

Revenue (1899) Department.

MISCELLANEOUS SERIES.

G.O., No. 1418

DATED 20th April 99

[Despatch Abstract.]

Coming: to the Bd: of Rev. Procp
of the P. to Dept. stating that the Govt.
does not consider that the reports
forwarded regarding the Tungabudra
Project come within the meaning of
the detailed investigation ordered
in G.O. No. 750 J., d/29 Sept. 1898, and
directing that certain further investi-
gations be made and a detailed estimate
prepared.

BACK PAPERS.

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

FURTHER PAPERS.

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

Revenue (1899) Dept

IRRIGATION.

Government (1899) of Madras. PUBLIC WORKS.

Current No 2328

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Enclosures

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G.O., No. 222 I., 8th March 1899.

G.O. No. 1418. d/ 20th April 99

MARCH.

Communicated to the

Mr. of Rev.

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To the Mr. of Rev. (Mr. & Mrs.)
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Tungabudra Project

Stating that the Government does not consider that the reports forwarded regarding the — come within the meaning of the detailed investigation ordered in G.O., No. 750 I., dated 29th September 1898, and directing that certain further investigations be made and a detailed estimate prepared.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following papers:—

From Lieutenant-Colonel W. L. C. BADDELEY, R.E., Superintending Engineer, III Circle, to the Chief Engineer for Irrigation, dated Bellary, 5th November 1898, No. 2882 I.

In reference to G.O., No. 750 I., dated 29th September 1898, I have the honour to report the result of my reconnoissance of the Tungabhadra river between Hospet and the Mysore frontier.

2. Between the above limits there is only one well-defined site for a large reservoir, viz., at Mallapuram, latitude $15^{\circ} 16'$, longitude $76^{\circ} 23'$. There are some poor, ill-defined sites between the anicut at Valavapur and the portion of the river near Hampasagar, a distance of about 20 miles along the river, the best being that selected by Mr. O'Connell, latitude $15^{\circ} 11'$, longitude $76^{\circ} 17'$. It is by no means a good or a marked site as is obvious from the length of dam, about 4 miles, required to impound a maximum depth of 60 feet of water.

3. The sites referred to in memo. No. III/39 B.L., dated 1st September 1898, of the Chief Engineer for Irrigation are both impossible. At Byalahunshi, latitude $14^{\circ} 57'$, longitude $75^{\circ} 45'$, the hills only approach the river on the north side, and the stream flows through riverine deposit, upon which a high dam could not be built.

At Honnur, latitude $15^{\circ} 2'$, longitude $75^{\circ} 56'$, the rocks belong to the Dharwar system; they are very unequal in hardness, some quite soft; they are full of faults and so bedded that a water-tight dam would be an impossibility. The site is an altogether impracticable one for a high masonry dam.

4. I will now turn to the possible sites. The site chosen by Mr. O'Connell at Valavapur is the best available for the supply of the Bellary plain. The total length of the masonry dam and earth banks would be about 4 miles. The exact lengths of these would have to be settled after detailed investigation. There is no saddle over which the surplus could be discharged. The proposal to pass floods over the dam is, I think, open to objection and it would be better to design the dam like a bridge, and pass both early freshes and floods through the piers. The openings would be closed by Stoney's shutters. The site at Mallapuram is a very doubtful one, as the rocks belong to the Dharwar system. The loss of head at this site is also a great objection if Bellary taluk is to be irrigated, as it means either increased difficulty with the supply channel from the reservoir which must cross the Hampi hills or the sacrifice of some of the storage in the reservoir.

5. Taking all the facts into consideration I am of opinion that if a reservoir is to be made on the river to supply water to the Bellary plain it should be at Valavapur.

6. Mr. O'Connell makes no mention of the compensation required for the villages and lands that the reservoir would submerge. At Valavapur about fifteen villages on the British side, and probably nineteen in Hyderabad territory, would be submerged. About 15,000 acres of most fertile land, upon which very fine dry crops are regularly raised, would be wiped out of the Bellary district alone, and the loss in the Nizam's dominions would be greater.

No money payment would meet the distress that the construction of this reservoir would bring upon thousands of homes.

At Mallapuram eighteen British villages and about sixteen in the Nizam's dominions would be destroyed and the reservoir would cover no less than 62 square miles of most fertile land, including a large area of wet cultivation.

7. I am of opinion that it would be impossible to construct either of these reservoirs without such serious injury to existing and long standing rights, that money compensation would be useless. Further on I shall proceed to show that the benefits that the reservoir would confer upon the Bellary ryots are illusory, while the financial prestige of the Madras irrigation productive works would be seriously injured.

8. Before leaving the subject of reservoirs, I must refer to those proposed to be constructed in Mysore, either on the main streams that unite to form the Tungabhadra or on the large affluent, the Haggari. The construction of these was considered in connection with the Kurnool-Cuddapah canal and five sites were selected—

- (1) Mudduck-Massoor on the Choardy.
- (2) Moodaba on the Toonga.
- (3) Luckawally on the Budra.
- (4) Mauri on the Haggari.
- (5) Bajoli on the Toonga.

The financial failure of the Kurnool-Cuddapah canal (the second or middle section of the original scheme for a great system of canals from Valavapur to Kistnapatam in the Nellore district) led to the abandonment in 1889 of the proposals of the Government of Madras to construct reservoirs at any of the sites above named. I may mention that both Mr. Gordon and General Mullins make no reference to any possible site on the Tungabhadra between the Mysore frontier and Valavapur, though both knew that a reservoir was an essential part of the upper Bellary project. General Mullins refers to the Mudduck-Massoor as the first, the nearest, and in all respects the one most suited to be undertaken.

9. Putting the question of the position of the reservoir on one side, I will now discuss that of supplying water to the Bellary plain by means of a canal from the river. The fall of the river decides that the head of the channel must be somewhere above Valavapur anicut, while the existence of the two great ranges of hills, the Hampi and Sandur, prevents the head of the channel being *very much above* Valavapur anicut, as, if taken too far to the west, both ranges of hills have to be crossed. Mr. Gordon fixed the head of his canal at the proper place at Valavapur, and his line of $66\frac{3}{4}$ miles is the best, if water must be delivered near Bellary town. He was also influenced by the necessity of eventually extending his canal to Sunkesala where it would join the Kurnool canal. These conditions are no longer binding and the enormous cost of his canal probably at present rates 110 lakhs, is a great objection to it. Moreover, I do not believe that it could be kept water-tight, without such charges for construction and maintenance as would swamp all the profits from it. Every one is however agreed that the first 17 miles of Mr. Gordon's line are unobjectionable, and Mr. O'Connell has very properly selected this line for this length, viz., as far as the Kamalapur tank. He has however, I think, under-estimated the cost, which he puts at 5 lakhs. General Mullins puts the cost for the first 17 miles at $20\frac{1}{2}$ lakhs including 2 lakhs for the anicut and head works, and probably after allowing for Mr. O'Connell's reduction in the section of the canal to supply 100,000 instead of 150,000 acres, the cost would be 15 lakhs.

Mr. O'Connell proposes to raise the F.T.L. of Kamalapuram tank from 1,482 + M.S.L. to 1,542 + M.S.L. in order to pass water through the Nellapur saddle by means of a cutting and tunnel. I have examined the Kamalapur tank bund and consider the proposal to raise the F.T.L. by 60' to be a most dangerous one. The other still higher earthen dams proposed to complete the lake are also in my opinion objectionable being very costly and subject to great risk. The formation of this large lake merely for the purpose of raising the water level involves a large waste of water by evaporation. To the rest of Mr. O'Connell's proposals I have no objection to offer.

10. If it is decided that at any cost the Tungabhadra water must be brought on to the Bellary plain, I think Mr. Gordon's line should be adopted as far as the Nellapur saddle, that is to say, for the first 28 miles.

The difficulties in making a water-tight channel from miles 18 to 28 will be enormous, and upon this point there is a consensus of opinion. General Mullins states that the subsoil is as a rule decayed granite rock, and that there is an almost entire absence of soil capable of being formed into a water-tight bank. He also remarks that from experience gained in the similar but less difficult second section of the Kurnool main canal, it would be better to face the difficulty and provide works which, though more expensive, may be expected to be fairly free from leakage. Upon this there can be no two opinions and it will probably be necessary to carry the water through certain lengths by flumes of wood or iron, as the only means of saving leakage. For reasons which I shall give in detail hereafter, the supply of water should be limited to, sufficient for 50,000 acres of rice, say, 500 cusecs—a flume, 20' wide, carrying 6' depth of water will discharge 564 cusecs with a slope of $\frac{1}{2500}$ and a value of .015 for "n" in Kutter's formula.

The question of passing through the Nellapur saddle by a tunnel or cutting is one that cannot be settled without very careful and detailed examination of the hill by means of shafts. Mr. Gordon proposed a cutting with a maximum depth of 105½ feet above the bed level of the canal. The magnitude of this work and the difficulty of maintaining the slopes of the sides are serious matters. At the same time the only alternative is the construction of a tunnel about 2,000 yards long, a most expensive and tedious piece of work. In addition to the tunnel or cutting through the Nellapur saddle, there is a tunnel in the 25th mile some 200 yards in length and very deep cuttings in several miles.

In short, I consider that Mr. Gordon's proposed canal is the only feasible way of bringing the Tungabhadra water on to the Bellary plain, but the cost of the works will be so enormous that the revenue from the lands irrigated will not give any reasonable return in the shape of interest upon capital.

11. There are two questions that require very careful thought before preparing any scheme for supplying water to the Bellary plain.

- (1) Will the Bellary ryots take the water except during periods of scanty rainfall?
- (2) What measure of protection against famine would be afforded by supplying water sufficient for 50,000 acres to the Bellary plain?

The similarity in the conditions between the valley of the Kunderu and the Bellary plain is marked, the soil is similar, the people are similar, both classes of ryots grow and reap good dry crops in ordinary years, and evince no anxiety to extend rice cultivation.

I am convinced that the Bellary ryot would not largely convert his lands into wet, except for sugarcane, the cultivation of which is limited by the supply of manure, and it is usually, I believe, only grown during alternative years, as it is a crop that exhausts the land. The ryots would readily take the water during famine years, to water their dry crops I have no doubt; but considering the enormous cost at which water would have to be brought on to the Bellary plain, this will not, I imagine, meet the views of Government, especially with such an object lesson as the Kurnool-Cuddapah canal in an adjoining district. As regards the second question, I have collected the following facts: out of eight taluks in the Kurnool district, five derive benefit from the canal water; out of the five taluks affected by famine during 1896-97, no less than four are traversed by the Kurnool-Cuddapah canal.

During the great famine of 1876-78 the percentages of population relieved in Bellary and Kurnool during 22 months were—

Bellary, 16.19 per cent. of population of 1871.
Kurnool, 14.19 " " of 1871.

But in Bellary very large numbers of persons from the Nizam's dominions were relieved, thus raising the percentage very considerably. Probably the measure of distress in both districts was the same. During the recent famine of 1896-97 the percentages of persons employed on relief works for the Bellary district and for the four affected taluks in Kurnool that derived benefit from the canal water were—

Bellary, 6.7 per cent. of population of 1891.
Four taluks of Kurnool, 10.7 per cent. of population of 1891.

The area irrigated under the Kurnool canal in that district alone during 1896-97 was 65,618 acres, whereas in the previous year the total area in both Kurnool and Cuddapah was 32,779 acres. During 1876-77 the canal irrigated in Kurnool and Cuddapah 92,276 acres, while during the previous year the area was only 14,763 acres. These figures are very striking, they show that although the canal water was largely used during famine, there was no appreciable protection to the Kurnool district as a whole during the great famine, and during the recent one, the percentage of relief workers in four taluks, partially protected by the canal, was very much higher than the percentage of such persons throughout the Bellary district. The reason is, I think, easy to explain. The amount of labour required for dry crops is small, and as the extension of cultivation during periods of distress in Kurnool is due to the increased area of dry crops watered, the canal does little towards alleviating the labouring classes. It puts a great deal of money into the hands of a comparatively small number of persons and this is of some use, but it does not do much in relieving distress due to high prices. With rice land the case is quite different, as the fields require much labour to bring under cultivation. If the Kurnool ryots would grow rice and use the canal water freely we might reasonably expect a considerable reduction in the percentage of persons who would require relief during famines.

These facts have an important bearing on the question of bringing water to the Bellary plain, for the purpose of famine protection, and in my opinion, considering the grave doubt that exists as to whether the Bellary ryot would grow rice to any great extent, under any circumstances, it would be most unwise to incur heavy expenditure in bringing the Tungabhadra water on to the Bellary plain, in the hope, that the Bellary district would thereby experience a sensible diminution of the effects of general distress caused by high prices, and want of demand of labour on the fields.

12. Mr. Goodrich, when Collector of Bellary in 1886, remarks in a letter to the Superintending Engineer, III Circle, "in black soil the people best acquainted with its properties, those who live on and by it, do not cultivate the whole area which seems available," and he mentions the case of the Kanikal tank in Rayadrug taluk, where, although the farmers have sufficient stock of labour, they do not keep in cultivation quite two-thirds of the ayacut even during good years. Mr. Goodrich also touches upon the question of an impermeable stratum underlying the black cotton soil, at no great depth. This I have often heard of as one of the chief reasons why the ryots will not cultivate wet crops readily on black cotton soil, and I have seen instances of this formation in the Kurnool district along the canal. When such conditions exist the land becomes waterlogged under wet cultivation, and is then useless for any crop. As regards the time it would take to bring new land under cultivation, Mr. Goodrich estimates that 38,000 acres in the Bellary taluk, would take fifteen years to bring fully under cultivation. I think therefore that I am not far away in assuming 50,000 acres as the maximum area likely to be cultivated within any reasonable time by water brought from the Tungabhadra on to the Bellary plain.

13. In his report in 1889 on the Tungabhadra scheme Mr. Russell, the Executive Engineer on special duty, makes some very pertinent remarks on the subject of irrigating the Bellary plain. He observes that the total irrigated area in the district is 47,313 acres, which is very small compared with the area under dry crop and goes on to remark "in a district where irrigation has hitherto been so little practised, it seems extremely doubtful whether the land under a canal which concentrates, in a small area, more than the total irrigated area of the whole district, is likely to be taken up. Where are the cultivators to come from? They are certainly not available at present."

The Daroji tank is referred to by Mr. Russell in proof of his assertions, he states that, during a period of 21 years, in spite of the construction of a sluice capable of bringing an additional area of 3,000 acres under cultivation only an average increase of 230 acres was obtained. This failure he rightly attributes to the unwillingness of the ryots to extend rice cultivation. They prefer to grow sugarcane to the extent for which they can provide manure, as they find this pays them better than growing crops of rice.

Mr. Russell also points out that most of the land commanded by the canal is already under dry cultivation and remarks "will the ryots go to the expense of converting fair dry crop land into land suitable for wet cultivation?"

14. I must now consider the question of constructing a reservoir with the object of sending water down the Kurnool canal for a second crop of rice or for the same purpose to the Kistna anicut, or to both systems. The Muddock-Massoor reservoir would probably suffice to supply the Kurnool canal for a second rice crop of 25,000 acres, in addition to the supply for 50,000 acres to the Bellary plain. But the question arises "will the Kurnool ryots grow two crops of rice?" I have no doubt that there would be an extension of permanent "wet" in Cuddapah if the supply down the canal could be increased; but I do not think there would be any appreciable change in Kurnool. Unfortunately Cuddapah is at the wrong end of the canal, and during seasons of scarcity when the wet lands in Cuddapah would want the water most, the Kurnool ryots would take off the greater portion to water their dry crops. In the Kistna it is possible that the ryots might, to some extent, alter their methods. At present they commence cultivation very late in the year and there is practically no second crop or sugarcane cultivation. It would probably be worth while to construct one of the reservoirs in Mysore territory with the sole object of supplying the Kurnool canal and the Kistna. If the Kurnool ryots remained obdurate and if it was found impossible to induce the Kistna ryots to grow a second crop, the reservoir water might be used partly in Mysore, and partly to supplement the irrigation under the existing Tungabhadra channels, and it might be found possible to restore the anicuts at Anjura and Maraballakota on the Tungabhadra, and construct a new one near Bassapur. The difficulty with these anicuts is the length of channel required before any land can be irrigated, probably the two ruined ones were abandoned, because it was then found impossible to make the channels. The reservoir must be an experiment, for, no one can say for certain that the Kurnool or Kistna ryots will alter their methods. They are prosperous now and are conservative to a degree.

15. Apart from the question of a great scheme to supply the Bellary plain I think a party on the lines of the Tank Restoration Scheme parties should investigate the numerous streams that run into the main river in the Hadagalli taluk. It is quite possible that some reservoirs might be formed which would be of considerable value. I do not believe that it should be feasible to supply any of these reservoirs from the river, on account of the slight fall in the river and the undulating nature of the country.

16. I do not think that the question of irrigating the western taluks on any large scale from the river is worth serious consideration. These taluks are not as subject to famine as the eastern ones, the country is undulating with numerous valleys running down to the river, and any scheme for distribution would be very costly.

17. I was accompanied on my tour by Mr. Clerk, the Executive Engineer of the Bellary division, and I append to this report a note by him which gives a great deal of useful information on the general question of irrigation from the Tungabhadra river.

18. I am returning separately the whole of the papers and plans received from your office in connection with the Tungabhadra and Haggani schemes.

ENCLOSURE.

NOTE by H. E. CLERK, Esq., Executive Engineer, Bellary Division, on Reservoir on Tungabhadra.

There seem to be three courses possible in constructing a reservoir on the Tungabhadra—

- (1) to make one somewhere within 12 miles of Hospet to irrigate Bellary and Alur taluks;
- (2) to make one somewhere west or south-west of Hadagalli to irrigate lands in Hadagalli and Hospet taluks;
- (3) to make a reservoir at any available site and to pass water down the river to be taken off by anicuts wherever it is most required.

2. With regard to the first two, sites have already been suggested—the Mallapur site by Mr. deWinton and the Vallabhapuram site by Mr. O'Connell. The Mallapur site would be an excellent one. I have not been able to examine the river bed, but it is possible that it has been cut down to the gneiss underlying the Dharwar series. Its principal objection, however, would be the amount and value of lands submerged.

A contour at 50 feet above crest of Hoosur anicut has been taken for this—34 villages (18 in British and 16 in the Nizam's dominions) would be submerged. The total area of waterspread would be about 67 square miles, of which a not inconsiderable area on either side is valuable wet land. I do not think the destruction of so many village sites would be tolerated even if the mere cost of acquisition were not fatal to any project here.

3. Mr. O'Connell's reservoir is not on so striking a site. There would be the practical difficulty of examining the foundations under the river. The undersluices of the Koregal anicut would hardly serve to run it all off, while investigations were being made. The water would, however, run up to Modulakotta and would submerge about 19 villages in the Nizam's territory and 15 in the British side. Compensation would not be so heavy as in case of the Mallapur-site, but would be enormous. Mr. O'Connell, in his rough estimate, appears to have made no allowance for compensation for land. Taking the waterspread sketched on his map as approximately correct, the area will be about 66 square miles. Of this 12 square miles is the existing bed of Tungabhadra river. Of the 54 square miles for which compensation will have to be paid about 25 will be in British and 29 in Nizam's territory. Almost the whole area grows good dry crops and the soil is very good. I do not think, therefore, that I am wrong in allowing compensation at Rs. 15 an acre all round in British and Rs. 25 an acre in the Nizam's dominions. The compensation for village sites is very hard to estimate. They vary in size, but allowing for the fact that not only must compensation be paid but new sites found, I think I err on the side of moderation when I suggest Rs. 6,000 per village in British and Rs. 8,000 in the Nizam's territory. The compensation then works out thus—

	Rs.
25 square miles, British $25 \times 640 \times 15 =$	2,40,000
29 Do. Nizam's $29 \times 640 \times 25 =$	4,64,000
19 villages at Rs. 8,000	1,52,000
15 Do. at „ 6,000	90,000
Total	9,46,000

I do not, however, think that such wholesale submergence of house property would be tolerated and the scheme for this reason alone would have to be rejected.

4. Another objection to these sites is that, even if the Nizam consented to give up the land, there can be no doubt that he would insist on a share of the water. This is not an insuperable one, but it would add immensely to the difficulties in the preparation of the project and in the distribution of the water afterwards. A site above Hampasagar would not be open to this objection. If the submergence of valuable land and villages is not considered insuperable, I can see no reason why a reservoir should not be made, preferably, as far as I can see at present, at Mullapuram, although probably the compensation would be rather higher there.

5. I will not discuss the much argued passage through the Daroji hills, but will proceed to consider the utilization of the water when it gets east of them. In this connection I would call special attention to paragraphs 79 and 80 of the preliminary report of proposed canal from Tungabhadra, &c., by Mr. A. S. Russell, in which the conditions of cultivation under Daroji tank are discussed. This tank is the only one which is likely to afford us any indication as to how any project of the sort under discussion is likely to succeed and deserves the most careful consideration. It will not, therefore, be out of place to state what has happened within my personal observations. In the end of June 1897 the tank hitherto dry received between two and three months' supply. Early in September it filled and the crest was lowered in order to throw less strain on the tank which developed a serious leak. A dry crop was sown in June over a considerable area. This was harvested in September, but after this no cultivation of any sort took place until the middle of February, when lands were ploughed and cultivation commenced, sugarcane forming an important portion of the crop. By the time they began to cultivate the tank had fallen 1' 6" by percolation and evaporation. Had they commenced cultivation with seed beds at the proper time the whole area under the tank might have been cultivated with two crops of rice. I have also made enquiries regarding the proposed extension of cultivation under Daroji tank and as far as I have been able to ascertain the ryots do not wish for new channels, not so much because they fear there is insufficient water but because they prefer their dry crops. The fact is that with very few exceptions throughout this district the ryot prefers dry crops to wet. They require less attention, they are less troublesome, they pay him better, that is to say, the increased profit per acre of paddy is not worth the extra trouble of working the land, and above all he commands a local sale for his cholam, whereas all his rice has to be exported. Sugarcane is of course popular, the profits on it being very great, but the area that can be grown under sugarcane is very limited, owing to the heavy manuring which is necessary. My own opinion is that in this district, on black soil at any rate, ryots will not willingly exchange their dry crops for a single crop of paddy; what would eventually happen were water supplied throughout the year to a large area, I do not like to say, but I am sure that in any case the land would come into cultivation very gradually.

The population is sparse and poor. Their cattle and implements are unsuited for wet cultivation. The Bellary ryot is also both conservative and as far as wet cultivation goes much behind the times. With the lesson of the Kurnool canal before us, I do not think that the prospects of irrigation in Bellary taluk can be considered promising.

6. Before leaving this part of the subject I may add an explanation of the apparent anomaly alluded to in paragraph 79 of Mr. Russell's report. The Daroji ryot does not use the water for six months after it is impounded and the results of filling the tank appear in the subsequent year. Mr. Russell's table becomes less perplexing if viewed with this fact before one.

7. With regard to the river above Bellahunsi, I append the following short notes:—

Between Bellahunsi and Hampasagar the country is undulating and other sites nearly as good as, but not better than, that proposed by Mr. O'Connell might be found. They would, however, be open to the objection of submergence, and they would not command any area west of the Daroji Hills, so that that pass would still have to be traversed. From Hampasagar to Honnur the river flows through a much flatter plain with steep earth banks most of the way. No site could be found here.

8. At the village of Honnur one of the Dharwar rock ranges crosses the river. On the left bank is a steep hill and on the right a knoll of considerable elevation. Unfortunately the rock in the river-bed is formed of schist and indurated clays of varying hardness. All are deeply fissured in every direction, and it would be impossible to found a dam on them.

9. Above this point there is no possible site for a dam. The hills on the Bombay side approach within about half a mile of the river near Byala hunsi, but on the right bank there is flattish country forming no basin whatever. Near Kuruvatti and Garbhagadi there are hills on the right bank, but the Bombay side has no corresponding elevations and no reservoir could be formed. Beyond this there is no site where a reservoir could be made.

10. I consider, therefore, that the only possible site for damming of the main stream of the Tungabudra is at Mullapuram four miles west of Hospet. It has, however, to be ascertained whether sufficiently good foundations can be obtained. This could only be done by careful investigation during the hot weather.

11. I am, for the reasons stated in paragraph 5, strongly of opinion that any such reservoir, if constructed for the irrigation of Bellary and Alur taluks, would be, financially speaking, a disastrous failure; and it would have to be constructed mainly as a famine protective work. If this were done, the higher and more expensive line should be adopted, were the line *vis à Metri* taken, a large area would be lost, and the value of the canal, in times of famine, would be largely diminished.

12. Colonel Mullins, in his note on Mr. Gordon's project, alludes to the question of reservoirs and places the only possible ones in Bombay and Mysore. It would probably be very difficult at this time to succeed in carrying these out, and I think that our attempts to utilize the surplus waters of the Tungabudra should, for the present at any rate, be limited to a much more humble scheme.

Tanks should be formed on all tributaries wherever suitable sites can be found. The advantages of this proposal may be enumerated as follows:—

- (1) Government would not be committed to an enormous outlay all at once.
- (2) If, as is possible, a large extension of wet cultivation were found unpopular, the construction of further tanks could be abandoned.
- (3) The works would be much more suitable for the employment of famine labour if the need for it arises.
- (4) It would be possible to distribute the land to be irrigated over a much larger area, so that it is probable that a much greater total acreage would be cultivated wet than if water were supplied to one large area and the ryots asked to cultivate it *en bloc*.

13. The great objection to the construction of tanks would be that it is improbable that many of them would be famine protective as they would, in years of defective rainfall, be dry or nearly so. Those, however, which had a large catchment would probably even in famine years hold enough water to bring a dry crop to maturity.

14. I have already selected two possible sites for large tanks, both in Hadagalli taluk:—

- (a) Across the Chinna Hagari at Hagaribommanhalli. This has an enormous catchment and even in bad years brings down a great deal of water.
- (b) Across a stream flowing into the Tungabudra near Honnur. This has a catchment of about 136 square miles and brings down a great deal of water.

I believe that, with proper precautions, earthen bunds could be thrown across these streams. They would have the advantage of submerging only about one village each and a fair proportion of the waterspread would be waste land.

15. It might be possible to supplement the supply to these or similar tanks by an anicut and a channel from the Tungabudra. The anicut would have to be situated high up the river and the channel would have to be a long one. This would, to a great extent, do away with the objection noted in paragraph 13 above.

16. I have not touched on the third possibility as I have no personal knowledge of the Kurnool canal or Kistna delta, and I do not think that a reservoir could be constructed which would give any return sufficient to justify the submergence of so many villages and cultivated lands.

Note by the Chief Engineer for Irrigation, dated 12th December 1898, No. 312 I.
Note by the Chief Engineer, Public Works Department, dated 23rd Jan. 1899, No. 484 C.

ORDER—No. 222 I., dated 8th March 1899.

Government does not consider that the reports come within the meaning of the detailed investigation ordered in G.O., No. 750 I., dated 29th September 1898, and directs that the proposed reservoir sites on the Tungabudra at Honnur, where the river passes through the Sandur Hills, and at Valavapur, be further examined, and if either of them is found suitable, a detailed estimate for a reservoir should be prepared. If both these sites are found unsuitable, a site should be sought for on one of the tributaries of the Tungabudra in Mysore. If a suitable reservoir site is found, an estimate should be prepared in detail for a channel to irrigate 50,000 acres of land in the Bellary district, east of the Daroji Hills, and as much land as it may command west of the Daroji Hills.

(True Extract.)

Thiel

Under Secretary to Government,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, III Circle.
" Examiner, Public Works Accounts.
" Chief Engineer, Public Works Department.
" Revenue Department.

Exd. A. Rungasawny Aiyangar.

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CURRENT No.

ENCLOSURES TO C. No.

ORDER OF GOVERNMENT

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LETTER OF GOVERNMENT

STATEMENT WITH DITTO.

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