the chemist can say *after* a sanitary survey has been effected, is not likely to alter much any verdict given.

Query (*c*).—If the Yeddapalle supply were started off straight from below the Yeddapalle village, it is questionable whence the water-supply is to be obtained. If it were not so piped, there are endless risks of its contamination, even were certain very desirable portions of Badaga cultivation and shola excluded. I consider were Coonoor so situated as to be obliged to have no other choice, it would be quite right to use filters and Anderson's revolvers and other methods of purification, but to deliberately spend money on a scheme including ground that has been lived upon by human beings would be sanitarily suicidal. The more we know of the typhoid bacillus, the more certain we are that its existence may be greatly prolonged in soil.

Query (*d*).—It has been shown above that pollution at least is not possible from any huts within the area chosen for the supply, and that the Wellington area is not involved. As regards the question of policy, I think the Sanitary Board is making a great mistake if it does not attempt to get the same powers into its hands as the Local Government Board of England possesses. It can insist upon a supply of water being obtained for any town on the representation of a certain number of tax-payers, and insist that only feasible and sanitarily safe supplies are used. Any other policy must represent gross waste of public money. Mr. Jones' note shows that the Yeddapalle scheme possesses no economical claim over that now proposed. It seems to me therefore that if the Coonoor Council object to adopting any other than the Yeddapalle scheme, it would not be difficult to cause them to alter their minds. Their opinions have been temporarily swayed by incorrect data and undesirable sanitary conclusions arrived at by the Collector.

Resolution—No. 457-S, dated 2nd September 1899.

In his letter of the 22nd December 1898, the Collector, the Nilgiris, re-submits to Government the question of the water-supply of Coonoor. He briefly reviews all former schemes, including the one last approved by the Sanitary Board in its Proceedings, No. 729-S, dated 26th October 1897, and he submits a resolution by the Council recording its opinion that the cost of the last-mentioned scheme is prohibitive. The Council considers that the proper course to adopt is to devote funds gradually to the improvement of existing supplies and in the first instance to pipe the channels within the confines of the town. The Council adds that it would probably be able to allot Rs. 2,000 towards the improvement of the water-supply in the present year 1898-99.

The Collector is in complete accord with the resolution of the Council. He considers the latest scheme, as well as the Sanitary Engineer's scheme of 1891, as prohibitive in point of cost, and is of opinion that, if a comparatively small sum were expended yearly for a few years in piping the existing channels and in acquiring and fencing the catchment areas, Coonoor would receive a supply of good water, which would suffice for the needs of the town until its population had considerably increased. He, accordingly, asks that the Government will finally authorise the Council to abandon the consideration of ambitious schemes which are beyond its means and permit it to gradually improve the existing sources of supply.

2. The matter has been referred by Government for the remarks of the Sanitary Board, which has consulted the Sanitary Commissioner and the Sanitary Engineer. From their notes quoted above, it would appear that both these officers prefer bringing water from the Wellington side and are opposed to the Collector's proposal to improve the water-supply by instalments. They doubt its economy and question its soundness from a sanitary point of view.

3. A further reference to the Sanitary Commissioner has elicited his report No. 1913-S, dated 20th July 1899, in which he supplies information on various points in connection with the Wellington supply scheme.

4. The Sanitary Board finally resolved to visit in person the various sources of supply and make the requisite investigations on the ground. This they did on the 16th August 1899, in company with the Collector, the Chairman of the Municipality, the Sanitary Commissioner and the Sanitary Engineer. As the result of this investigation, the Board has unanimously arrived at the following conclusions, which it begs to submit for the orders of Government:—

(1) The Board is in favour of the Wellington valley scheme recommended by them to Government in Proceedings, No. 729-S, dated 26th October 1897, and condemns the Yeddapalle scheme as being quite unfit for the water-supply of any town owing to frequent contamination at its source and along its banks.

(2) The Wellington valley scheme is estimated to cost Rs. 1,13,800, and the Board recommends its adoption in its entirety, with the exception of that portion of the distributary piping referred to by the Sanitary Engineer in his office-note No. 298 of 13th March 1899, which is estimated to cost Rs. 14,600.

(3) The Board does not recommend the omission of the service reservoir, as proposed by the Sanitary Engineer in paragraph 7 of the above office-note, because it has not sufficient proof before it that the supply of water will be equal to the demand at busy times of the day without some provision for storage.

(4) The omission proposed in clause (2) of paragraph 4 above will reduce the estimate to Rs. 99,200, or, say, one lakh. The Board recommends that, in view of the special circumstances of Coonoor, and of the fact that similar assistance has been given to Ootacamund, Government should grant a sum of Rs. 50,000 as a free gift to the town, and authorise the Coonoor Municipality to raise a loan in the open market for the remaining Rs. 50,000, or lend it on the usual terms. Provision for such gift and loan to be made in the budget for 1900-1901.

(5) The Board recommends that, in the interval between now and the commencement of work—

(*a*) The water should be analysed.

(*b*) The flow of water should be again gauged daily for a period of not less than three months by means of a pipe discharging into a measure of known capacity.

(*c*) The levels of the service reservoir, Stfll Brook, Cairnsfort and other high parts of Coonoor be again carefully checked to insure that the former is placed sufficiently high to deliver water under pressure everywhere.

(True Extract.)

(Signed) R. PARSONS,
Secretary, Sanitary Board.

To the Secretary to Government, Local and Municipal Department.
" Sanitary Commissioner.
" " Engineer.
" Chairman, Municipal Council, Coonoor.

Proceedings of the Sanitary Board, No. 513-S, dated 23rd September 1899.

Resolution—No. 513-S, dated 23rd September 1899.

In continuation of the Proceedings read above, the Board begs to recommend that the diversion of the public road, which now passes through the area upon which the Wellington valley scheme depends, be estimated for and carried out, if funds permit. This work is not, however, in the opinion of the Board, very pressing.

(True Extract.)

(Signed) R. PARSONS,
Secretary, Sanitary Board.

To the Secretary to Government, Local and Municipal Department.
" Sanitary Commissioner.

Memorandum.

A copy of the Sanitary Board's Proceedings is forwarded to the Collector, the Nilgiris, with a request that he will be good enough to report at once if he concurs with the views of the Sanitary Board.

27*th September* 1899.

(Signed) M. HAMMICK,
Ag. Secretary to Government.

From C. J. WEIR, Esq., I.C.S., Collector of the Nilgiris, to the Secretary to Government, Local and Municipal Department, dated 28th September 1899, R. Dis. No. 708.

With reference to your memorandum of the 27th instant, I have the honour to state that having had the advantage of going over the ground with the members of the Sanitary Board, and having fully discussed the matter with the Sanitary Commissioner and Engineer, I am in complete accord with the suggestions of the Sanitary Board.

ORDER—No. 1640 M., dated 6th November 1899.

The Collector's proposal that the Municipal Council of Coonoor should be permitted to abandon the consideration of the schemes for the water-supply of the town and to restrict its action to the gradual improvements of the existing supply cannot be approved, as both the Sanitary Commissioner and the Sanitary Engineer doubt its economy and question its soundness from a sanitary point of view. Nor does the Government consider the Yeddapalle scheme suitable, as the channel from which the supply is to be drawn is subject to constant contamination at its source and along its banks. The Wellington valley scheme, which is recommended by the Sanitary Board, will, as modified in paragraph 4 (2) of its Resolution No. 457-S, dated 2nd September 1899, be now approved, and the Public Works Department is requested to take the work on hand as soon as possible.

2. The cost of the scheme, as revised by the Sanitary Board, is estimated at Rs. 99,200, or roughly one lakh. The Government will make a grant of a moiety of this amount, viz., Rs. 50,000, and the Accountant-General is requested to place this sum at the disposal of the Municipal Council out of the allotment of Rs. 54,500 provided for the Bezwada water-supply scheme in the estimate of Provincial grants for the current year. The Municipal Council should raise the balance of the required funds by a loan in the open market. The annual payment towards interest and sinking fund on account of this loan, which the Government considers can be raised at 5 per cent. interest repayable in fifty years, will be Rs. 2,943, while the working charges of the scheme are estimated at Rs. 2,500 per annum. Thus the total annual expenditure in connection with the scheme will be Rs. 5,443; but taking credit for the revenue from the tax on servants, which in 1898–99 yielded Rs. 1,094, as available for this purpose, the balance which the Council has to find is Rs. 4,349. The levy of an extra $2\frac{1}{2}$ per cent. of the water and drainage tax will, in the opinion of Government, be sufficient to raise this sum.

3. The recommendations made by the Sanitary Board in paragraph 5 of its first resolution read above are approved.

4. The attention of the Municipal Council is drawn to the remarks in the Sanitary Board's Resolution No. 513-S, dated 23rd September 1899.

(True Extract.)

M. HAMMICK,
Ag. Secretary to Government.

To the Chairman, Municipal Council, Coonoor.
" Collector of the Nilgiris.
" Sanitary Board.
" " Commissioner.
" " Engineer.
" Accountant-General.
" Public Works Department.

Exd. C. M. Thumbuswamy.

Please answer the Queries on pages 3 & 8

707

Government (1899) of Madras.

LOCAL AND MUNICIPAL.

Proof for approval.

Strike off as revised

Recd. } 1899

Regd.

Enclosures

Spare copies

G.O., No. 1640 M., 6th November 1899.

NOVEMBER.

Coonoor Water-supply Scheme.

Approving, with remarks, the scheme for supplying Coonoor with water from the Wellington valley, undertaking to make a grant of Rs. 50,000 from Provincial funds in aid of the scheme, and requesting the Public Works Department to take the work on hand as soon as possible.

GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

READ—again the following paper :—

G.O., Mis. No. 2811 M., dated 16th December 1897.

Read—the following paper :—

Proceedings of the Sanitary Board, No. 729-S., dated 26th October 1897.

Read—the following papers :—

From J. A. JONES, Esq., MEM. INST. C.E., F.R.S.E., Sanitary Engineer to Government, to the Secretary, Sanitary Board, dated Fort St. George, 29th April 1897, No. 792.

Coonoor Water-Supply.

With reference to G.O., Mis. No. 1935 M., of 22nd November 1895, I have the honour to forward the following papers, plans, &c. :—

(1) Report on the scheme.
(2) Estimate.
(3) Statement showing comparative cost of previous and present scheme.
(4) Portfolio containing the following plans and sections :—
  (*a*) Survey showing site of proposed dam and service reservoir.
  (*b*) Plan and sections of dam across stream.
  (*c*) Line from spring head to service reservoir.
  (*d*) Plan and sections of service reservoir.
  (*e*) Plan showing pipe lines, fountains, valves, &c.
  (*f*) Section showing hydraulic gradients of pipes, main line.
  (*g*) Section showing hydraulic gradients of pipes, sub-main No. 1.
  (*h*) Plan showing proposed improvements to existing supply.
(5) A file of papers, viz.—
  (*a*) G.O., No. 2199 M., dated 11th December 1891.
  (*b*) G.O., Mis. No. 719 M., dated 21st April 1892.
  (*c*) G.O., Mis. No. 569 M., dated 29th March 1895.
  (*d*) Memorandum No. 1333, dated 18th September 1895.
  (*e*) Sanitary Engineer's letter No. 2789, dated 26th September 1895.
  (*f*) G.O., Mis. No. 1935 M., dated 22nd November 1895.

ENCLOSURE.

Coonoor Water-Supply.

REPORT accompanying plans and estimates for a new scheme of water-supply.

A scheme for the water-supply of Coonoor was sanctioned for execution in G.O., No. 2199 M., dated 11th December 1891, but on a representation by the Council Government in its order Mis. No. 719 M., dated 21st April 1892, stated that its immediate execution would not be insisted upon.

2. The Sanitary Board having been asked in 1895 to report on the scheme for providing Coonoor with a water-supply, stated that the scheme was undesirable unless considerably extended at greatly enhanced cost and suggested an alternative scheme and the provision of Rs. 1,000 by the Municipal Council for its investigation. This money was supplied in 1895, the surveys were undertaken in 1896, and designs and estimates for the scheme were then begun and these are now completed and forwarded.

3. A reference to the Sanitary Board's resolution of the 5th September 1895 shows that, while the source of the scheme proposed in 1891 was a safer source than the Arvenghat valley * source suggested by the Sanitary Commissioner, many additional works would have to be undertaken to make it a pure and suitable source of supply for Coonoor and that it would be desirable to consider whether a supply could not be obtained at very little greater expense from the stream which now feeds the Wellington Cantonment.

* This is a misleading statement, *vide* my note attached. (Signed) W. G. KING.

4. This scheme has been investigated and it is the scheme which is now put forward for adoption, because from a comparative statement attached to this report it will be observed that after the scheme of 1891 has been modified and added to has suggested in the Sanitary Board's resolution No. 2537 of 5th September 1895, the excess cost of the scheme now suggested is only Rs. 4,000. The revision of the Yedapalli scheme (including as it does additions to meet the cost of reserving land, fencing, stoneware piping through the tea estates and improvements to the existing channel with other increases due to a covered instead of an open reservoir, to cost of pipes and extra pipes to bring it in line with scheme now proposed) increases the estimate of 1891 from Rs. 80,000 to Rs. 1,09,800 as against Rs. 1,13,800 for the scheme now proposed.

5. There is no comparison between the one scheme and the other either in the purity of the source, the manner in which the water is conveyed or the area it commands; the new scheme is entirely superior in all these respects.

6. The last sheet, No. 8, in the portfolio of plans forwarded herewith shows the scheme of 1891 from its source up to the point where the pipe entered the town close to Sims Park and shows the length where the open channel would have to be piped, the land to be acquired around the springs, &c., and the drainage channel required to divert the drainage of Yedapalli village from the head of the supply. It has not been possible to estimate the cost of stopping Badaga cultivation along the supply stream; this would be a considerable amount and [illegible]ng that without the cost of diverting the stream from Elk Hill House (which would also reduce the supply) the estimates are so nearly on a par, the cost of this has not been estimated nor included. It is thought, however, that even apart from financial considerations, the great superiority of the one scheme over the other—a closed supply against an open unprotected one—cannot but recommend it to Government and the Council. No further comparison need therefore be instituted and it therefore but remains to describe the scheme now suggested for adoption.

7. It will be observed that, in Sanitary Board's resolution No. 2537 of 5th September 1895, while the suggestion was to obtain the supply for Coonoor from the same stream from which Wellington is supplied, it was noted that the Wellington channel was not received from a pure source, but that the conditions of the area of collection could be improved and rendered safe at small cost. The stream which passes down the Kóttagiri road valley is formed by the junction of two other streams, the Wellington supply above alluded to is taken from the branch entering the stream on the right bank and it is around the source of this branch that the area requires improvement. The source of the scheme proposed for Coonoor is the valley from which the branch entering the main stream on its left bank flows, and this valley is perfectly free from habitations of all descriptions and is probably one of the clearest valleys around Coonoor. The land consists chiefly of grass lands with some few topes and the only objection to the area is that the Wellington-Kóttagiri road passes through it, but even this is for a very short distance only and the road is so steep curving sharply round the hill that the chance of any drainage going into the stream above the point of offtake is extremely small and not worth consideration especially as the traffic is exceedingly limited.

8. The point of offtake, it will be observed, is placed above one of the feeders of the branch. This has been done because it has been found desirable to place here a small masonry dam to allow the offtake pipe to be always under water and because the valley very rapidly opens out below the place chosen for such dam. The site has also been selected in view of the fact that some day it may become necessary to erect a dam of some height to store water to provide against the diminished stream supply in the spring months. This at present is by no means necessary, and as the present scheme will supply the increased population of Coonoor with 20 gallons a head, while the stream sends down double that quantity, it will be many years before such a contingency will require to be considered. This opportunity may, however, be taken to state that, while the annual supply required for Coonoor at 20 gallons per head for 7,500 people is 8,760,000 cubic feet, a dam at this point would retain—

	Cubic feet.	Supply.
If 50 feet high	7,900,000 =	10 months.
If 40 „	4,450,000 =	6 „
If 30 „	2,276,000 =	3 „
If 20 „	816,750 =	$1\frac{1}{11}$ „

and the dam in no case would be of any great length. No such work is however for the present proposed nor is there any necessity for it.

9. The population of Coonoor at the last census was 6,049. The works as designed are for a supply of 7,500 people with 20 gallons per head per diem half delivered in six hours; this equals a supply of 15 gallons per head for 10,000 people half delivered in six hours. The gradients in Coonoor are so steep that whether the supply is 15 or 20 gallons a head makes very little difference in the size of the pipes which are all of comparatively small diameter.

10. At the point of offtake it is proposed to construct a small dam 5 feet 7½ inches in height (*vide* sheet No. 2 of the plans). The top level of this dam will be coincident with the present maximum flood level; this dam is merely to keep the top of the 4-inch supply pipe to the service reservoir at an always sufficient depth below water.

11. The greatest rainfall registered at Wellington has been 4·90 inches in 24 hours. The discharge over the dam with this fall and from a drainage area, calculated at three-tenths of a square mile, taking the co-efficient of 675 by Ryves' formula, works out thus :—

$$D = C\sqrt[3]{M^2}$$

$$D = 675\sqrt[3]{\cdot 09}$$

$$D = 675 \times \cdot 448$$

$$D = 302 \text{ C. ft. per second.}$$

and the length required for the dam (2 feet flowing over) would be—

$$L = \tfrac{2}{7} \times \frac{D}{d\sqrt{d}}$$

$$L = \tfrac{2}{7} \times \frac{302}{2\sqrt{2}} = \frac{604}{19{\cdot}01} = \text{say 30 feet.}$$

The dam has a level length of 29 feet 6 inches but has wings rising at the sides each 13 feet 6 inches in length and is therefore of ample length.

12. Another calculation has, however, been made from the data of the existing flood sectional area and the slope of the stream. This works out as follows :—

The area is 76·27 square feet.

$$\text{H.M.D.} = \frac{76{\cdot}27}{33{\cdot}75} = 2{\cdot}26$$

Slope of stream = 1 in 48.

$$V = C\sqrt{rs}$$

$$\text{and } C = \frac{1}{\sqrt{\cdot 00008534\ \frac{(2{\cdot}26 + 4{\cdot}1)}{2{\cdot}26}}}$$

$$= \frac{1}{\sqrt{\cdot 0002401604144}} = \frac{1}{\cdot 0154971} = 64{\cdot}52$$

Therefore

$$V = 64{\cdot}52\sqrt{\cdot 047008}$$
$$= 64{\cdot}52 \times \cdot 217$$
$$= 14 \text{ feet per second}$$

and the discharge would be 76·27 × 14 = 1067·78, say 1,068 feet per second, and this discharge works out to a depth of 3·6 feet flowing over an anicut 29 feet 6 inches in length, but as the sides of the anicut extend 13 feet 6 inches on either side and the ends are 4 feet higher than the centre, there is ample length to take even this discharge. It is evident that the co-efficient adopted by Ryves for limited areas near hills is in this instance much too small.

13. A discharge of 1,068 feet per second would from an area of three-tenths of a square mile represent a fall of—

$$\tfrac{X}{12} \times 5{,}280 \times 5{,}280 \times \tfrac{X}{12} = 1{,}068 \times 60 \times 60$$

X = 6 inches per hour, which is a very large amount.

A discharge of 4·9 inches in 24 hours from the same area equals only 40 feet per second.

14. The minimum flow of the stream is sufficient to supply the quantity required for Coonoor.

15. An experimental weir was erected at the site of the proposed dam in the beginning of February last and the lowest gauging received since that day and these are the dry months of the year (January to April) shows the discharge to be ¾ inch over a weir 7 feet in length with a velocity of approach equal to 160 feet a minute or 2⅔ feet per second. For the purpose of determining the flow the average velocity of approach has been taken at 2⅔ × ⅔ or ⁸⁄₉ feet per second and the discharge works out to 0·67505 cubic feet per second or daily.

0·67505 × 60 × 60 × 24 hours × 6¼ gallons = 364, 588 gallons daily, while as before known a population of 7,500 drawing 20 gallons per head will be only 150,000 gallons per diem. The quantity required will be during parts of the day double this, but the fluctuation is provided for by the service reservoir.

16. The dam is furnished with a scour pipe with valve which must be opened occasionally to clear any silting occurring at the back of the dam, the stream having a heavy grade of 1 in 48 at this point. A section of the stream above the dam is shown on sheet No. 3 of the drawings.

17. The water is taken from the front of the dam by a 3-inch pipe which passes round or rather through the extended wall of the dam and after passing through a sluice valve enters a chamber in which an equilibrium valve is placed (*vide* sheet No. 2). The object of this valve is to prevent the pipe between this point and the service reservoir ever flowing more than full or with pressure. The fall between the point of offtake and the reservoir is, in a distance of 5,800 feet, no less than 327 feet or a grade of 1 in 18, and the discharge of a 3-inch pipe flowing only full is 120 gallons per minute, while the supply required is 104 per minute, but the discharge must be regulated to the supply required by the sluice valve above the break pressure tank. Two overflows from this 3-inch cast-iron pipe are also provided for, one at about half the distance and the other just before the junction with the reservoir. This 3-inch pipe will be laid along the steep side of the hill which forms one side of the valley of the stream in the Wellington-Kóttagiri road valley and the pipe line has been so located that a fairly regular grade has been secured, though the line naturally winds round the various spurs in its course. Sufficient bends have been provided so that there should be little difficulty in laying this pipe.

18. In the original scheme the reservoir, as designed, was an open one. In this scheme, as the water is brought from its source in a closed pipe, the reservoir is a covered one. It has been placed on an open piece of land near the old Wellington-Kóttagiri road (*viâ* Bleak House) which gives facility for cartage of materials and erection, but its site has been determined chiefly of course with reference to the head required to supply the higher portions of Coonoor, and bearing this in view it has been placed as near Coonoor as possible. The nearer the service reservoir could be placed to Coonoor the less would be the cost of the main distributing piping because mains between the town and the service reservoir have to be proportioned to carry double the average, while those on the other side of the reservoir require to be of such dimensions as will carry the average demand only. It might have been placed further from the town and at a higher level, but this would have, while giving an increased grade and perhaps a very slightly reduced size of main, increased the length of the main and also the pressure on it; as this is already 300 feet in parts (crossing the Wellington race-course valley), I did not consider it an advisable alteration. It could have been placed very slightly lower and a little nearer the town, but this would have prevented the extension of the supply to some houses on the Coonoor Bleak House road which the Chairman considered it desirable should be included. Taking all circumstances into consideration, it is probably in the best situation for all purposes.

19. There is nothing novel in the construction of the reservoir itself except that in addition to being furnished with self-closing equilibrium inlet valves, it is also furnished with floating drainers which will take off the clearest water always. The reservoir is divided into two compartments and will contain 51,538 cubic feet or 322,112 gallons which is more than two days' supply.

20. The main from the reservoir passes directly down to the Wellington course and proceeds along the western side of that course until it meets the stream near the Victoria Bridge; thence it ascends the hill and meets the "Figure of Eight" road close to the McIvor Villa. At this point it branches into two, the eastern branch passing round the Sims Park with a branch of Stillbrook and following the "Figure of Eight" road to the library, taking in then both portions of the "Figure of Eight" road *via* Glenview Hotel, &c., the western branch passing between Bleak Heath and the new club, and thence *viâ* the Government reserve and Annalore Cottage to the hospital and through the main streets of the town. Thus the distribution portion of the scheme with the exception of minor details and the extension to Stillbrook is the same as in the former scheme, the plans for which have been before the Coonoor Municipal Council.

21. At two points as shown on the hydraulic section, two reducing pressure valves will be put in to bring down the pressure after crossing the summit levels to a reasonable amount. One minor detail altered is the substitution of Tylor's waste not taps for the Glenfield pattern of taps formerly provided; the former while they are more efficient for high pressures cost less than the latter pattern and are more economical as they close after a certain supply (2 to 3 gallons) and have to be again opened if more water is wanted.

22. The pipes estimated are for class A pipes suitable in their thickness for the high pressures in this scheme.

4. The works are designed for a supply of 7,500 * people with 20 gallons per head per diem, half delivered in six hours. This equals a supply of 15 gallons per head for 10,000 people, half delivered in six hours.

* The last census shows the population of Coonoor to be 6,049.

5. The following is an abstract of the estimate which amounts to Rupees 1,13,800 :—

	Rs.
Constructing a dam across stream	1,170
Piping from dam to service reservoir	5,830
Laying and jointing pipes for service reservoir	2,740
Constructing service reservoir	27,300
Supply and delivery of pipes, &c.	56,200
Laying and jointing pipes, erecting fountains, &c.	15,100
Tools and plant and contingencies	5,460
Total ...	1,13,800

6. The annual charges are estimated as follows :—

Interest and Sinking fund	3,290
Maintenance charges	2,500
Total ..	5,790

7. The Sanitary Board is of opinion that the project is a good one, and resolves to recommend it for the sanction of Government.

(True Extract.)

(Signed) R. PARSONS,
Secretary, Sanitary Board.

Order—Mis. No. 2811 M., dated 16th December 1897.

The plans and estimates will be forwarded to the Municipal Council of Coonoor for remarks and for report, as to how it proposes to finance the scheme, on the understanding that Government will be prepared to advance the required amount at $4\frac{1}{4}$ per cent. interest repayable in twenty years. The Government regrets that, in the present state of the finances, it cannot make any grant from Provincial funds towards the cost of this scheme, nor can it hold out a promise that any portion of the loan will be paid in the current or ensuing years. The Municipal Council should therefore consider whether, instead of delaying the scheme, it would not be better to borrow in the open market. A loan could, in all probability, be raised at $4\frac{1}{2}$ per cent. without difficulty, provided its currency was put at thirty years.

2. In the meantime, the Sanitary Board is requested to obtain and send to the Chemical Examiner for analysis a specimen of the water from the proposed source of supply and report the result to Government.

(True Extract.)

(Signed) H. TREMENHEERE,
Ag. Secretary to Government.

To the Chairman, Municipal Council, Coonoor
(through the Collector of the Nilgiris).
„ Sanitary Board.

READ—also the following papers :—

From A. BUTTERWORTH, Esq., I.C.S., Acting Collector of the Nilgiris, to the Secretary to Government, Local and Municipal Department, dated 22nd December 1898, B. & G. No. 1247.

I have the honour to address Government in regard to the improvement of the water-supply of Coonoor Municipality—a matter which has been long under discussion and which, in the opinion of the Municipal Council, the residents of Coonoor and myself, demands early settlement.

2. The first correspondence on the subject to which I invite attention is the Sanitary Engineer's report embodied in G.O., No. 2199 M., dated 11th December 1891. It will be observed that Mr. Jones, after first describing the sources whence Coonoor derives its water-supply, expressed an opinion that the best source is the Aravenghat river, but that the cost of supplying Coonoor from this source would be beyond the means of the municipality.

He then went on to consider the Yeddapalli stream, which is now the main source of supply to the town, and came to the conclusion that it could be so improved as to render it a safe and sufficient source. The Sanitary Engineer roughly estimated the cost of the improvements, which would be required, at Rs. 80,000. Mr. Jones' scheme was referred to the Chief Engineer who raised questions as to the correctness of Mr. Jones' calculations regarding the quantity of water available, but, after considering the Sanitary Engineer's reply, expressed his approval of the scheme.

Government also approved it, offered to advance the money at $4\frac{1}{2}$ per cent. and directed the Chairman to report how the Municipal Council proposed to raise the sum of Rs. 4,768 required to meet the annual payment due on the loan.

3. The Chairman's report is contained in his letter, dated 27th February 1892, No. 511, from which it will be seen that the Council, while recognizing the expediency of improving the water-supply, demurred to providing the requisite funds by means of enhanced taxation.

Thereupon Government, observing that the Council was then carrying out a drainage scheme, stated that it would allow the water-supply scheme to be deferred (G.O., No. 719 M., dated 21st April 1892).

4. The matter seems to have dropped after that until, in paragraph 4 (5) of G.O., No. 861 M., dated 6th July 1894, Government directed the Council to reconsider the question of the water-supply.

The Chairman's reply is to be found in his letter, dated 6th October 1894, No. 200. It will be seen that the Council merely referred Government to its previous resolution and asserted that it could not find the money.

5. In October 1894, the Sanitary Commissioner inspected Coonoor and his remarks upon the water-supply will be found in paragraph 4 of his report read in G.O., No. 800 M., dated 6th May 1895. Dr. King considered that, as the Yeddapalli supply was liable to contamination at various points, it would be expedient to investigate the Aravenghat river as a source of supply.

In forwarding this report, the Chairman observed that the Council would, as funds permitted, pipe the existing water-supply channels—a promise which has not been fulfilled. So far as concerned the subject of water-supply, Government merely recorded these papers, the matter being under discussion separately.

6. In a letter, dated 8th March 1895, No. 252, the Collector addressed Government regarding the same subject.

Mr. Rees expressed the opinion that the piping of the Yeddapalli channel in certain places is a matter of most urgent necessity and that it should be disposed of before the small Vannarpet and Ottupatrai channels are taken in hand. He observed that he was in favour of raising the water-tax in order to provide funds and suggested that the Sanitary Engineer should be called on to estimate the cost of piping the Yeddapalli and Vannarpet channels at the places where they are most exposed to contamination.

3. I propose, therefore, at the suggestion of Mr. Rhodes James, that the Council should now devote itself to the gradual and methodical improvement of our existing supplies. A careful examination of the Yeddapalli channel has satisfied me that the supply is at present exposed to serious risk of pollution in the following localities only, namely :—

(1) at the head of the main stream ;
(2) along the course of the eastern stream until it turns southwards in G 84 ;
(3) in Springfield tea estate ;
(4) in E 80C and E 53A where houses are being built ; and
(5) from the neighbourhood of Mr. Rhodes James' present residence into the town (in this last locality the supply channel actually receives a street drain into it).

4. In all the above localities the risk of pollution is not equally great, unquestionably it is greatest in the last two and to these the attention of the Council should, in my opinion, be first directed. My first suggestion, therefore, is that an effort should now be made to set aside sufficient funds to provide for the piping of the supply in the last two localities.

5. The next step to be taken would be to acquire all the catchment area of the main stream close to Yeddapalli village. Unfortunately the village itself is in part situated within this area, but I do not think there would be appreciable risk of contamination if the land taken up extended to the edge of the village and elsewhere to the crest of the watershed. Ultimately this portion could be fenced but outlay on fencing might be deferred.

I understand (I have no means handy for ascertaining definitely) that extension of cultivation in the catchment of the head waters has been prohibited, but the land should be taken up with the object of abolishing the cultivation now existing. I fancy that the cost of compensation for the land required at the head waters would be a comparatively small sum.

6. The next step would be to acquire a suitable margin for the eastern stream which runs through fields G 46, 48, 51, 84, &c., to fence it so as to prevent access from the road and to remove the blue gums which are carrying off a part of its water. In this case, too, the cost of compensation would probably be very small.

7. These matters being settled, the tea estate might be attended to. The whole of the channel should, I think, be piped in this area. Two streams flow into the channel through the estate from the east and of these the northernmost gives a supply of clear water too large to be neglected. Where they pass through the estate they should be piped but above, in the wood and hills beyond, they can, for the present, be left as open channels.

8. The above improvements having been effected, the Yeddapalli channel might fairly be pronounced to be free from appreciable risk of pollution. Ultimately it may be expedient to pipe the channel along its whole course, but the forest reserves afford great protection to the supply and such action is not called for at present.

9. There remain three other points to notice—

(1) The first is an improvement at the junction of the easternstream in "blackhouse block" with the supply channel. The natural course of this stream is to the west and south but it has been diverted into the supply channel and, after heavy rain, the risk of water down the eastern stream is said to often breach the bank of the channel. At this point then a small sluice seems to be necessary, and it is also desirable that the bed of the channel at the point where the eastern stream joins it should be paved and a low wall (perhaps a foot high) erected between the channel and the old course of the eastern stream so as to prevent escape of water.

(2) A much more important matter is a proposal to which Mr. Rhodes James drew my attention, that a dam should be erected on the main stream close to Yeddapalli. At the point selected the stream runs through a narrow gap in the hills and it is thought that a small dam thrown across and provided with a sluice would render possible the regulation of the supply of water in case of scarcity. This is a matter which can be deferred, but, should it be found that the supply is insufficient at any time, the consideration of this proposal will be expedient.

As an alternative, the point where the channel and the eastern stream meet might be found suitable for a reservoir.

(3) Another suggestion made by Mr. Rhodes James is that, instead of piping the channel round Walker's Hill, the ridge near field No. E 53A should be tunnelled and the channel conducted across the neck of the great bend round the hill. When the question of piping this bend is taken up it will have to be considered whether this straight cut will not be the cheaper and better route. At present it will suffice to mention the matter.

10. A few words concerning the *Vannarpet supply channel* may not be out of place. Near the take-off of this channel there has been a little earthenware piping laid down. At this spot is a collection of huts and I think it is unfortunate that a part of the channel has been left open here for use by the cottagers. In the opinion of the District Medical Officer and myself this bit should be completely piped and a tap provided for the cottagers. To allow of such a tap being made iron pipes will have to be either substituted for the earthernware pipes, or laid on in connection with them. Farther down the channel there are stretches which are open to all sorts of defilement and which ought to be piped without delay.

11. The condition of the *market* is not, I think you will agree, quite satisfactory. It is very dirty and in parts dilapidated and at a small cost could be improved considerably in appearance. A necessary but more expensive improvement is the flagging of the ground which in wet weather is slushy and disagreeable. The flagging could be carried out by degrees.

12. I have made the above observations in the hope that by some means money may be found in the present and future years to carry out little by little the various improvements indicated. Large schemes are beyond our resources but much might be done by persistent attention extending over four or five years without throwing the municipality into debt.

No. 64.

Referred to the Sanitary Board for remarks.

(Signed) H. TREMENHEERE,
Secretary to Government.

FORT ST. GEORGE,
24th January 1899.

Endt. No. 48-S.

Referred to the Sanitary Commissioner and the Sanitary Engineer who are requested to be so good as to favour the Sanitary Board with their views on the present proposals.

(By order.)

(Signed) R. PARSONS,
Secretary, Sanitary Board.

11th February 1899.

Proceedings of the Sanitary Board, No. 457-S., dated 2nd September 1899.

Read—the following papers :—

Note by Lieutenant-Colonel W. G. KING, M.B., I.M.S., C.I.E., Sanitary Commissioner for Madras, to the Secretary, Sanitary Board (through the Sanitary Engineer to Government), dated 26th February 1898, No. 680-S.

[*Reference.*—Endorsement by the Sanitary Board, No. 48-S., dated 11th February 1899, referring for remarks proposals for the improvement of the water-supply of Coonoor.]

The policy laid down by the Collector is one that would find many advocates in any ordinary Municipal Councils, but it is, nevertheless, unsound. No estimates have reached me showing what the cost of proposals is, but if worked out *fully*, I do not see that they are likely to cost a whit less than the scheme originally designed by the Sanitary Engineer known as the Yeddapalle scheme—if it is, in the end, to serve the only justifiable reason for expenditure, namely, sanitary protection. The Collector's position is that the water *plus* known sources of defilement is "usable" as judged by the chemical analysis ; but at this point he falls into an error in thinking that a "usable" water is good. This classification of a water may imply one that merely escapes being classed as absolutely "bad," and is in any case of mediocre quality—not good. But in such a case the pronouncement of the chemist is out of place, and is of little use in guiding a decision, beyond the dietetic value of the water. The Collector's own full evidence of possible means of contamination from inhabited areas, as gained by a "sanitary survey," is of far more importance. Without adding anything to his description, I would say that, should any of these well-recognized sources of contamination remain, the Coonoor water-supply of the future could not be considered sanitarily safe, and neither the present nor future generations would have any reason to thank him for its acceptance. The "little by little" method of making

improvement is absolutely the worst that can be conceived in this country. It is very taking, because it enables local authorities to shut their eyes to facts for a certain period, after the style of the proverbial ostrich. But it is as absolutely rotten in practice. Men and their projects disappear with rapidity, to be succeeded by new men and new projects. The Collector of the Nilgiris and the Chairman of the Municipality of Coonoor of to-day having disappeared before one-third of the project is completed, it may be depended upon, in the natural course of events, that the whole expenditure would be regarded as wasted by the new man with the new idea. I hold that it would be an absolute mistake to accept any such tinkering of the nature suggested, *if current funds are to be increased by extra taxation.* I would, therefore, state that whatever has to be done should not be effected by instalments, but by raising a loan and effecting all that can be done within the means of the Municipality. I suggest the following course :—

(1) It should be definitely ascertained whether Government is prepared to exhibit any leniency toward this Municipality, on the ground that (*a*) its finances are very limited, (*b*) that its people already pay much more per head than elsewhere in the Presidency, and (*c*) that the death-rate from preventible diseases—notably dysentery —probably conveyed by water, demands urgent attention.

(2) If Government will not make any concession, it should be ascertained what the full amount is that the Municipality can raise on loan in the open market.

(3) The Sanitary Engineer should then be required to state what work could be fulfilled within the amount so ascertained. In coming to a conclusion on this point, he would understand that the scheme last prepared by him—bringing water from the Wellington side—is very decidedly preferable to Yeddapalle scheme under any circumstance, and that if economy is to be practised, it would be sanitarily safer to allow certain parts of the new scheme to be without piping than the Yeddapalle scheme. Thus a decision could be arrived at based on the best sanitary and economical reasons, under the unusual circumstances.

2. As regards the protection of the supply at Vanarpet, the necessity for action ~~have~~ has been constantly pressed upon the Municipality by this office. This should be capable of ready attention from current funds. The same may be said of the gross pollution going on in the gutter, in which drinking-water passes down to the bazaar. In both cases earthenware pipes might be used in the short lengths concerned. In this connection, I think it must be held in mind that although the Collector, in his paragraph 4, speaks of remedying urgently-required defects, his proposals are by no means of the minor nature I here suggest. What he really means to do, is to adopt the Yeddapalle scheme by successive instalments, without ascertaining what funds can really be raised, and whether, if forced to adopt a scheme by instalments, it could not with equal financial economy and better sanitary results be applied to the Wellington scheme.

Office-note from J. A. JONES, Esq., Sanitary Engineer to Government, to the Secretary, Sanitary Board, dated Madras, 13th March 1899, No. 298.

[*Reference.*—Endorsement by the Sanitary Board, No. 48-S., dated 11th February 1899, referring for remarks certain proposals for the improvement of the water-supply of Coonoor.]

The undersigned fully concurs in the views expressed by the Sanitary Commissioner with regard to Mr. Butterworth's proposals for the improvement of the water-supply of Coonoor. The policy proposed to be pursued in respect to the improvement of the water-supply is one that will undoubtedly end as the Sanitary Commissioner supposes, and there can be no guarantee that this little by little system will ever be carried to its legitimate conclusion.

2. The Yeddapalle stream, which is now the main source of supply to the town, and the channel that conveys the water from the stream to the town are admittedly open to contamination.

3. In a comparative statement attached to the report on the Wellington stream scheme (*vide* Sanitary Engineer's letter to the Sanitary Board, No. 792, dated 29th April 1887), the cost is given of works considered necessary for the prevention or removal of the sources of contamination which the supply is liable to. These works are —

	Rs.
1. Channel to divert the drainage of the village of Yeddapalle from the stream at its head	720
2. Compensation for land	2,400
3. Removal of village	900
4. Fencing land acquired	2,000
5. Piping the channel where it is liable to receive the drainage from tea-estates	7,000
6. Improving the existing channel	400
Total	13,420

Mr. Butterworth's present proposals practically amount to carrying out the above enumerated works with the exception of Nos. 3 and 4. He considers the fencing of the land not quite necessary and the removal of the village not essential. Omitting these two items, his proposals, if carried out, will cost Rs. 10,520, which is very nearly the sum Mr. Butterworth himself mentions in his letter.

4. Even if the improvements above indicated were carried out, the town supply will not be improved to any appreciable extent. The supply is infinitely more liable to contamination after it enters the town than it is during its passage to the town along the supply channel to which the above improvements relate, and unless the whole supply is piped throughout the town and unless the grosser impurities which it receives after its entering into the town are also eliminated, the improvements to the supply channel above the town will produce no appreciable improvements in the purity of the supply given to the consumer.

5. Mr. Butterworth states in his letter, No. 1247, dated 22nd December 1898, paragraph 11, that an increase of water and drainage tax from $2\frac{1}{2}$, which is what is now levied, to 5 per cent. will yield an enhanced income of nearly Rs. 4,500. Instead of spending this amount year after year in ineffective puny improvements on an insanitary supply, it would be far wiser to raise a loan, the interest and sinking fund of which would be covered by the amount of Rs. 4,500.

6. The undersigned considers that for a sum of Rs. 70,600 a very substantial portion of the Wellington stream scheme can be carried out, by omitting certain works the execution of which is not quite essential just at present, and which could be carried out whenever funds permit in future. The works referred to are (1) the service reservoir, (2) certain branch pipe-lines.

7. The object of a service reservoir is, first, to provide for the excess of maximum demand over the average, and, secondly, to hold a reserve in case of an accident to the supply pipe. As regards the first, it is not likely that the maximum supply as provided in the scheme will be demanded for many years to come, because the scheme provides for a population 25 per cent. in excess of the present population at 20 gallons per head per diem, and the supply pipe as designed is capable of delivering even in excess of this. The supply pipe above the reservoir is capable of delivering 120 gallons per minute, which without the adjunct of a reservoir, is equal to an average supply of 60 gallons per minute or 86,400 gallons per day. This will give a little less than 14 gallons per head per diem for the present population of Coonoor, which may be considered a fairly ample supply for the present. As regards the second object to be served by a reservoir, it is considered that its absence will not inconvenience the supply to any serious extent, as the supply pipe is only a little more than a mile long and being only 3 inches in size any break in the pipe can be readily detected and repaired in a few hours. For these reasons the construction of the reservoir may be deferred for some years. The omission of the reservoir will reduce the estimate by Rs. 28,600.

(5) The Board recommends that, in the interval between now and the commencement of work—

(*a*) The water should be analysed.

(*b*) The flow of water should be again gauged daily for a period of not less than three months by means of a pipe discharging into a measure of known capacity.

(*c*) The levels of the service reservoir, Still Brook, Cairnsfort and other high parts of Coonoor be again carefully checked to insure that the former is placed sufficiently high to deliver water under pressure everywhere.

(True Extract.)

(Signed) R. PARSONS,
Secretary, Sanitary Board.

To the Secretary to Government, Local and Municipal Department.
" Sanitary Commissioner.
" " Engineer.
" Chairman, Municipal Council, Coonoor.

Proceedings of the Sanitary Board, No. 513-S, dated 23rd September 1899.

Resolution—No. 513-S, dated 23rd September 1899.

In continuation of the Proceedings read above, the Board begs to recommend that the diversion of the public road, which now passes through the area upon which the Wellington valley scheme depends, be estimated for and carried out, if funds permit. This work is not, however, in the opinion of the Board, very pressing.

(True Extract.)

(Signed) R. PARSONS,
Secretary, Sanitary Board.

To the Secretary to Government, Local and Municipal Department.
" Sanitary Commissioner.

Reference.

A copy of the Sanitary Board's Proceedings is forwarded to the Collector, Nilgiris, with a request that he will be good enough to report at once if he concurs with the views of the Sanitary Board.

27*th September* 1899. (Signed) M. HAMMICK,
Ag. Secretary to Government.

From C. J. WEIR, I.C.S., Collector of the Nilgiris, to the Secretary to Government, Local and Municipal Department, dated 28th September 1899, R. Dis. No. 708.

With reference to your memorandum of the 27th instant, I have the honour to state that having had the advantage of going over the ground with the members of the Sanitary Board, and having fully discussed the matter with the Sanitary Commissioner and Engineer, I am in complete accord with the suggestions of the Sanitary Board.

Order—No. 1640 M., dated 6th November 1899.

The Collector's proposal that the Municipal Council of Coonoor should be permitted to abandon the consideration of the schemes for the water-supply of the town and to restrict its action to the gradual improvements of the existing supply cannot be approved, as both the Sanitary Commissioner and the Sanitary Engineer doubt its economy and question its soundness from a sanitary point of view. Nor does the Government consider the Yeddapalle scheme suitable, as the channel from which the supply is to be drawn is subject to constant contamination at its source and along its banks. The Wellington valley scheme, which is recommended by the Sanitary Board, will, as modified in paragraph 4 (2) of its Resolution No. 457-S, dated 2nd September 1899, be now approved, and the Public Works Department is requested to take the work on hand as soon as possible.

2. The cost of the scheme, as revised by the Sanitary Board, is estimated at Rs. 99,200, or roughly, one lakh. The Government will make a grant of a moiety of this amount, viz., Rs. 50,000, and the Accountant-General is requested to place this sum at the disposal of the Municipal Council out of the allotment of Rs. 54,500 provided for the Bezwada water-supply scheme in the estimate of Provincial grants for the current year. The Municipal Council should raise the balance of the required funds by a loan in the open market. The annual payment towards interest and sinking fund on account of this loan, which the Government considers can be raised at 5 per cent. interest repayable in fifty years, will be Rs. 2,943, while the working charges of the scheme are estimated at Rs. 2,500 per annum. Thus the total annual expenditure, in connection with the scheme, will be Rs. 5,443; but taking credit for the revenue from the tax on servants, which in 1898–99 yielded Rs. 1,094, as available for this purpose, the balance which the Council has to find is Rs. 4,349. The levy of an extra $2\frac{1}{2}$ per cent. of the water and drainage tax will, in the opinion of Government, be sufficient to raise this sum.

3. The recommendations made by the Sanitary Board in paragraph 5 of its first resolution read above are approved.

4. The attention of the Municipal Council is drawn to the remarks in the Sanitary Board's Resolution No. 513-S, dated 23rd September 1899.

(True Extract.)

M. HAMMICK,
Ag. Secretary to Government.

To the Chairman, Municipal Council, Coonoor.
" Collector of the Nilgiris.
" Sanitary Board.
" Accountant-General.
" Public Works Department.

Exd. C. M. Thumbuswamy.

...Local & Munl. (1899) Department.

CURRENT No. 2393 M

From
The Secretary, Sanitary Board

...rder

No. 4575.

Dated 2nd Sept 99

Received } 6th
Registered }

Enclosures 9 - Plans returned to the Sanitary Engineer vide regn No 6386 of 5-12-99 on the 5/12/99

Spare copies

SUBJECT.

Forwarding the resolution of the Sanitary Board on the question of the water supply of Coonoor.

63

19/9

BACK PAPERS

G.O.	No.	Department.	Date.

FURTHER PAPERS

G.O.	No.	Department.	Date.

Ref.

A copy of the Sanitary Board's proc
is forwarded to the Col. Surgeon with
a request that he will be good enou
to report at once if he concurs
the views of the Sanitary Bd.

27. 1x. 99

To

The Collector of the Philippines

Despt'd.
27/9.

[L & M. 500—4-3-99.]

LOCAL AND MUNICIPAL DEPARTMENT.

Info 1640 M
6/11/99

NOTE FOR THE Hon'ble Mr. Winterbotham & His Excellency the Gov:

The papers on the Coonoor Water Supply scheme are submitted for orders please see Flag Y, for note & the Hon'ble Mr Arundel's remarks.

A.E.H.
16.10.99

The required money can be spared from the allotment for the Baywada - Water Supply scheme

[signature]
11.x.99

L. & M.
50—19-12-98.

LOCAL AND MUNICIPAL DEPARTMENT.

Papers to be read in proceedings:—

Again G.O., No. 28-vm. dated 16th Dec. 1897.
Again G.O, No. 1417 dated 22nd Dec-98. 189 Cor. Nilgiris
Current No. 2393. of 1899, dated 2-Sep/99. , from Sant. Bd.
" " " 189 , " , "
" " " 189 , " , "

Coonoor Water Supply

Hm.

To Finance. U. O. with reference to the Ist Sec. remarks.

Hm
26.IX.99

CHIEF SECRETARIAT
27 SEP. 1899
OOTACAMUND.

U. O. Fin. No 210 d/27-9-99

St. am

Bl. accordingly?

Fm ORDERS.

It is submitted that the recommendation made by the Sanitary Bd in paras. 4 & 5 of its Proc. read above may be approved.

2. The G.O. No 28 M. d. 16. Dec 97 the Govt stated that it would be prepared to advance the required amount at 4½ p.c. interest repayable in twenty years, that in the then state of its finances it could not make any grant from Pro. Funds towards the cost of the scheme. It asked the Council to consider whether, instead of delaying the scheme, it would not be better to borrow the required amount in the open market.

In the Budget Estimate of Prov. Loans & advances for the current year however provision has been made for a loan of Rs 50,000 on account

2

the Coonoor water supply scheme and if it is decided to give grant necessary provision can be made in Budget Estimates for 1900–1901.

The scheme to commence will cost about one lakh.

The annual cost will be about R2500.

The present water supply of Coonoor is abominable — the stream in which is almost a latrine and it passes through estates and behind cooly lines for great part of its course. Coonoor is increasing fast & we were told that if only a good water supply were secured, much land available for building would be taken up.

Taking the initial cost as one lakh, & the annual maintenance charges at R2500, if the Municipality is to borrow the whole of the required funds & Government undertakes to advance the sum from Prov. Loans & Advances, repayable in 20 years with 4 p.c. interest, the annual payment required for the liquidation of the loan will be R7360 — viz

3360

3

$\frac{2.19123}{29.778081} \times 100,000$ The total annual expenditure on account of the scheme will then be R2500 + 7360 or Rs 9860 —

If the Municipality have to borrow the whole in the open market at 6 p.c. the interest & sinking fund at 20 years will amount to R8718

$\frac{7.207135}{36.785584} \times 100000 = 8718$

The total annual cost will then be

R8718 + 2500 = R11,218

At 50 years the expenditure would be R6345 + 2500 = 8845

$\frac{18.420154}{290.385586} \times 100000 = 6345$

If, however, Government make a grant from Provl. funds of a moiety of the cost of the scheme & lends the balance on the terms above indicated the cost will be

4% for 20 yrs

$\frac{2.19123}{29.778081} \times 50000 = 3680$

R2500 + 3680 = R6180

A1 In para 8 of the note for orders in G.O. No 2811 d 16 Dec 97. in which the financing of the scheme was discussed, it was pointed out that in order to meet the annual additional expenditure of R8388

which was to be amended at
once, the Council would have to
impose an extra water tax of
4 p.c which would yield an
annual income of R6680, which
with sum together with the anticipated
revenue from the tax on private
annual and domestic consumption
would be enough to pay for the
proposed scheme. It would of
course not be enough to pay for
it, if the Municipality borrowed
on the open market at 6 p.c.
payable in 50 years.

The tax on servants yielded in
1898-99 - a Rev. of Rs 1094 &
taking Credit for this sum as available
for meeting the annual cost of the
Scheme, the Municipal Council
will have to find - if Govt pays
a moiety of the scheme - R6180 - R1090
or R5090. from other sources.
The water and drainage tax is now
levied at the rate of 2½ per cent
on the annual rental value of the

buildings & lands, & the present Council
demand in 1898-99 under the head
was R4578 - The levy of an
extra 2¾ per cent of this tax will
be sufficient to raise the funds
required - if Govt make a grant of
half the estimated cost or ½ a lakh.

But if the Municipality has to
borrow the whole of the lakh from
Government, then an extra
4¾ per cent of the tax will be
necessary in order to meet the
annual cost of the scheme, after
allowing for the Rev. from the tax
on Servants.

Total Cst.	Rs 9860
Rev Servants Tax	R 1090
Balance	8770.

I think that Govt may make
a grant of Rs 50000 if
funds permit, leaving the
M.C. to raise the remaining
Rs 50000 in the open market.
This they can no doubt do at
5 per cent. Refer to
Financial for remarks, and
afterwards circ.
If the foregoing proposal is
adopted, the M.C. must be
informed & invited to take
action. There is nothing on
the file to show that the Collr.

It is submitted that Govt might
as they have done in some other cases
Grant the Municipality ½ the cost as
a grant & tell them to raise the
other half in the open market -
They can hardly afford to raise
the whole sum -

HH 25 iv 5

concurs with the Sanitary Board. I believe he does but he should be asked. This should be done before circ.ⁿ

AA 26.9.99.

This letter is submitted He concurs with the Sanitary Board

[illegible] 10.x.99

I have no objections or remarks to offer

[illegible]
12-10-99

I concur with the Hon. M. Pr[illegible]

A.S.H.
16.10.99

Fiscal Department

Note

I have checked the Calculation in the note below with the tables and found them correct.

I have examined the facts and other figures. They are all correct.

In page 5 of the notes the current demand in 1898-99 under water and drainage tax is stated to be Rs 4578. This figure cannot be checked as the annual report of the Municipal Council does not ~~[illegible]~~ show demand, collection and balance separately. The total amount collected in 1898-99 under that head was Rs 3839. (G.O. 1110 M dated 7th August /99) -

Y

[illegible]
29.8.99

2

Pav 218 C.B.S.

Fc B.I.

Fc E.E. & J.

CHIEF SECRETARIAT
10 OCT. 1899
OOTACAMUND.

Finl U.O. No 2418/10-10-99.

NOTE FOR THE Finance Dept

The grant of R 54.500 provided for in the Estimate of Prov. Grants for the current year for Bezwada Water Supply Scheme - will not be required this year, as the scheme has to be further investigated.

Can this amount be appropriated for the Coonoor Water Supply?

[signature]
9 x 99

Financial Dept

For the C.S.

Subd. that there is no objection to the re-appropriation provided that L. & M. is not likely to exceed its total grant under 45 Civil Works - Civil Officers in the current year.

[signature]
10 x 99

[signature]

[signature]

[F. / 20]
200—4-8-30.

FINANCIAL DEPARTMENT.

U.O. No 210

NOTE FOR THE C.S

The figures have been examined with the Cabes in the office (please see note below). There is no source from which a grant of £50 Cattle can be found at present; unless the £60 under Lighthouse Improvements is appropriated for this purpose, or unless Dr Mc can find the amount from its budget for grants to Municipalities. The former amount PWD has in a file now circulating proposed to re-appropriate from for Civil Works - PWD.

Fairly funds being found this year, the Dr Mc. may be asked to include this amount in the estimate for

* The Comm Allotment (£50) is, it is understood, not to be touched at present
Civil

...rants for next year

Cml
24/2/99

[illegible]

30/5/9

[L. & M.]
250—19-12-98.

Coonoor water supply scheme (Sanitation)

LOCAL AND MUNICIPAL DEPARTMENT.

Papers to be read in proceedings:—

Again G.O., No. dated

Again G.O., No. 2811 M dated 16th December 1899.

Current No. 14 M of 1898, dated 22nd December 1898, from the Collr. of the Nilgiris
" " 2373 M " 1899, " 28th September 1899 " " Sanitary Board
" " 2531 M " 1899, " 23rd " " "
" " 2602 M " 1899, " 28th September 1899 " Collector of the Nilgiris.

Pig ORDER, No. 1676 M 6/11/99

the Public Works Departt for ci...

Vide paras 3 & 4 of the Sanit. Bd's Resoln. flag...

1. The Collector's proposal that the ~~Municipal Council of~~ Coonoor should be permitted to abandon the consideration of ~~[illegible]~~ the schemes for the water supply of the town and to restrict its action ~~[illegible]~~ to the improvement of ~~[illegible]~~ the existing supply ~~by instal-ments~~ cannot be approved, as both the Sanitary Commissioner and the Sanitary Engineer doubt its economy and question its soundness from a sanitary point of view. Nor does the Govt. consider ~~that~~ the Yedlapalle scheme suitable, as the channel from which the suppl... is to be drawn is subject to ~~frequent~~ constant contamination at its source and along its banks. The Wellington Valley scheme, which

is ~~now~~ recommended by the Sanitary Board, will, as modified in para. 4 (2) of its Resolution No. 457 S, dated 2nd September 1899, be ~~now~~ now approved and the Public Works Department is requested to take the work on hand as soon as possible.

2. The Cost of the scheme as revised by the Sanitary Board is estimated at Rs. 99,200, or roughly one lakh. The Government will ~~give~~ make a grant of a moiety of this amount, viz. Rs. 50000, ~~as a grant from~~ and the Accountant General is requested to place this sum at the disposal of the Municipal Council out of the allotment of Rs. 54,500 ~~made~~ provided for the Bezwada Water-supply scheme in the Estimate of Provincial Grants for the Current year. The Municipal Council should raise the balance of the required funds by a loan in the open market. The annual payment towards interest and sinking fund on ~~account~~ account of this loan, which the Government considers can be raised at 5 per cent interest repayable in 50 years, will be Rs. 2,943, while the working charges of the scheme are estimated at Rs. 2500 per annum. Thus the total annual ~~expenditure cost~~ expenditure in connection with the scheme will be Rs. 5,443, but taking credit for the revenue from the tax on Servants, which in 1898-99 yielded ~~a revenue of~~ Rs. 1094, as available for ~~meeting~~ this purpose, the balance which the Council has to find is Rs. 4,349. The levy of an extra 2½ per cent of the water and ~~drainage~~ drainage tax will, ~~it is believed~~ in the opinion of Govt., be sufficient to raise this sum.

3. The recommendations made by the Sanitary Board in para. 5 of its first resolution read above are approved.

4. The attention of the Municipal Council is drawn to the remarks ~~of the~~ in the Sanitary Board's Resolution No. 513 S, dated 23rd September 1899.

(From orders)

V.R.
24/10/99

[signature]
30 & 87

[signature] 1/11/99

Vide para 4(4) of the Resoln. of the Sanitary Board flagged

Note
The revenue from a 2½% of the tax in 1898-99 was Rs. 4578.

Vide G.O. No. 2165 M. 15-12-98. B.1.

Interest		Rs. 2500
Sinking fund (If investment is made in 3% Govt. Securities)	= 50000 / 112.797864	443
	Total	2943

The Collector of the Nilgiris 3/2
The Chairman M.C. Coonoor
" Sanitary Board 1/13
" Accountant General
" Public Works Department 1/1
Sanitary Commissioner /3
Sanitary Engineer /6 Despd. 28/11/99

Recd 27 12/98
Fil JK

ISP

Refer P 971/98 of 26 12 98

Returned to the Chairman, Coonoor Municipal Council. The undersigned has addressed the Government on the subject of the water supply and the Chairman is informed that he need do nothing more.

A. Butterworth.

Collector of the Nilgiris

LSQ
24-12-98.

Secretary ...
Rept & Est ...
Scheme ...
Rs 1,15,800 ...
& Committee ...

...st copy sent to Press. 6-11-99

...ned for signature. 27-11-99

...spatched in print. 28-11-99

Number of copies required: Order complete. 70 / Letter only. / Order complete with Letter.

...cal

...again G.O., 189 2811 Rev dated 16-12-97. — A.
14 M 9/98
2393 — 9/99
2531 —
2602
} — A

...osures to C. No.

Press
Show format please. PR 4/11/99

...der of Government .. .. .. A

...etter of Government.

...ement with ditto.

...s not filled up, being meant for despatch in original.

N.B.—
A = Print in full.
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P = Print abstract only.
Q = Print heading only.