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# MADRAS RECORD OFFICE

## Government of Madras

Public Works DEPARTMEN

G.O. No. 2994 Press

~~B.P. No.~~ ~~Mis.~~

110-111

Dated 12-12-1879 ~~195~~.

***Not to be folded or roughly handled***

No. 210. Read the following Memorandum from Lieutenant-Colonel J. MULLINS, R.E., Chief Engineer for Irrigation, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Narsipatam, 8th October 1873, No. 716-B. :—

In Government Order of the 20th January 1873, No. 183, Government declined to sanction funds for a Survey Establishment for continuing the investigation of the Kondakirla Ava Project, pending the receipt from the District Engineer of definite information as to the kind and amount of work already done, and remaining to be done, in connection therewith. Also in Government Order of the 17th January, No. 157, Mr. Turner, who had been employed for a time on the project, and who had quitted the district on transfer to Salem in an irregular manner, was directed to draw up a memorandum showing the exact state of the investigations connected with this project, as also with the Pengole River Schemes, giving information as to surveys and levels taken; he was moreover to plot such as of these as had not been plotted, and to send all survey and level books, papers, etc., connected with these projects to the District Engineer, Vizagapatam. Up to this time the latter order has produced no results. Mr. Turner left behind him an incomplete survey of part of the Kristamraz Channel which supplies the Ava, and contours of the Ava at calingulah crest level 6 feet below that level, and 6 feet above it, and on this plan there is also laid down the line of channel proposed by Mr. Laskey from the reservoir, and that is all the information possessed by the District Engineer. It is not even certain what is the value of some of the work shown on the survey, nor is it known what part of the work was done by Mr. Turner himself, and what by Mr. Fletcher who was employed under him. It appears to be doubtful whether the contour at 6 feet below calingulah crest level could have been run at the time Mr. Turner was engaged upon the project, the water in the Ava being at that time* of the year usually much above that level. It appears to be necessary therefore to repeat the orders passed on the 17th January last.

* August to October.

2. I have just inspected the supplying channel of the Ava from the Godary Anicut in company with the District Engineer and the Range Officer, and I have endeavoured to make myself as well acquainted with the circumstances of the Ava with what is proposed to be done, and the objects to be attained, as is practicable. These appear to be as follows.

3. The Ava is, at least in part, a natural lake. Below the sluice sill in the regulating calingulah the area of its waterspread is a little more than a square mile; what was the original water level before its supply was increased and arrangements for drawing off the water thus stored were made, there does not appear to be any evidence to show, but the calingulah provides the means of retaining a depth up to its crest of 6 feet above the sluice floor, while on this crest there are upright stones averaging about 1 foot 10 inches in height. As will be seen from Government Order, 15th May 1871, No. 1,334, part of the bed of the Ava is within the limits of proprietary villages, and repeated disputes have arisen from a custom which has gradually sprung up of cultivating the bed as the water recedes, this practice resulting here, as it does everywhere else, in a waste of water from the

desire of those wishing to cultivate to get early possession of the submerged lands. In 1860 the then Collector of Vizagapatam proceeded to Kondakirla in order to settle the long pending water dispute, and he met there the agents of the Ankapilly Proprietrix and entered into arrangements under which the full water level was fixed at a certain point on the western of two small mounds, called Jodu Dibbalu, lying within the waterspread, and thereupon a masonry bench-mark was erected, and the calingulah adjusted. A sketch is given in the Collector's letter, but it really gives but little idea of the mound. The supply in the Ava was to be retained, if possible, at the full level thus fixed until the 15th December, and then it was to be drawn off *as required for cultivation below the calingulah*, thus allowing a Dalwa, or late cold weather, crop to be cultivated in the tank bed. The terms of this agreement have not been fully carried out, and indeed efforts have been made to get rid of the most important part of the agreement, viz., the adjustment of the full tank level. The bench-mark has been very considerably lowered, and the materials of which it was composed taken away; the mound has also, it is said, been cut down, and this would seem to be probable as the highest point is now only about 1 foot above the present water level, and that is flush* with the crest of the Aripalem Calingulah, and 10 inches above the foundation of the bench-mark. Moreover cultivation in the bed was clearly to be confined to a late cold weather crop, but there is paddy cultivation at present considerably to the south of the Jodu Dibbalu, which again are much south of the northern edge of the waterspread. This paddy must have been planted some two months ago at least, and it now stands in 18 inches or perhaps more water at its outer margin. An Aripalan Mirassidar showed me a block of rock in the water about 80 yards from the calingulah, the top edge of which, now about 1 foot above water, was, he said, the proper full level as fixed in 1860, and the similar level pointed out on the upright stones of the calingulah corresponded therewith. This calingulah is in itself strong evidence that the full level of the Ava, as fixed by the Collector and the Proprietrix's agents, must have been considerably above the crest of the calingulah, because otherwise there would have been no use for the upright stones, and it is my impression that 1 foot above that crest may safely be assumed to be the correct level; and, if this should err by an inch or two on the side of excess, those who will suffer are those who deserve to be punished for the destruction of the bench-mark on the mound. In addition to that bench-mark, the corresponding level should have been permanently inscribed on the wing walls of the calingulah, and it would have been better perhaps had the tops of all the upright stones been at exactly the full tank level, but so unscrupulous do the ryots appear to be in connection with these water disputes, that probably a good deal of difficulty would have been experienced in preserving on the spot any reliable record of this kind.

G. O., 15th May 1871, No. 1,334.

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4. The Ava presents such natural advantages for the storage of water that it is much to be regretted that encroachments were not in the first instance firmly resisted and put a stop to. The sort of compromise effected in 1860 was not a desirable one, nor was it fair as regards the tank and those cultivating under it,





for it prevented the continued storage of water, even if available in the river after the 15th December. The Board of Revenue in paragraph 14 of their Proceedings, 12th May 1869, No. 240, stated that they were not prepared to acquiesce in the claims of the ryots of the Ankapilly Estate to cultivate the bed of the Ava, and that, if those claims were allowed, they believed that additional peishcush might legally be imposed, as these lands were not assessed to the permanent settlement. There is now the less reason for concessions to the Proprietrix, seeing that the agreement of 1860 has not been carried out, and that, in addition to the destruction of the regulating bench-mark then set up, further encroachments have been made. The exclusion of the lands from the permanent settlement is evidence that at that time their cultivation was deemed impracticable, and that they were reserved for the Ava, within the waterspread of which they were situated. The preservation of the Ava as a reservoir is of very great importance in connection with the efficient irrigation of the Government lands in this part of the district; no substitute for it can be found, and the rights of the Government should, I think, be enforced to their fullest extent.

G. O., 15th May 1871, No. 1,334.

5. The way in which the Ava is to be dealt with must in a great measure depend upon the decision which may be come to as to whether the conditions at the time of the permanent settlement are to be reverted to or not, and if not what the arrangements to be sanctioned for the future may be. The Ava is at present capable of doing more than irrigating the lands* directly dependent upon it, and, but for very improper interference with the Kristamraz Channel from the Godary Anicut, its supply would be much greater than is now the case. Under other channels from the Saradanuddy the lands† of twenty villages are imperfectly supplied; on the average the remissions of the twelve years up to Fasli 1282 averaged 5,603 Rupees a year, while in that year they amounted to Rupees 19,816. The Ava is the natural source whence to supplement the river supply of those lands when the latter runs short, and it can, as far as I can judge, be easily made to perform this duty, in part if not entirely, if its original dimensions be maintained, while if a greater depth be stored its irrigating power might be largely increased. To provide for additional storage without increasing the waterspread on the north and north-west sides, it would be requisite to construct a bund on the present margin of the tank, but there are at present not sufficiently complete data on which to determine whether additional storage will really be necessary or, if so, the quantity required.

* Acres 2,004, assessment 16,045.

† 8,142 acres.
G. O., 10th July 1872, No. 1,663.

6. One of the first things needing to be done is to restore the Kristamraz Channel to an efficient state. The river is capable of affording an abundant supply of water, but the encroachments of some of the holders of land in the proprietary estates, and the long continued neglect of the interests of Government and of the cultivators of Government lands have practically rendered this abundance of no use. In the first mile a stone dam has been thrown across the channel for the supply of lands belonging to the proprietary village of Kassimkotta, and its top

is 6½ feet above the bed of the channel. In the 4th mile also a similar dam having its top nearly 3 feet above the channel bed has been constructed.* The obstruction caused by those dams would be of comparatively little consequence were it not that, owing to most of the branch channels being without head sluices and to the lands adjacent to the channel being in many places low, even a moderate depth of water cannot be maintained in the channel without causing inundation, and the result has been that the head sluice at the anicut has been regulated to suit the requirements of those who, by their own acts, have exposed their lands to inundation. These stone dams are supposed to have vents in them for the passage of a proportion of the supply when that is small, but these vents, I am informed, are but seldom allowed to remain open, and the Government lands, which are for the most part below those of the Ankapilly Estate Villages, get but little of their share of the water at such times. Near Munagapaka, in the 3rd mile of the channel, the surplus from the Ankapilly Ava falls into the channel, and is discharged at two calingulahs in its right bank. The arrangements here are very defective, for the channel supply cannot be maintained without submerging cultivated lands, and consequently the calingulahs are often open when they ought to be shut. The obvious remedy is to pass the drainage under the channel, and then the latter can be embanked. The District Engineer has brought this requirement of the channel prominently to notice, and he has been requested to have the necessary estimates prepared. In the next place some parts of the channel banks require to be raised considerably, and simultaneously arrangements must be made for the regulated admission of drainage from the neighbouring lands, which now finds an entrance at numerous openings or low places, which, were a proper depth maintained in the channel, would result in inundation. Up to the margin of the Ava, or in other words up to the contour at full level, the supply channel should be embanked on its left side, while on the right side a proper† level should be maintained all the way to the Aripalem Calingulah.

* For Munagapaka, a proprietary village.

† Three feet above full supply level, or 3 feet above full Ava level, equivalent to 4 feet above calingulah crest level.

7. Measures will require to be taken to furnish all the branch channels with head sluices; the levels of the sills should be fixed by the District Engineer to correspond with the revised bed level of the channel, and the dimensions of the openings should be such as to allow of a full supply being passed through them when the channel is conveying about 10,000 cubic yards an hour, which would represent the maximum supply for the 3,344 acres under it, though to fill the Ava a much larger quantity will be taken down whenever the river is in considerable freshet. The bed of the channel is at present very irregular, and this no doubt has interfered much with the proper supply of the branch channels.

The depth of water for this will be about 1 foot 9 inches.

8. The improvement of the supply channel,‡ with the rectification of its levels, and the repair of its banks, should be estimated for at once. I do not think any material widening will be needed above the point where the Ankapilly Ava surplus crosses it, to allow of its carrying all the water which would be needed

‡ Kritamraz.



for the greatest probable extension of irrigation, and this with a depth of 4 feet of water. Below this much of the channel is too narrow; it should be widened at present only to the extent necessary to provide earth for the embankments, and these should be placed so as to allow of future widening on one side. Some valuable land will have to be taken up for this work. At or about the present site of the rough stone dam in the 4th mile, a regulating masonry dam should be constructed. The revised bed level will approximate very closely to the top of the present rough stone dam; the bed should be dropped 3 feet at this dam. Efficient arrangements for the admission or disposal of drainage water will also be needed.

9. Rather less than two miles below the Godary Anicut, and opposite to Kassimkotta, there is a rough stone weir across the Saradanuddy, from which, on the left bank, a channel is taken off for the supply of both Government and Proprietary lands. This anicut is liable to frequent damage, and its reconstruction in masonry has been asked for. The proper course will be to bring the irrigation under the Godary Anicut, and to abandon the Kassimkotta Weir.

10. Part of the cost of improving the Kristamraz Channel will be payable by the Proprietors of the estates affected, and it will be necessary to divide the estimates into sections, so as readily to show what parts of the work are connected with the different estates.

11. The discharge of the Saradanuddy in June to December 1872 has been calculated to have been 1,088 millions of cubic yards, equivalent to about 26 inches depth over the catchment basin of 450 square miles. The rainfall of that year at Vizagapatam was 52·9 inches, and the average* is 42·8 inches. The calculations of discharge above given require some correction, owing to the level of the water below the anicut not having been taken into account, but on only a few days was this tail water above the crest of the weir, and so the difference on this account will not be considerable. Supposing that, with the smaller rainfall, the proportion finding its way into the river will be reduced from one-half to three-eighths, and assuming the corrected discharge of 1872 to be 1,050 millions of cubic yards, the average discharge of seven months, and there is but very little water in the river in other months, so that this may be taken as the annual discharge, will be 646 millions of cubic yards.

420 Square miles on Atlas Sheet.
30 ,, ,, allowed for unsurveyed portions.

* 1,866 to 1872.

12. With but slight modifications of dimensions in the upper part of the Kristamraz Channel, this with a depth of 4 feet or possibly 4½ feet will carry 60,000* cubic yards an hour or 450 cubic feet a second. In 1872 such a full supply would have been obtainable from the river for about 3[illegible] days, while for another 60 days there would have been from 5[illegible],000 to 48,000 cubic yards, for 25 days about 28,000, and for 65 days less than this, say altogether 150 millions of cubic yards. Reducing this to the supply of an average year, 92 millions would be available, and this being only $\frac{16}{26}$ or $\frac{8}{13}$ of the supply in the river, there can be little doubt but that this quantity may be fully relied on, and it will be sufficient for at least 20,000 acres, of which at present there are 3,344* acres under

* Possibly this is more than will be required.

| | Rs. |
|---|---|
| Government ... ... ... ... | 2,163 |
| Proprietary ... ... ... ... | 1,181 |

the Godary and Ava, and 8,142 acres, assessed at Rupees 65,134, inadequately supplied by river channels below the Godary Anicut. Water will, therefore, be available for a considerable extension of irrigation, and it is understood that there is plenty of Government land available.

13. It may be as well to consider in a general way the sufficiency of the Kondakirla Ava to maintain the supply to the lands to be brought within the influence of the Godary Anicut. At calingulah crest level its capacity is supposed to be 11½ millions of cubic yards, and if, as I have concluded, its proper full level be 1 foot above the crest, probably that capacity, without alteration or enlargement, may be taken as 14½ millions. Now, in a year like 1872, the cultivation might have been carried on successfully to a full area of 20,000 acres with but very slight aid from a reservoir. In ordinary years, however, considerable storage will be required; and reducing the number of days given in the last paragraph it may be assumed that for 60 days out of the 110 days during which a main crop requires irrigation, no reservoir will be needed, and for 50 days the reservoir water will have to supplement that in the channels to the extent of, say, ½ for 25 days and ¼ for the other 25 days. Then taking 2 cubic yards an acre per hour as the supply needed, $\frac{14\frac{1}{2}\text{ Millions}}{1+\frac{1}{2}(2\times24\times25)}$ =10,357 will represent the acreage for which the Ava storage will suffice. This is of course only a rough approximation, but it tends to the conclusion that, at any rate for some years to come, no increase to the capacity of the Ava will be needed, and that it is very improbable that it will ever be necessary to add 2 yards to its depth. Indeed, it seems probable that by raising the Godary Anicut about 1 foot, all necessity for additional storage would be obviated by increasing the number of days on which the channel would carry a full supply for the entire area of irrigation.

Paragraph 3 above.

$\frac{8}{13}$ of (38 + 60) = 60¼

14. The above remarks will show how little use has hitherto been made of the very great natural advantages which the Godary Anicut across the Saradanuddy, with the Kristamraz Channel and the Kondakirla Ava, possess. Less than 3,500 acres have been irrigated, and three to four times that area can be supplied without difficulty by making the Kristamraz Channel fairly efficient, and connecting the Ava with the channels of the twenty villages referred to in paragraphs 5 and 12 above.

15. In working out the estimates for the improvement of the irrigation under and below the Godary Anicut, it will be required to take into account the lands which are now entitled to water for a second crop, and to reserve water for them.

16. The [illegible] work to be done in connection with this project is as follows:—

1*st*.—An accurate survey with levels and cross sections (about 40 to the mile) of the Kristamraz Channel; on the longitudinal section should be shown the levels of all branch channel heads, masonry works, etc., and upon this should be plotted the revised bed level; on the cross sections the alterations to the channel, the present and proposed heights of the banks will be exhibited.

*Proceedings of the Madras Government, Public Works Department,*
*12th December* 1873.

2*nd*.—Surveys of all the channels branching from the Kristamraz Channel with their levels. No sections of Proprietary Channels will be needed beyond a few near their heads.

3*rd*.—Survey of the Channels and its branches under the Kassimkotta Anicut, with such longitudinal and cross sections as may be needed to enable the arrangements for connecting this irrigation with the Kristamraz Channel to be determined, and the proposed connecting channel should then be laid out, and estimated for.

4*th*.—An accurate contour of the Kondakirla Ava at 1 foot above calingulah crest level, showing the situation and extent of all lands within this contour which may have been laid out for cultivation, and indicating also those which have been cultivated this year. On the same survey by the aid of Mr. Turner's contours and a few cross sections run from, and within, the full contour line, contours at intervals of a foot can be laid down, and the contents of the Ava at each contour calculated. Should there be land marks denoting the boundary line between Government and proprietary villages in the bed of the Ava these should be shown on the plan.

5*th*.—Surveys and levels of all the present distribution channels from the Ava, and on these surveys the boundaries of Government lands should be shown.

6*th*.—Surveys and levels of all the channels from the Saradanuddy which it is proposed to supply through the Ava or from the Kristamraz Channel, with the boundaries of the lands under each.

7*th*.—Surveys and levels of lands not now irrigated but which it may be found are capable of irrigation from the Ava, together with similar information for the channels necessary to supply them.

17. Within the embankments of the Kristamraz Channel there is in parts a considerable width of lunka or berm and in places this has been brought under cultivation. Inquiries will be necessary as to whether this cultivation is authorized, and care must be taken that claims to compensation for land belonging to the channel are not admitted. In some places the berms are wider than is necessary, and probably the amount of compensation to be paid for new land may be lessened by relinquishing or disposing of land not needed.

18. There should be a good bridle-path for the whole length of the channel on one or other bank, as may be most convenient.

19. Mr. Brickwell, the Range Officer, is of opinion that he can, without detriment to the current duties of his range, supervise the preparation of the project and control the work of a Survey party, and the Executive Engineer concurs with him. Such being the case, immediate sanction may be given for the following establishment:—

| | Rs. |
|---|---|
| Two Surveyors, the pay of each being settled locally within the sanction... | 120 |
| Ten Lascars, at 6 Rupees ... ... ... ... ... ... ... | 60 |
| Monthly... | 180 |

The work will probably occupy four or five months if not more, and as it will be some little time before Surveyors can be procured and the surveys commenced, the sanction may remain in force up to the close of the current official year, when a clear report of what has been accomplished, and of what remains to be done, should be transmitted, should an application for the continued employment of the establishment be made.

20. As soon as possible an approximate estimate of the cost of reforming the Kristamraz Channel should be submitted, in order that provision may be made for this work in the Budget of 1874-75, and the regular estimate should follow when the details have been determined.

21. The head sluice of the channel will require to be altered to pass the full discharge of 450 cubic feet a second. At present it would require a depth of 3 feet 3 inches passing over the crest of the Godary Anicut to obtain this discharge. Were the lower cross stones removed, a depth of 2 feet 2 inches would suffice, but even this is too much, and therefore it will be necessary to add two vents of 4 feet by 4 feet at some future time, when the demand for water exceeds the capacity of the sluice, and the arrangements can be put on paper, though, for the present, the alterations should be confined to removing the lower cross stones, replacing them at 4½ inches above the sill level of 2½ feet above the sill level, and to blocking up the part of the vent above. Round bar iron 2½ inches diameter may be inserted at 2½ feet above sill level to support the present baulk shutters, until it may be convenient to substitute sliding shutters worked by s[illegible].

No. 211.

ORDER THEREON, 12th December 1873, No. 2,994.

IRRIGATION, No. 13.

THE Memorandum by the Chief Engineer for Irrigation will be communicated to the Revenue Board through the Revenue Department, in order that the rights of Government in connection with the Kondakilla Ava may be clearly and definitely ascertained and effectively maintained. Such detailed instructions as may be necessary will be issued in the Revenue Department. The District Engineer will afford the Collector of Vizagapatam all requisite assistance in determining by the aid of levels or otherwise the proper boundaries of the Ava, and he will arrange for having them carefully surveyed, so soon as they may have been determined.

2. The employment up to the close of the official [illegible] year of the Survey Establishment detailed in paragraph 19 of the Chief Engineer's Memorandum is sanctioned, and its cost will be debited to the provision for temporary establishments. It is considered unnecessary, at the present time, to issue the order of Paragraph 2 of G. O. No. 157 of 17th January, should be repeated. The Assistant Engineer G. J. Turner was instructed to draw up, in communication with Lieutenant-Colonel Fischer, a certain memorandum, and to forward certain papers to the District Engineer of Vizagapatam; and His Excellency the Governor in Council looks to the Chief Engineer for Irrigation to enforce such orders without further reference to Government; as he expects him to see that the detailed instructions contained in



his note above recorded are duly carried out by the District Engineer of Vizagapatam and Mr. Brickwell, without detriment to the executive duties of the latter coffier.

(True Extract.)

Colonel, R.E.,
*Secretary to Government.*

To the District Engineer, Vizagapatam.
" " Godavery.
" Revenue Department.
" Chief Engineer for Irrigation.
" Officiating Controller of Public Works Accounts.

Exd. W. H. French.
Spare Copies

No 716 B.

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G.O. 15th May 1871 No. 1334.

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G.O. 15th May 1871 No. 1334.

the efficient irrigation of the Government lands in this part of the District: no substitute for it can be found, and the rights of the Government should, I think, be enforced to their fullest extent.

5. The way in which the Ava is to be dealt with must in a great measure depend upon the decision which may be come to as to whether the conditions of the time of the permanent settlement are to be reverted to or not, and if not what the arrangements to be sanctioned for the future may be. The Ava is at present capable of doing far more than irrigating the lands directly dependent upon it, and, but for very improper interference with the Kristamraz channel from the Godary Anicut, its supply would be much greater than is now the case. Under other channels from the Saradamuddy the lands of 20 villages are imperfectly supplied: on the average the remissions of the 12 years up to Fusly 1282 averaged 5393 Rupees a year, while in that year they amounted to Rupees 19,816. The Ava is the natural source whence to supplement the river supply of those lands when the latter runs short, and it can, as far as I can judge, be easily made to perform this duty in part if not entirely, if its original dimensions be maintained, while if a greater depth be stored its irrigating power might be largely

increased.

× Acres 2004 assessment 16,046

× 8142 acres. G.O 10th July 1872 No. 1663.

increased. To provide for additional storage, without increasing the waterspread on the north and northwest sides, it would be requisite to construct a bund on the present margin of the tank, but there are at present no sufficiently complete data on which to determine whether additional storage will really be necessary or, if so, the quantity required.

6. One of the first things needing to be done is to restore the Kristanraz Channel to an efficient state. The river is capable of affording an abundant supply of water, but the encroachments of some of the holders of land in the proprietary estates, and the long continued neglect of the interests of Government and of the cultivators of Government lands have practically rendered this abundance of no use. In the first mile a stone dam has been thrown across the channel for the supply of lands belonging to the proprietary village of Kapimkotta, and its top is 1½ feet above the bed of the channel. In the 4th mile also a similar dam having its top nearly 3 feet above the channel bed has been constructed. The obstruction caused by those dams would be of comparatively little consequence were it not that, owing to most of the branch channel being without head sluices, and to the lands adjacent to the channel being in many places low, even a moderate depth of water cannot be maintained in the channel without causing inundation, and the result has been that the head sluice at the Anicut has been regulated to suit the requirements of those who, by their own acts, have exposed their lands to inundation. These stone dams are supposed to have vents in them for the passage of a proportion of the supply when that is small, but these vents, I am informed, are but seldom allowed to remain open, and the Government lands, which are for the most part below those of the Ankapilly estate villages, get but little of their share of the water at such times. Near Managapaka, in the 3rd mile of the channel, the surplus from the Ankapilly Ava falls into the channel, and is discharged at two Caliyulahs in its right bank. The arrangements here are very defective for the channel supply cannot be maintained without submerging cultivated lands, and consequently the Caliyulahs are often open when they ought to be shut. The obvious remedy is to pass the drainage under the channel, and then the latter can be embanked. The District Engineer has brought this requirement of the channel prominently to notice, and he has been requested to have the necessary estimates prepared. In the next place some parts of the channel banks require

* for Managapaka a proprietary village

require to be raised considerably, and simultaneously arrangements must be made for the regulated admission of drainage from the neighbouring lands, which now finds an entrance at numerous openings or low places, which, were a proper depth maintained in the channel, would result in inundation. Up to the margin of the Ava, or in other words up to the contour at full level, the supply channel should be embanked on its left side, while on the right side a proper level should be maintained all the way to the Aripalem Caliguelah.

7. Measures will require to be taken to furnish all the branch channels with head sluices; the levels of the sills should be fixed by the District Engineer to correspond with the revised bed level of the channel, and the dimensions of the openings should be such as to allow of a full supply being passed through them when the channel is conveying about 10,000 Cubic yards an hour, which would represent a maximum supply for the 3344 acres under it, though to fill the Ava a much larger quantity will be taken down whenever the river is in considerable fresh. The bed of the channel is at present very irregular, and this no doubt has interfered much with the proper supply of the branch channels.

8. The improvement of the supply channel, with the rectification of its levels, and the repair of its banks, should be estimated for at once. I do not think any material widening will be needed, above the point where the Antapilly Ava surplus crosses it, to allow of its carrying all the water which would be needed for the greatest probable extension of irrigation, and this with a depth of 4 feet of water. Below this much of the channel is too narrow: it should be widened at present only to the extent necessary to provide earth for the embankments, and these should be placed so as to allow of future widening on one side. Some valuable land will have to be taken up for this work. At or about the present site of the rough stone dam in the 4th mile, a regulating masonry dam should be constructed. The revised bed level will approximate very closely to the top of the present rough stone dam: the bed should be dropped 3 feet at this dam. Efficient arrangements for the admission or disposal of drainage water will also be needed.

9. Rather less than 2 miles below the Godary Anicut and opposite to Khasimkotta, there is a rough stone weir across the Saradamuddi, from which, on the left bank, a channel is taken off for the supply of both Government and Proprietary lands. This Anicut is liable to frequent damage, and its reconstruction in masonry has been asked for. The proper course will be to bring the irrigation under the Godary Anicut, and to abandon the Khasimkotta weir.

10. Part of the cost of improving the Kristamraz channel will be payable by the Proprietors of the estates affected, and it will be necessary to divide the estimates into sections, so as readily to show what parts of the work are connected with the different estates.

11

× 3 feet above full supply level, or 3 feet above full Ava level equivalent to 4 feet above Caliguelah crest level.

× the depth of water for this will be also 1-9.

× Kristamraz.

11. The discharge of the Saradamuddi in June to December 1872 has been calculated to have been 1088 millions of Cubic yards, equivalent to about 26 inches draining off the catchment basin of 450 Square miles. The rain fall of that year at Vizagapatam was 52.9 inches, and the average is 42.8 inches. The calculations of discharge above given require some correction, owing to the level of the water below the Anicut not having been taken into account, but on only a few days was this tail water above the crest of the weir, and so the difference on this account will not be consider-able. Supposing that, with the smaller rainfall, the proportion finding its way into the river will be reduced from one half to $\frac{5}{13}$ and assuming the corrected discharge of 1872 to be 1050 millions of Cubic yards, the average discharge of 7 months, and there is but very little water in the river in other months, so that this may be taken as the annual discharge, will be 646 millions of Cubic yards.

420 Sq. miles on atlas Sheet.
30 —"— allowed for unsurveyed portions.
* 1866/1872.

12. With but slight modifications of dimen-sions in the upper part of the Kristamraz chan-nel, this with a depth of 4 feet or possibly 4¼ feet will carry 60,000 cubic yards an hour or 450 cubic feet a second. In 1872 such a full supply would have been obtainable from the river for about 38 days, while for another 60 days there would have been from 36,000 to 48,000 cubic yards, for 25 days about 28,000, and for 65 days less than this, say altogether 150 millions of Cubic yards.

* Possibly this is more than will be required.

Reducing

$\frac{16}{26}$ or $\frac{8}{13}$

Reducing this to the supply of an average year, 92 millions would be available and this being only $\frac{5}{13}$ of the supply in the river, there can be little doubt but that this quantity may be fully relied on, and it will be sufficient for at least 20000 acres, of which at present there are 3344 acres under the channel and Ava, and 8142 acres, assessed at Rupees 66134, inadequately supplied by river channel below the Godary Anicut. Water will therefore be avail-able for a considerable extension of irrigation, and it is understood that there is plenty of Government land available.

* Government 2163
Proprietary — 1181

13. It may be as well to consider in a general way the sufficiency of the Rondakirla ava to maintain the supply to the lands to be brought within the in-fluence of the Godary Anicut. At Calingulah crest level its capacity is supposed to be 14½ millions of Cubic yards, and if, as I have concluded, its proper full level be 1 foot above the crest, probably that capacity without alteration or enlargement, may be taken as 14½ millions. Now in a year like 1872 the cultivation might have been carried on success-fully to a full area of 20,000 acres with but very slight aid from a reservoir. In ordinary years however considerable storage will be required, and

para 3 above.

reducing the number of days given in the last para, it may be assumed that for 60 days out of the 110 days, during which a main crop requires irrigation, no reservoir will be needed, and for 50 days the reservoir water will have to supplement that in the

$\frac{8}{13}$ of $(38+60) = 60\frac{1}{3}$

Channels

channels to the extent of say ½ for 25 days and ⅖ for the other 25 days ~~[illegible]~~. Then taking 2 Cubic yards an acre per hour as the supply needed, $\frac{14\frac{1}{2} \text{ millions}}{\left(\frac{1}{2}+\frac{2}{5}\right)(2\times24\times25)} =$ 10357 will represent the acreage for which the Ava storage will suffice. This is of course only a rough approximation, but it leads to the conclusion that at any rate for some years to come no increase to the capacity of the Ava will be needed, and that it is very improbable that it will ever be necessary to add 2 yards to its depth. Indeed it seems probable that, by raising the Godary Anicut about 1 foot, all necessity for additional storage would be obviated by increasing the number of days on which the channel would carry a full supply for the entire area of irrigation.

14. The above remarks will show how little use has hitherto been made of the very great natural advantages which the Godary Anicut across the Saradamuddy, with the Kristamraz channel and the Koudakirla Ava, possess. Less than 3500 acres have been irrigated, and 3 to 4 times that area can be supplied without difficulty by making the Kristamraz channel fairly efficient, and connecting the Ava with the channels of the 20 villages

referred

referred to in paras 5 and 12 above.

15. In working out the estimates for the improvement of the irrigation under and below the Godary Anicut, it will be requisite to take into account the lands which are now entitled to water for a second crop, and to reserve water for them.

16. The out door work to be done in connection with this project is as follows.

1. An accurate survey with levels and cross sections (about 40 to the mile) of the Kristamraz channel; on the longitudinal section should be shown the levels of all branch channel heads, masonry works &c. and upon this should be plotted the revised bed level; on the cross sections the alterations to the channel, the present and proposed heights of the banks will be exhibited.

2. Surveys of all the channels branching from the Kristamraz channel with their levels - no sections of Proprietary channels will be needed beyond a few near their heads.

3. Survey of the channels and its branches under the Khasimkottar Anicut, with such longitudinal and cross sections as may be needed to enable the arrangements for connecting this irrigation with the Kristanuay channel to be determined, and the proposed connecting channel should then be laid out, and estimated for.

4. An accurate contour of the Hondakula Ava at 1 foot above Caliyulah crest level, showing the situation and extent of all lands within this contour which may have been laid out for cultivation, and indicating also those which have been cultivated this year. On the same survey, by the aid of Mr. Turners Contours and a few cross sections from from, and within, the full contour line, contours at intervals of a foot can be laid down, and the contents of the Ava at each contour calculated. — Should there be land marks denoting the boundary line between Government and proprietary villages in the bed of the Ava, these should be shown on the plans.

5. Surveys and levels of all the present distribution channels from the Ava, and on these surveys the boundaries of Government lands should be shown.

6. Surveys and levels of all the channels from the Saradanuddy which it is proposed to supply through the Ava or from the Kristanuay channel, with the boundaries of the lands under each.

7. Surveys and levels of lands not now irrigated, but which it may be found are capable of irrigation from the Ava, together with similar information for the channels necessary to supply them.

17. Within the embankments of the Kristanuay channel there is in parts a considerable width of lunka or berm and in places this has been brought under cultivation. Enquiries will be necessary as to whether this cultivation is authorized, and care must be taken that claims to compensation for lands belonging to the channel are not admitted. In some places the berms are wider than is necessary, and probably the amount of compensation to be paid for new land may be lessened by relinquishing

relinquishing or disposing of land not needed.

18. There should be a good bridle path for the whole length of the channel on one or other bank, as may be most convenient.

19. Mr. Brickwell, the Range officer, is of opinion that he can, without detriment to the current duties of his Range, supervise the preparation of the project, and control the work of a Survey party, and the District Engineer concurs with him. Such being the case, immediate sanction may be given for the following establishment.

| | |
|---|---|
| 2. Surveyors - the pay of each being settled locally within the sanction | 120. |
| 10 Lascars at 6 Rupees | 60 |
| Monthly Rupees | 180 |

The work will probably occupy 4 or 5 months if not more, and as it will be some little time before Surveyors can be procured and the surveys commenced, the sanction may remain in force up to the close of the current official year, when a clear report of what has been accomplished, and of what remains to be done, should be transmitted, should an application for the continued employment of the establishment be made.

20. As soon as possible an approximate estimate of the cost of reforming the Kristamraz channel should be submitted, in order that provision may be made for this work in the Budget of 1874-75, and the regular estimate should follow when the details have been determined.

21. The head sluice of the channel will require to be altered to pass the full discharge of 450 Cubic Feet a second. At present it would require a depth of 3.3 passing over the crest of the Godary Anicut to obtain this discharge. Were the lower cross stones removed, a depth of 2.2 would suffice, but even this is too much, and therefore it will be necessary to add two vents of 4 feet by 4 feet at some future time, when the demand for water exceeds the capacity of the sluice, and the arrangements can be put on paper though, for the present, the alterations should be confined to removing the lower cross stones replacing them at 1½ instead of 2¼ feet above the sill level, and to blocking up the part of the vent above. Round bar irons 2½ inches diameter may be inserted at 2¼ feet above sill level to support the present baulk shutters, until it may be convenient to substitute sliding shutters worked by screw gearing.

Office of Chief Engr. for Irrigation
Nursipotam 8th Octr 1873

I have &c.
Lieut-Col. R.E.
Chief Engineer for Irrigation

To,
The Secretary to Government G.P.W.D.

Mrb

No 1 to the Madras Govt
dated 31st
Read the Following
from the Chief Engr for Irrigation No 716 B dated 23

The memorandum by the
Chief Engineer for Irrigation
will be communicated to the
Revenue Board, through the
Revenue Department, in order
that the Legislature of Government
may be moved to the Kondaveeda
=kurla Ana may be clearly
and definitively ascertained.
Such detailed written explanation as
may be necessary will be
found in the Revenue Collector's
Eastern District
Engineer will attend the
Collector of Vizagapatam &c
requisite assistance in deter
=mining by the said floods

P. W. D. 1873 Department
From, No. 5849.
The Chief Engineer for
Irrigation
To, The Secretary to Govt.
P. W. D.
No. 716 B.
Dated 6th } October 1873.
Rec 28 "

Mems. on the Konda=
=kurla Ana project
in connection with the
Godavery Anicut
across Saradamuddy and
Kistamraz &ca Channels.

No 2994 - 12 Dec 1873 -

No 2-10
Mailed to Govt 29 Oct 73

or otherwise the proper boundaries of the Ava, and he will arrange for having them carefully surveyed, so soon as they may have been determined.

2. The District Engineer of Salem will call upon Mr. Turner to explain at once why the instructions, contained in Government Order of the 17th January last, R.C. 157, have not been complied with.

3. The employment up to the close of the official year of the Survey establishment detailed in para 19 of the Chief Engineer's Memorandum is sanctioned, and its cost will be debited to the provision for temporary establishments.

Wm. 15/10/73

C. No 996

R 210-11.

No. 2994 Public Works Department

35

Rec: of the Madras Government

Read the following

From the Chief Engr for Irrign. (P.E. Dec. 7/1873 & 8th Oct/73.

The Memorandum by the Chief Engineer for Irrigation will be communicated to the Revenue Board, through the Revenue Department, in order that the rights of Government in connection with the Kondaveeta Ava may be clearly and definitely ascertained. Such detailed instructions as may be

effectively maintained

necessary will be issued in the Revenue Department. The District Engineer will afford the Collector of Vizagapatam all requisite assistance in determining by the aid of levels or otherwise the proper boundaries of the Area, and he will arrange for having them carefully surveyed, as soon as they may have been determined

The employment up to the close of the official year of the Survey establishment detailed in para 19 of the Chief Engineer's Memorandum is sanctioned and its cost will be debited to the provision for temporary establishments

It is considered unnecessary that the order of para 2 of G. O. No. 157 of 14th January should be repeated. Dr it Assistant Engineer G. J. Turner was instructed to draw up in communication with Lieut. Col. Fischer a certain Memorandum, and to forward certain papers to the District Engineer of Vizagapatam; and His Excellency the Governor in Council looks to the Chief Engineer for Irrigation to enforce such orders without further

reference to Government;
as he expects him to see
that the detailed in-
-structions contained
in his note above recorded
are duly carried out by
the District Engineer
of Vizagapatam, and
Mr. Brickwell, without
detriment to the Executive
duties of the latter office.

Genl

60
6

To
Md Dt Engr Vizagapatam
" Dt — Godavery
" Revl Deptt
" Chief Engr for Irrn
" Controller

Accpd 15/12/73.

15/11/73

C/2.5549

Govt. of {1873} Madras.

PUBLIC WORKS.

To The District Engr
Vizagapatam

Dated

Recd. Encl 2994

G. O. 12th Dec. No 2994.

Nos. 2101/11

Kondakila Ava Pro-
ject- Passing orders on
Secrs: by the Chief Engr
for Irrigation on the
Kondakila Ava
Project.