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78
Read the following:—

MEMORANDUM.

IN February and March last a tour of inspection was made in the South Arcot District, and the following notes on the works seen and parts of the district visited are submitted for the information of Government.

2. This tank is of considerable size. It has a bund $2\frac{3}{4}$ miles long between the calingulahs at either end. The east calingulah is in very bad order, and appeared to want rebuilding, but the Range Officer, Captain Graham, thinks he can repair it and make it efficient. The access to the bund is much obstructed by jungle; the inside slope should be planted throughout with tank grass (kuskus). Near the west end there is a calingulah about 170 feet long with 61 upright stones, the length available for discharge being about 150 feet. Water-marks are 2 feet above the body of this escape; the west wing is very low, and the apron requires some repair. Beyond this again there is a small calingulah with a breach round the east wing. Judging from the Atlas Sheet the drainage basin is about 35 square miles, and, if so, the total length of waste weir required may be taken as 300 feet, with a maximum depth of 3 feet passing over, in which case the top of the bund above the crest should not be less than 6 feet; or 560 feet with 2 feet as the maximum depth on the crest, when the top of the bund may be $4\frac{1}{2}$ feet above that level. With a longitudinal and cross sections of the bund it will be easy to determine which arrangement will be the more economical. Several tanks lie above in the same catchment basin, and their safety will require to be provided for similarly.

3. Several small tanks were seen on the line of march, all of which require thorough repair. The level of the bunds varies very considerably; the revetments have for the most part fallen or settled out of shape by the washing out of the soil, and when rebuilt should have a backing to prevent this; the wing-walls of calingulahs are generally too low, and their aprons need repacking.

4. This tank is much larger than that shown on the Atlas Sheet; formerly there were two tanks which have been joined into one. The northern part of the bund is covered with jungle, which is less thick elsewhere. Much of the bund is in very fair order, but the places where paths cross the bund are very low, and these here and elsewhere should have ramps at gradients of about 1 in 6 added to make them more convenient and less liable to be cut down. Revetments in better order than usual. There are two sluices, one of which requires rebuilding, and the other repair and lengthening in rear. There are three escape weirs, calingulahs of the ordinary kind, which appear to be of sufficient capacity; the wings which are too low should be raised. The ryots wish for a supply from the Paumbayaur, which is connected with the Pooniar anicut (near Trikalore), and this it is believed can be afforded.

A 2

See page

10. The construction of this embankment was sanctioned in August last for the purpose of shutting out Pooniar water in high freshes from the Koryaur, and in the Note on the estimate it was pointed out that the nanel planting in connection therewith should be commenced as soon as the state of the ground was favorable. Instead of doing this, the plantation was commenced in January, and when the work was visited in the last week of February there were many coolies employed in watering it. There was no chance of saving much of the plantation, and the useless expense of watering was therefore ordered to be discontinued. The watering of the nanel revetment or facing of the embankment ought alone to have been necessary; all the rest, if planted at the proper time, would have thriven much better without any water, than at a later period with any amount of artificial irrigation. This bank was carried away in the flood of May last, and the requisite instructions as to its proper level when reconstructed have been given in reviewing the report of the damage sustained.

11. There is a ruined anicut across the Guddelum river, some six or seven miles above the point where this crosses the Trunk Road to Trichinopoly. A project for a new anicut about two miles higher up the river was submitted for sanction some time ago, and further information was called for. An establishment for working out the project was sanctioned in September 1873 and had not been entertained, the time of the District Engineer and Range Officer having been fully occupied with current work.

The restoration of the old anicut, which was turned at the left bank of the river, owing to its having no wing-wall, would be a very simple matter either on the present or on a new line just below. There is some rock here in the bed of the river; the old work consisted merely of a little rough stone packed so as to form an oblique dam. The irrigation on the right bank will be confined to the limited area between the channel and the Guddelum, down to an affluent which falls into the latter close to the Trunk Road. That on the left bank has to be determined, but its boundaries are, on the one hand, the junction of the Guddelum and Mullataur, and, on the other, the irrigation under the Pooniar and Mullataur.

If an anicut be built at or near the old site its cross section will be simple. The body will be built on concrete laid on fairly hard soil or rock, and will consist of a wall 3 feet wide at top, coped with stone and with a vertical face below and slope of 1 in 4 on the upper side. The cut or fitted stone apron should be in width five times the height of the anicut crest wall, and probably three or four yards of rough stone outer apron will suffice. Rupees 750 may be allowed for temporary buildings at the anicut, of which 450 to 500 will do for a bungalow of the same kind as, but smaller than, that at the Pooniar anicut, and the rest will provide for sheds.

In other respects the instructions already given appear to be sufficient.

12. This weir is a fine old native work on the Manimuthanuddy, at its site built to reduce leakage. The channel offtake, which is on the left bank, is protected

from heavy floods by a sluice vent of massive dry stone, and has never had any shutters. The channel is a very small one and very winding, but the nature of the ground rendered many of the ^{bunds} necessary. It appears to be efficient. There is a great deal of prickly-pear which must be cleared away.

13. A good tank, of which the bund is in fair order except that the revetment is in rather a loose state, but it will stand for a long time to come. Bund much overrun with prickly-pear. The calingulah is in a very dilapidated state, it is said that water rarely goes over it. The supply is good, though very little water is received from the river channel. It will probably be worthwhile to enlarge the latter; the country will take all the water which can be supplied and stored.

14. The bund is in need of repair; the sluice is in very bad order, the rear wall having fallen; there is a cut in the bund at the south-west end for irrigation, which should be superseded by some safer arrangement.

15. This tank is much larger than that shown on the Atlas Sheet. The eastern part is in fair order.

16. The bund is much in need of repair; the water has been very nearly over it; the villagers have done a little kudimaramut very roughly here and there. The bund should be raised to a proper and regular level, and tank grass should be planted to protect the interior slope, which has been much cut away.

17. The bund is in fair order; it has a strip of revetment along the deeper part. There are two old sluices which want looking to, and a modern one at the south end. At the north end a new flush crest has been built some feet in front of the old crest with its upright stones, and the latter should be removed. It is not clear why the new crest was considered necessary, and why the stones were not removed; the wings are incomplete, and should be completed at once. An earthen bund, a few inches higher than the new crest, has been thrown up in front of it; this is contrary to orders, and its removal by the villagers should be directed. The proper height for the masonry crest should be carefully and finally determined, and no obstruction should on any account be allowed.

18. Some earthwork repairs were in progress and were in fair section, but the level was not sufficiently regular. The escape at the end near the road, a dry stone work, is also not very level.

19. This lies close to the road from Kullakurchy to Sepakkum, and on the south-west side. Some repairs have recently been carried out. The unpaired part at the south end is irregular in level, and there is a lot of prickly-pear on it.

20. A small tank, supplied by an anicut across a small stream. A small quantity of a earthwork and some revetment repairs have been recently done; also repairs to the calingulah. The last was not inspected; the other

repairs had been fairly executed, but the earthwork was rather loose; village cattle use the bund as a road, and cut it up much. The cultivation is close up to the foot of the rear slope.

21. This weir is on the Myorenuddy, some 3 miles west of the Trunk Road. It has recently* been constructed.

Katamylur Anicut.
* Sanctioned in G. O.s., Nos. 3,087, dated 1st October 1868, and 212, dated 23rd January 1872.
The masonry apron bears no resemblance to the sanctioned design which shows dressed stone, whereas rubble masonry has been substituted, which has not stood, and is not likely to stand, well. This apron may remain for a few years if it be found that the repairs required are not excessive, but it will be necessary before long to substitute cut-stone for a width of at least 10 feet from the crest wall. The outer apron between the under-sluices and the left bank of the river has been entirely washed away. The wings and head-sluice walls were all raised 4 feet after a flood which occurred during the construction of the works. The river banks below the dam have been much cut away, and they have been faced with durbah or nanel revetment, and on the left bank protected by a modussil also. The left bank above the anicut has also a modussil, and the nanel there has grown very well. The nanel revetments below should be extended to the line of the under-sluice aprons.

Head-sluice.—The sill is supposed to be 4 feet below the crest of the anicut, and there were 4 inches of water on the latter, while the gauge at the sluice read 4 feet 2 inches. The gauge is wrong and should be rectified.

22. The channel from the anicut is so called. Its head has not been well laid out. There are some bulrushes in the upper part which should be eradicated, as they interfere greatly with the discharge of the channel. The way in which this channel has been carried out is most discreditable, the proper levels having been entirely ignored; consequently hitherto the work has been a great failure, and a great deal remains to be done to render the channel efficient.

In the first mile there is a super-passage for passing drainage over the channel. The earthworks have never been connected with the wings, and the jungle stream would be much more likely to enter the channel than to cross the aqueduct, seeing that the bed below the latter is choked with prickly-pear and scrub jungle, and also higher than the junction of the wings and soil; indeed, the drainage did so enter at the upper wing, left bank. The junction of the wings and banks should be properly made and revetted. The bed of the channel here is some 2½ feet higher than the section indicates, and a little above the cutting is, at a reef of rocks, some 6 feet too high. Again, at the half mile the original section gives a cutting of 10.80 feet. Abdul Lateef's section shows 11 feet to be deep, and the actual depth is 6 feet. Here also the cutting is exceptionally deep, and just above, the bed is 9 or 10 inches higher. At the ¾ mile the cutting is 7 feet deep, and was possibly a few inches deeper; the section allows about 10.60. Here a cut in the centre, about 18 inches deep, has been made by the ryots. At the 1st mile stone the cutting is now 2.75, and there are possibly 6 inches of silt (gravelly material of which the lower part of the cutting is composed); the proper depth of the cutting is 4.75 feet.

Aqueduct of six vents in the 2nd mile.—Revetments should be added to the wings to maintain the earthworks, which now are a couple of feet or so below the side walls. The plastering is damaged, much of it wilfully. This work has been built in a pit on rock, which latter must be cut away to 10 feet from the line of the face walls on both sides. There is leakage at the junction of the upper wings and earthwork. The bed of the stream is not 3 feet below the channel bed as the section indicates.

In this mile the banks are irregular, and the intended height of 6 feet from bed of channel to top of banks has not been maintained.

The channel has been breached by the drainage which used to supply the ruined Sepakkum tank. An inlet, with the right bank connected with the tank bund, and an outlet weir in the left bank are required; the latter should have sluice vents in the body wall.

3rd mile.—The banks have never been anything like 6 feet above bed, which here for much of the distance is flush with the ground, or nearly so.

Tunnel on Trunk Road—a 9 feet vent. Depth of water on floor 2 feet 2 inches, and bed of channel except in the cunette is at least 2½ feet above the tunnel floor; the sanctioned section shows no cutting hereabouts, except a few inches just at the tunnel.

For the drainage of the fields to the south of the channel and west of the road a small under-tunnel will be required. The channel (new) terminates a short distance to the eastward of the road, and here there is a quasi-regulating dam with a crest 34 feet long, the mean width of the channel at its head being only 10½ feet; the work is altogether inappropriate. The banks of this part are about 3 feet instead of 6 feet above bed. The widening of the banks for raising them should be effected on the inside, and soil can be obtained from the bed, bars 6 feet wide being left at intervals of 55 yards, the pits will then soon silt up. Much of the ground through which this channel was cut was covered with prickly-pear, and the clearances were so badly executed that it has sprung up again extensively, and a complete clearance is necessary and should be made at once. No prickly-pear whatever must be allowed on either the channel, its berms, or banks.

Nothing need be added to the above remarks to show how carelessly and inefficiently this small project has been carried out. The Officiating District Engineer, who was with me during the inspection, was told that a full report determining the responsibility for such a disgraceful failure, and particularly noticing by whom the channel was inspected and passed, would be required, and this has not yet been received. The early attention of the present District Engineer should be given to the work, and I think that it will be necessary and proper to make the responsible officer, or officers, pay any extra expense which may be incurred in rendering the channel efficient. I am not sure whether over-measurements and payments have been made, but if so, it will be a fit case for retrenchment, for nothing but gross carelessness could have led to mistakes of such magnitude being made.

In its present state the channel, even if completed, could not effectually supply the lands it is intended to irrigate, and there must be an extension or branches both for direct irrigation and for the supply of the Nuggur tank, etc.

23. The bund has a good lower section, but in places it is too low; the deep part has a little revetment. It has one sluice which is unserviceable, and the lands which it should supply are irrigated by a cut close by. There is another irrigation cut a few yards further on. Surplus water escapes over high ground near the village. The bund is a very long one, and is much overrun with prickly-pear. The tank will require a considerable outlay to render it safe and efficient. The revenue is said to be 650 Rupees.

Nuggur Tank.

24. This tank was repaired last year. The top of the bund is not level, and there are no regular interior slopes; the bund might have been straightened and the villagers cleared away some prickly-pear, and a little attention and trouble would keep the bund and two yards on either side of the foot of the slopes clear. The tank has one sluice which wants repair and lengthening, or possibly reconstruction. There is no surplus weir, but water escapes down a channel to the Gotady river, which joins the Myorenuddy just below the Katumyloor anicut.

Adiur Tank.

25. This is a work of recent construction, and has been built across the somewhat with advantage. The masonry apron is in good order; the outer rough stone apron wants a little repair. The under-sluice shutters require rings to allow of their being worked more easily; the sluices next the head-sluice should be opened whenever the water in the river is in excess of the supply required for the channels.

The anicut was finished in 1870, since which time there had been no high flood, but it is said that there was a high fresh in 1869. The wings are 7 feet above crest and will probably require raising, the greatest depth on the crest in the past season was 3 feet 4 inches.

Head-sluice, three vents of 4 feet. There were 2 feet 8 inches of water on the sill, which is 5 feet below the crest of the weir. The upper part of the channel has an irregular bed owing, partly at any rate, to rock cropping out at intervals. It is clear that the draught at the head-sluice, with 3 feet or less on the sill, is very much less than it should be, so that levels should be run for the first mile or two, and the bed should be adjusted to the correct longitudinal section. The side slopes have suffered from erosion a good deal.

Nallur Road Bridge.—This is cracked through the abutments and arch, apparently from being built on varying soil. There is no immediate danger of its giving way, but it should be watched by the Anicut Superintendent.

Parallur dividing Dam.—This has been twice considerably damaged by the parties interested in keeping the main channel open. Two lascars should be located here at night when the next irrigation season commences, and it would be well to offer a reward for information leading to a conviction of the offending persons, the amount to be settled by the District Engineer in communication with the Magistrate. Such lawless acts demand prompt repression, and every means should be taken to obtain the punishment of those who wilfully damage public works.

Manavalla Nellore dividing Dam.—The channel of this village is on a high level and appears to want clearing. The shutters on the main line are unsup-

ported, and should be put to rights. The earthworks here have never been properly executed, and the banks are of very irregular height, even where there are outside pits, which indicate that a certain minimum section had to be made up by additions to the soil obtained from the cutting.

Syphon sluice in the 5th mile.—This appears to be a large work, but it accommodates several channels, and it will serve also to pass drainage. It should be baled out and examined. There are several minor masonry works, some with and some without means of regulation.

In the 7th mile, what is there the principal channel crosses the Virdachellum road, and follows the course of an old supply-channel of the cusbah tank, which has been embanked with soil taken entirely from the outside of the channel. The course of the deep bed of this channel wants improvement; at present within narrow limits its course is very crooked, and in places the embankments are being undermined.

Prickly-pear is more or less prevalent all along this channel, and should be removed—one bank should be made into a bridle-path; at present inspection is somewhat difficult, the top width of the banks being sometimes less than a foot, while every here and there they are impassable from prickly-pear or scrub jungle.

26. This tank, which was recently constructed, held water, I was informed, in 1872, and breached in October 1873.

Vylur Tank.

A copy of paragraphs 26 and 27 was furnished to the District Engineer in March last.

An estimate for closing the breach and bringing the bund to a proper level throughout will require the sanction of Government, and, in submitting this estimate, it will be requisite to afford full explanation as to why it was left unfinished, though, it is understood, reported to be complete, the level of parts of the bund being such that its breaching was inevitable on the tank receiving somewhat less water than would suffice to fill it. The names of the officers who passed the work, and of those who had charge of it while under execution, should be reported, with dates, quantity, and value of work passed by each, etc. The new tank is a continuation in a northerly direction of an old tank under which, even in this unfavorable season, there is some excellent cultivation.

On the first sluice the H. W. level has been marked at $6\frac{1}{2}$ feet above the sill, and this appears to be about $1\frac{1}{2}$ feet below intended full tank level.

On the longitudinal section the top of the bund is shown at 4 feet above full tank level, and this was altered by a note on a slip of paper attached thereto to $4\frac{1}{2}$ feet, so that the highest level reached by the water was some 6 feet below the proper top level of the bund. From the south end to the third sluice, which is a short distance to the north of the breach, the level of the top of the bund is most irregular; this I observed, and the longitudinal section taken for the restoration estimate clearly shows this to be the case. Immediately north of the breach the longitudinal section shows that the bund should have been $(12.58 + 0.50) 13.08$ feet above ground; the new section gives the actual height at 7.35, or 5.73 feet below the proper level. I checked this roughly with a measuring rod on the ground, and there is certainly no considerable error. Moreover, the bund slopes from both sides towards the breach, so that it is certain that it was somewhat

lower at the point where the water first spilled over it. It is tolerably clear, therefore, that when the tank breached the water was at least 18 inches below full tank level, and this is confirmed by the fact that the bund to the north of the surplus weir has never been carried up to the point intended, and that the ground beyond it is below full tank level, but no water appears to have escaped over this ground. The total length of the bund as constructed is 4,968 feet, and that of the original section 5,152 feet, so that 184 feet have yet to be added.

The sluices have not been built in the places indicated on the original section, and the masonry is not as good as it might have been. It is very doubtful whether the vents are of sufficient capacity, the plug hole being but 3 inches in diameter and the lower opening 6 inches square. This matter should be looked into, and the requirements of the cultivation ascertained. At half the full depth on the sills the sluices should be capable of passing a full supply for the entire area through the plug hole, and at one-fourth of the full depth through the plug hole and lower opening combined. Taking No. 1 sluice, the full depth is about $7\frac{3}{4}$ feet; the orifice is $2\frac{1}{4}$ feet this is $3\frac{3}{4}$ feet; the discharge about $1\frac{3}{4}$ cubic feet per second, $C = \frac{1}{4}$ above sill, so $h = 1\frac{1}{2}$ feet and $v = 6.81$ $A = \frac{7}{144}$ $D = \frac{7 \times 6.81}{144} = 0.331$ cubic feet a second = 44 cubic yards per hour, or at most enough for 22 acres. With one-fourth the full depth, or $1\frac{1}{4}$ feet on the sill of this sluice, the plug hole would be above water, and the lower vent would discharge about $1\frac{3}{4}$ cubic feet per second, or enough for about 116 acres.

The waste weir is an efficient work of 22 bays of $4\frac{1}{2}$ feet each, or 99 feet in the clear, the total length between wings being 118 feet. The heaps of earth above crest level in front should be cut down, and the soil above the apron level in rear should be removed and formed into a training bank from the left rear wing return, so that the water may flow directly away, and not along the face of this return.

The shutter stones are $1\frac{3}{4}$ feet high, instead of 2 feet, as in the section. The site of the work is apparently somewhat to the north of that intended, but as it was indicated on the section by a line instead of by a space of 120 feet, the exact intention is not now ascertainable, and if the line represented the south end its position is about right. A rough stone apron 6 feet wide and 1 foot thick should be placed below the retaining wall of the apron. The soil of the bund from the south end to half way between the third sluice and the waste weir is a good dark clay; much of it was thrown up in the irregular way common in this district, instead of in regular section to the full width from bottom to top; the slopes are very steep, and it is doubtful whether they ever were correctly thrown up. North of the surplus weir the earthworks have certainly never been sectioned at all. A ramp at about 1 in 6, and 5 yards wide, is required on either side of the bund a little north of the waste weir for a cattle crossing, though the cattle ought to go round the end of the bund, which is only a few yards distant.

The interior slope from the south end nearly up to the breach is protected by grass which has grown strongly, and should be continued up to the north end. The prickly-pear which has drifted on to the bund should be entirely removed and buried.

In closing the breach the instructions contained in Circular No. 48 should be attended to, and the whole of the bund up to the waste weir should be brought to a uniform level of $4\frac{1}{2}$ feet above the top of the dam stones, while north of the weir the top may be carried from the wing-wall to the ground at 18 inches above full tank level.

The tunnel over the main feeder of the tank on the Olundurpet road should be examined. Scour appears to have been going on for many years.

27. This was restored in 1870-71 at a cost of Rupees 2,062, and it breached in the cyclone of 1872. The bund east of the breach is wretchedly weak. West

of the breach some work has been recently done by the people in anticipation of the sanction of an estimate, but it is so done as to be of little or no use. The restoration must have been very badly carried out, and the present section of the bund is extremely like that showing its condition before the restoration. The tank has a good and sufficient waste weir and a new sluice.

Before closing the breach all the sand must be cleared out from the bottom, then a trench 2 feet deep and 6 feet wide is to be cut into the firm soil, and carried into the old bund on either side for a distance of 9 feet, and then the whole section of the bund is to be carried up in thin layers from the bottom and watered and well rammed. In other respects the instructions of Circular No. 48 should be attended to.

28. This anicut also is on the Manimuthanuddy, 5 or 6 miles below Virdachellum. It has channels from both ends. It was built in 1867-68 on an

estimate of Rupees 28,420, and is a good work of the pattern usual in this part of the country, viz., a crest wall with a vertical overfall. The crest or body-wall is 6 feet high. Wings $9\frac{1}{4}$ feet above crest, which should be taken into account in considering whether the wings of the Mehmatpur anicut are high enough, there being but little drainage coming into the river between the two dams. The masonry apron requires underpinning in parts, and the body-wall should be pointed. The rough stone apron has almost entirely disappeared, and should be replaced at once, or the safety of the anicut will be endangered; its surface may be 1 foot below that of the masonry apron. The head works generally require careful repair. The under-sluices have evidently not been worked as they should be, and their intended object of clearing away deposits from the neighbourhood of the head-sluices should not be lost sight of. The head-sluice on the left bank has three vents, that on the right bank two vents; the sills are 4 feet below the anicut crest.

About $1\frac{1}{2}$ miles of the north or left bank channel are modern, and form a new head to an old channel. The former has one or two obstructions to inspection, the latter is overrun with prickly-pear which must be cleared away thoroughly.

29. This considerable project is under execution from Loan Funds. It is situated on the Vellaur, about 10 miles south of Virdachellum. The brick

masonry below the stone apron was, in March, complete throughout, and the stone

apron was well advanced; this is to be 25 feet wide, and beyond this a further width of 18 feet of less carefully fitted stone apron remained to be constructed. Opposite the under-slucices the former will have a width of 35 feet. The two ends of the anicut had been raised to the full height for a few feet, elsewhere the crest wall had not been commenced. There is to be one set of under-slucices near the right wing, there being only one channel on the south side of the river. The piers and facing of the sluices are of sandstone, as also the masonry aprons, coping, etc. This stone is obtained from Virdachellum, and is a very excellent building material.

The lime used is from a limestone found in great lumps in the river bed. It is a fat lime and is not suited, when used as a sand mortar, to hydraulic work. I found it quite soft in masonry, which had been built for a considerable time. A mixture of clay and lime was used for the concrete in the foundations, and this, it is said, set well. All the foundation work, and indeed the whole work every where, ought to have been built with hydraulic mortar. In the joints of the under-slucice apron a trowel could be inserted without difficulty, and of course such cementing material is useless. There is a clay close to the anicut which appeared likely to answer when burnt for mixing with the lime. A few dozen cakes were to be burnt for trial of the proper proportions. Brick dust should be mixed with the lime for ordinary superstructure work, one brick dust being substituted for one sand. The bricks used are rather indifferent, but those which have been well burnt will make sufficiently good internal masonry. The limestone blocks are to be used for the rough stone apron for which they will do very well.

It is to be regretted that the masonry aprons were not stepped down a couple of feet or so, and the under-slucice flooring placed so much lower, for the bed of the river is already considerably below them, and this will lead to expense in maintenance, especially of the rough stone apron. The surface of the latter may be placed 1 foot below that of the masonry apron.

The head-slucice is of brick masonry, some of the face work being of machine-made bricks, and the rest of bricks made in the ordinary native way. The work is moderately good; it may be plastered up to 6 feet above sill level, above that pointing will suffice. The shutter grooves are of brick and will not do. Iron (angle) ought to have been inserted, and must now be placed there. The shutters are, it is said, to be supplied from Chepauk, and the masonry will have to be altered to take them, as no space has been left for the shutter spear; the belt heads also will, unless countersunk, come in contact with the lintel and face wall. Holding down plates will also be needed. The sluice is not at right angles to the head of the channel, and the consequence will be a set against the right bank.

Main Channel.—This was for the most part in an extremely unsatisfactory state. The spoil was thrown up without any attention to regularity, and the drainage from it had already cut deep gullies in the channel side slopes and berms. The widths also near the head were found to be irregular, and the centre line had not been properly laid out. A great deal of silt has come into the first quarter of a mile, partly from river water which ought to have been excluded, and partly from drainage finding its way through the irregular spoil banks. The drainage which now comes in on the right bank a few yards below the head sluice must

be stopped. The flood bank on this side will be about 20 feet high above bed of channel, and that, with perhaps a small cut at some distance to the southwards to pass accumulated drainage water into the river, will effectually stop it. No opening must be left, or the head-slucice would be liable to be turned. All sand should be removed from the bed of this infall, and then the new earthwork must be carried into the good soil on either side, and be very carefully filled in so as to make a breach impossible. The drainage on the left bank of the channel should be turned into the river below the anicut. A small flood bank will probably be required on the left bank of the river.

The first furlong, and the greater part of the second, was laid out afresh by me, so as to correct as far as possible the irregularity of the excavations, and diminish the set from the head sluice.

Cost of the Anicut and Head Works.—The Officiating District Engineer gave me to understand that the estimate for these would be exceeded, but the accounts were not in a state to admit of any definite information being obtained, and the few accounts of this range, which I had to examine in connection with a special inquiry ordered by Government, convinced me that in the little time available it would be impracticable to ascertain how matters stood. The Deputy Controller was expected about the time of my visit, and to him was therefore left the duty of overhauling the accounts. A report has been called for which will be reviewed in due course. The fact that certain unsanctioned works, as a bungalow and a

short piece of road, had been undertaken and completed has been separately reported* to Government.

* No. 450-I, 26th June.
Proceedings Madras Government, No. 2,262,
dated 15th August 1874.

30. Drainage of berms and sectioning of spoil banks.—One of the great defects nearly everywhere along this channel is the absence of any arrangements for disposing of the drainage from the spoil banks and berms. Instead of the banks being thrown up from the first in rough section, with the slope of the soil always away from the canal, and with, as a temporary arrangement, six or eight openings a mile left through the banks for passing such drainage to the outside, the berms have by the dropping of earth from the baskets got a slope towards the channel, and this slope is continued over the banks, so that on every fall of rain a great deal of water runs into the channel carrying with it some soil from the spoil banks, and cutting gullies in the side slopes. It is as easy to do the work properly as without attention to essentials, and of course infinitely easier to prevent damage and silting than to remedy the one and clear out the other. Special attention was called to the results during the inspection, and it may be hoped that in future work will be carried out in an efficient manner.

31. A bridge is required at the 1st mile-stone for Pelandorai, the span must not be less than 26 feet, and a width of 9 feet between the parapets will suffice. An estimate for this and other additional works, found necessary since the works were commenced, should be submitted for sanction.

32. About a furlong below the 1st mile-stone a drainage is intercepted by the channel, and water accumulates behind the right bank, swamping the village. This water used to run into a pond behind the left bank. The drainage can be

diverted to the aqueduct at $1\frac{1}{2}$ miles, which should have a width between side walls of 6 feet instead of 4 feet, and the ends of the side walls should be 3 feet higher than the central part, so that excessive drainage may be discharged into the channel and do no injury.

33. At $2\frac{1}{2}$ miles a bridge of 26 feet span was under construction, the thickness, $4\frac{3}{4}$ feet allowed at the abutments, is small; the bricks used are common; the earthworks behind the abutments and wings had not been properly tamped; this omission is a cause of cracks and settlements, and the consolidation of earthworks at their junction with masonry works is of essential importance. Wings may actually be split right through by the settlement of soil on either side of the ends.

34. At $2\frac{7}{8}$ miles an aqueduct is to be built to carry a drainage across to Kurukadajairy. There is no defined channel, but there is no doubt some water of value to be taken across. Care must be taken that the aqueduct side walls are above full tank level, which appeared to be somewhat doubtful.

35. At $3\frac{1}{2}$ miles an additional aqueduct is required for the Pootoor tank (Trichinopoly District). This must have an iron duct, as the cutting of the channel here is only 7 feet 4 inches.

36. In the lower part of the 5th mile the cutting is very small, and the sections show varying depths of water. These sections are on the working drawing of the channel and require to be put right. The channel and banks were not properly marked out, and sections to guide the work-people should be put up at every chain (66 feet).

37. In the upper part of the 6th mile a bridge of two spans of 12 feet head been built up to springing level. It should have been two spans of 15 feet at least as the depth of water is less, and the width of channel, the discharge being the same, greater than in the upper miles. Earthwork filling was badly done and without proper tamping.

38. *Rajandraputnam Fall and Head-sluiice.*—The crest of the fall and the sills of the under and head sluiice should be of sandstone. The cushion floor is finished, and it would have been better had half its width next the drop wall been of stone, as also the coping of the cushion wall. The earthworks will have to be carefully joined on to the irrigation sluiice, the wings of which are not adapted to the banks.

39. Just below the $8\frac{1}{4}$ miles there is a bridge of two arches of 12 feet span each. These bridges, as regards some of their details, should have been designed with special reference to the circumstances of the sites they were to occupy, instead of which the lengths of the wings have, under different circumstances, been made the same.

40. In the 8th and 9th miles there are two considerable drainages crossing the line of the channel, and these must be effectively dealt with, so as to prevent their being a source of danger to the channel.

41. *Head-sluiice of branch channel C.*—This is on the line of road, and at some distance from the main channel. Vent 15 inches by 10 inches. Work finished except the shutter.

42. *Head-sluiice of branch channel D.*—The head of this channel has been placed where very heavy cutting has been necessary, although a short distance

above an offtake might have been obtained in any cutting deemed convenient. The sluiice is on the road. Vent grooves should be made in stone not in brick-work, which will very soon be knocked to pieces.

43. *Strimustnum cutting.*—This heavy piece of work of which the greatest depth is 34 feet, was finished all but the dressing of the slopes and bed, and the putting of the spoil banks and berms in order. The Contractor has applied for and increase of rate, and if it can be demonstrated that an increase would be only reasonable, there will be no objection to his claims being considered. The requisite instructions have been given. With one or two exceptions, where a slight deviation from the line proper cross section has occurred, this cutting has been well done. A drop or fall was under construction at the lower end of this cutting, and a bridge might easily have been combined with it had the need of such a means of crossing the canal been earlier noticed. Puddle clay should be placed against the upper wings and body wall up to crest level.

44. The 12th mile bridge had been completed, except the approaches and roadway, which should be finished at an early date, so that the bridge may be available for traffic. There are two cross drainages in this mile, and it is intended to divert the first to the second, and to provide an outlet in the left bank of the channel. The necessary plan and estimate should be prepared at once. The earthworks of this part of the canal are very incomplete, and much of the spoil will have to be removed, it having been placed out of the proper line.

45. At $12\frac{1}{2}$ miles there is a small cross drainage which will have to be admitted to the channel, and an outlet for it in the channel bank will be needed.

At the lower end of this mile a small part of the supply of the Yerranjan tank of Tetampett has been stopped by the channel. Possibly if this water be of importance an equivalent supply could be afforded from the channel. The circumstances should be investigated.

46. The cutting in the 13-14 miles was nearly down to full depth. The spoil banks were very irregular, and had occasioned much guttering of the side slopes of the channel.

The village of Nqchiarpett is close to the channel, and the villagers have asked for a bridge, which is certainly necessary, and an estimate should be prepared.

47. A small inlet is required in the upper part of the 15th mile for drainage from some paddy-fields. The Calingari tank supply stream also has to be provided for. An inlet on full supply level will submerge but little land, and may be 20 feet long. The outlet weir should have a sluiice vent for surplus water, and another for irrigation. The bed of the stream is a little below channel bed level.

In the first furlong of the 16th mile a small inlet and outlet are required. Nine feet crest will suffice.

48. The dividing dam at the lower end of the main channel is a nondescript work quite unadapted to its situation, and it will be difficult to maintain the bank between the two channels.

A drainage which comes into the channel just above this dam will require no special provision.

49. The Pelandorai project has suffered considerably from the frequent changes of the executive agency, both that employed on the works and that in charge of the range. It will cost more owing to these changes than would otherwise have been necessary, added to which a proper control over the petty contractors, to whom the earth and other works have been let, has been very difficult of attainment. On the whole the state of the works, no less than that of the accounts connected with them, is very far from satisfactory. Even where, as at one place near the head of the channel, a small length of the bank and berm on the left side was properly done as a guide to the work-people under Mr. R. E. Norfor's direction, no effect upon the rest of the work, even in the immediate neighbourhood, was produced. What was clearly wanted was an officer in charge who knew how work should be done, and who should have had charge of the project from its commencement to its completion. The results would, then, have been very different. The necessity for arrangements in connection with cross drainage was pointed out at the time the estimates were submitted for sanction, and all that is needed on this account should be estimated for without further delay.

50. It was noticed in reviewing the project that additional storage would be requisite, the tanks to be supplied not having sufficient capacity to provide a reserve for the increased area of irrigation. A statement, dated 1st November 1873, shows that the capacity of nine out of the twelve tanks referred to in the papers No. 3,880, dated 10th December 1869, note paragraphs 5 and 11. printed with the Government Order on the estimates is very much below the approximate estimate than given, while the proposed enlargements would add very little to the storage, and would cost more than they would be worth. Something may perhaps be made of the Konamungalum tank, as the estimate makes the cost of the additional storage about 1 Rupee for 365 cubic yards, but the calculations of present and intended areas are certainly incorrect somewhere, as the present area is certainly greater than that of the re-arranged tank. The capacity of two other tanks was roughly checked, and in one case it was found to be one-third less than that supposed, and in the other only one-third of that intended. At the latter tank the rate of storage would be 53 cubic yards the rupee, and the cost would, therefore, be prohibitory. This subject must be dealt with by some one competent to determine from an inspection of particular tanks whether they are capable of being enlarged at a reasonable cost, and if so to fix approximately the limits of enlargement. It is by no means a difficult matter and might very well have been settled a year or two ago.

51. At the anicut there was a brick machine and some other plant which will not be used any more, and which Plant not required for the project should be got rid of. Stores at a valuation. Under the circumstances of the work, it is to be regretted that such plant was indented for, but at any rate it should now be transferred to where it may possibly be made use of.

52. This tank is to be supplied from the Pelandorai channel. It is in very bad order. The waste weir has a breach round the north wing. The tank evidently receives sometimes a considerable supply, and it may be necessary to provide for passing this across the main channel. A sluice in the bund for branch channel had been partially built, and the channel therefrom had been dug up to and beyond the Trunk Road; three distribution sluices on the latter would have been better had they been built as small road tunnels with regulating shutters.

Pandien Tank.

53. The second apron behind the southern under-sluices was under repair. The outer rough-stone apron has almost entirely disappeared, and its replacement was urgently necessary. Instructions were given for taking sections from the apron down the river for 50 or 60 feet at intervals of 20 feet, and for noting thereon how far the debris of the rough-stone apron extends. The masonry apron and the body of the anicut are in good order. The under-sluice shutters want renewal; they can be transferred to other sluices where shorter baulks or needles will do. One of the cast-iron shutter bars was broken and should be replaced by a wrought iron bar, as this will cost less probably than cutting out one of the superfluous bars in front of the shutters.

Shatiatope Anicut.

The plastering and pointing of the bridge over the anicut need attention. This appears to be a Local Fund work, as the bridge was built by the Trunk Road Department in 1850-51. It is said that 13 feet of water went over this anicut in November 1871 (cyclone). After visiting Cuddalore on the march southwards, a more detailed examination of the anicut was made, and the following matters were noted:—

Water-wing and buttress, left wing, lower side.—This addition was made five years ago; the brickwork was badly done, and plastering was laid on without raking out the joints, consequently it has never adhered properly.

From the north the whole of the edge of the second apron up to the extended apron has been more or less undermined, and stone must be packed in all the way along. The extended apron opposite half the fourth and the fifth bridge arches has sunk a good deal, but it is said that it had not been disturbed by the freshes of the last season. The hole under it near the north end should be under-pinned. The cut stone apron is of sandstone, obtained from Gungagoondapuram, about fourteen miles distant south, near the 148th mile-stone of the Trunk Road. The sluice piers are cased with the same material, and it is an excellent stone. The existence of these quarries was brought to the notice of the District Engineer, Tanjore, as the stone will be a valuable material for use at the Lower Anicut, the distance of the quarries thence being moreover only six or seven miles. Some few stones in the fourth bay from the south, at foot of the overfall, near the third pier, require to be replaced. A good many pot holes were noticed in the laterite steps of the anicut crest wall, of which there are four, two being of laterite and two of sandstone. These holes should be filled in with hydraulic cement concrete.

All the plastering of the bridge at this part was badly done, the joints not having been raked out; the brickwork is good and need not be plastered above ordinary fresh level. There is a hole 10 to 14 feet deep below the southern third

arch (right bank). It is the result of a set on the left bank about half a mile above the anicut; the approach of the river to the anicut is bad, and at different times some measures have been taken to rectify the course of the river and to produce a more direct approach and a more equal discharge, but these have not been successful, because they were not adapted to the local circumstances. A cut should be made on the left side from about 150 to 200 feet below the head of the channel leading to the north channel head-sluice, down to the left abutment face. This cut is to have its bed 2 feet below anicut crest level at the upper end, and 4 feet below that level at the lower end. As soon as an accurate survey shall have been made of the river for one mile above the anicut, the exact alignment will be laid down. In the first instance the cut should be made four yards wide with 1 to 1 slopes on the left side, and a vertical face on the other side. The lower end is to communicate with the under-sluices, and whenever they are opened the soil on the right side of the cut is to be loosened with crowbars, so that the draught of the under-sluices may wash it away, until the whole of the soil outside the new alignment shall have disappeared.

Some distance above this two groynes have been constructed; it is doubtful whether they were really required, as they are in a bay on the left bank which has silted up a good deal, but they may serve to help to establish the nanul plantation, which, it must be noticed, was commenced some months after the proper time. The groynes are great masses of earth, revetted with nanul on the up-stream side, which is further protected by stakes and wattle, between which latter and the nanul facing brushwood has been packed. The upper of the two groynes is higher at the nose than at the root, and a very moderate fresh would breach it. The root should be some 5 feet higher, and a bank of small groyne can be placed up on the present wide bank forming the body of the river embankments. A connection should also be made above maximum fresh level with the

All work of this kind should be based on surveys; it is impracticable to carry out river conservancy properly without the information which surveys afford. The Revenue Survey maps will be very useful, and do away with the necessity for much new surveying. The flood bank (left side) was heavily breached in 1871, and, as a result, the Trunk Road was breached in many places. This accident affords another instance of the costliness of leaving works to take care of themselves. The flood bank was not properly maintained, even if it had ever been raised to a sufficient level, and so just when it should have fulfilled its intended object it failed and led to an expenditure, one-fiftieth part of which properly applied would have secured the works and country the bank was constructed to protect.

On the right side of the river above the anicut there is a cut which was made many years ago by Major Lawford, when Civil Engineer of the division, and called the Eachy Voikal. This would be of advantage if it would act, but as is almost universally the case with cuts which have their heads at points away from the strong current, it is in backwater, and rapidly silts up after clearance. Foord's cut on the other side of the deep channel is for similar reasons non-effective. The river in all considerable freshes spreads a long way beyond its ordinary channel or bed.

54. This is at some distance above the anicut and from the river, and the leading channel is not very effective. It is a sluice of three vents, and the ordinary water level is $4\frac{1}{2}$ feet above sill. It is in better order than most of the masonry works hereabouts. The arrangements for working the shutters are not convenient, as the platform consists of one cross stone to each vent on which the lascars must have considerable difficulty in balancing themselves and can exert but little power. The river flood bank beyond the sluice was in very bad order.

55. This sluice has three vents of 6 feet each, and is on the Trunk Road. The first apron has a drop of 15 inches, and at the lower end of the second apron,

Rajah Voikal surplus sluice. which is 12 feet wide, there is a drop of nearly 3 feet, and beyond this again a hole 8 or 9 feet deep. There was formerly a rough-stone apron 12 feet wide here, but it has almost all been washed away. The water-wing under construction on the right side should be carried out to the end of the second apron, and below the latter a rough-stone apron four yards wide and one yard thick, to be laid on a slope from 1 foot below the surface of the second apron, should be given. Another masonry apron would have been better, but there was no chance of its being constructed in time, as the laying of the foundations of its retaining wall would have been difficult, and no materials were ready. The wing on left side is cracked and buttressed; the water-wing on this side should be repaired and extended to the same length as that on the other side.

This sluice has suffered from a retrogression of levels in the channel below, and what is necessary is the carrying down of its aprons to the present, or to somewhat below the present, level of the channel bed.

56. This is a regulating sluice on the North main channel which here passes into the tank. It is very greatly in need of repair, and should be attended to at once.

Wallajah Tank head-sluice.

Above this several channels take off and have their head-sluices in the Trunk Road embankment. One of these—the Odiyur—had recently gone to pieces, and was about to be reconstructed at a fresh site a few yards to the south. As the design was not adapted to the locality, a revised design was prepared and furnished to the District Engineer.

57. This is an important tank, and is a long narrow reservoir lying to the west of the Trunk Road for a distance of several miles. It was inspected from

Wallajah Tank.

the north end, near which extremity there is a surplus sluice of two vents, which is used also to supply the Permaul tank. The northern abutment has settled northwards and westwards. The rear face is badly cracked, and the lowest apron wants repair. The earthworks in connection with the sluice are in bad order.

North Calingulah.—There are some cracks, but not of much importance, in the wings; these should be carefully filled to prevent vegetation taking possession of them; the second apron requires some repair. Length of body-wall about 120 feet. All the surplus crosses the road by a five-arch bridge (arches 30 feet span apparently), and it seemed probable that a road dam 150 yards long placed some

distance to the north of the bridge, where the embankment is low, would be a wise precaution against damage.

Middle or second escape weir.—This consists of a broad body-wall with three small steps in rear, then a wide laterite apron with a drop of 5 feet on to a second apron 12 feet wide, from which there was a drop of some 18 inches on to a rough-stone (laterite) apron 8 or 9 feet wide, which latter, except at the two ends, has disappeared. The aprons require repairs, and the body-wall is much out of repair. The wings are badly cracked in all directions; the south wing rear return has fallen over. The first apron has several bad longitudinal cracks. There are no upright stones. This work appears to have been much neglected; the wings must be entirely rebuilt with proper foundations. The inadequacy of these here and elsewhere in this part of the district has been the cause of the failure of many masonry works, and it is evident that the nature of the soil has not been duly taken into account, and it must be added that failures of old works have not led hitherto to such alterations of design as would prevent new works following their example.

Third or Southern Escape Weir.—This is a few yards distant from the second. The wings are cracked in all directions. The body or crest wall is wide, and there are nine aprons of varying widths with drops of small height. Some small repairs were executed three years ago, and some little work is now required. The wings must be rebuilt with adequate foundations, as they overhang and may fall at any time, and thus occasion breaches. The length of this weir is 98 feet, and it has no upright stones.

About a third of a mile south of the last-mentioned weir a narrow strip of revetment begins, which is for the most part in disorder. Then for considerable lengths at intervals there is a brick-in-chunam revetment wall, which has been pushed out of position by the earth, and against it a lot of laterite stone has been piled to prevent its falling; here again the foundations appear to have been defective.

Northern Sluice.—This appears once to have been an efficient work, but it is much out of repair, owing in part to the laterite of which it was built being of indifferent quality. A new plug stone is required, the part of the old stone between the plug holes having disappeared. The tunnel is said to be out of repair, and the sluice generally needs thorough overhauling and putting to rights.

Jenghada and Kolakudi Sluice.—This is of comparatively modern construction; its head is all to pieces.

Kistnapuram Sluice.—A modern work (1857). There are two large cracks in the rear wall. It has a rear cistern, over the top of which the water flows. Behind the front wall a large hole has opened, and this had been temporarily stopped with clay and straw. River water was flowing to this sluice. The bed of the tank is about 6 feet above the sluice sill. No proper regulation appeared practicable, and this should be attended to in repairing the head.

Thalakolum Sluice.—Nothing of this sluice visible except a low front wall without apparently any convenient means of regulation.

Varagatuty Sluice, unserviceable; a hole behind the head wall. The soil of the bund of this tank varies very considerably, as does also the condition of the bund; it should be cleared, properly levelled, and brought to

section, the inner slopes planted with tank grass, and the masonry works rendered efficient. It is not creditable that so important a tank should have been so much neglected.

58. *Undermined Tunnel, Trunk Road.*—Riding along to the eastward of the road an undermined tunnel in the 126th mile was noticed, which should be attended to before it tumbles down.

59. *Permaul Tank.*—A large tank with a bund six or seven miles long a little to the north of the latitude of Porto-Novo. The bund to the south of the open waste weir wants some repair, but is for the most part strong. Weir 100 yards long, crest wall and retaining walls are of bad laterite, the aprons are of brick on edge. There is a hole above the weir near the south end, which is the result of cross currents. The Overseer proposes to run out a groyne or training bank from the south-west wing which may answer, but will probably only change the position of the hole. The ground above the crest wall wants levelling. It should be 1 foot below the crest at the body-wall, and should then slope slightly towards the tank. The hole can be filled and the rest of the earth carried to form a bank from the wing to the nullah. The wing is cracked and should be repaired. Wings are 6 feet above crest of weir. A belt of tank grass is required all along the interior slope. There is some prickly-pear (not a great deal) which should be cleared away.

Near the second escape 500 yards of laterite in chunam revetment have been recently constructed at a cost of 9,000 Rupees, or 18 Rupees the yard run; the wall is on a slope of about $1\frac{1}{2}$ to 1, and this is not an economical disposition of masonry. It was proposed to construct an additional length of 200 yards. The work is not properly a repair but an improvement, which should be treated as a new work, and be regularly sanctioned as such.

Second Escape.—This work has seven bays of $25\frac{1}{2}$ feet each. The crest wall is in two steps with upright stones, five of the bays are divided by short piers into sluice vents 3 feet wide, with their sills on the level of the first apron; the steps of the weir wall are of laterite. The first apron of the four eastern bays is of laterite, the rest is of brick on edge; the second apron is of brick-work, and the third apron, built in 1864, is of laterite. The foundations must have been very inadequate, as the work is cracked in all directions. The eastern rear wing return fell over and was replaced, and this later return has separated from the wing. The original work was built in 1854, and was called the covered calingulah. The three western bays were added in 1856. There is a fourth apron of loose stone which is $7\frac{1}{2}$ feet below sluice sill; this is in good order. Wing wall cracks should be cut out and made good where rebuilding is not required, but the east wing must be taken down and rebuilt. The earth has pushed the wings generally out of position, and it was probably not tamped when filling in.

Cement concrete should be used for the apron repairs, and for a covering to the brick-work of the apron. The material called "kuppy" at the Lower Coleroon Anicut is the best for concrete, if it can be obtained in the neighbourhood; it is river gravel.

After running a short distance further in an easterly direction the bund turns northwards and soon reaches a sand ridge, which continues for one and a

half miles, and no artificial bund is there required. The inspection was not continued beyond this ridge.

There are two kotens or lascars on this tank, and they must prevent cattle injuring the slopes, eating the grass on and near the bund, and walking over the revetments. If any more revetment be deemed necessary, it must be designed with a steeper batter and ample foundations; with a proper backing dry stone will do very well, and will be much cheaper than masonry.

60. *Reclamations.*—To the east of the tank some embankment

60. *Reclamations.*—To the east of the south end of the bund of the Permaul tank some embankments were being thrown up to protect from floods some land (330 acres about) durkhasted by a Mr. Pedroza. This is not a repair work; for its proper execution a survey and levels are required, and it should be treated as a new work and be regularly submitted for sanction.

61. *Oopuluvady Channel*.—This is a new irrigation channel from the Pooniar left bank; the head-sluiice has two vents; the lower part of the plastering is not good, and the filling in at the wings, where done, has not been tamped; there is hardly room enough for the shutters.

A road tunnel about 300 yards below the head was under construction; one span of 6 feet. Shell lime was being used without any admixture of burnt clay for the brickwork, and such mortar is altogether unfit for hydraulic works, as it can never set properly in water or damp situations. A short distance below this the channel was laid out on a wrong line and ground broken; then the altered line to agree with the survey was marked out through a tope between two rows of trees, and it being found that this would cause the removal of more trees than would result from making the centre line coincide with one row, the owners of the tope moved the French Authorities, in order that this part of the channel runs, to get the line altered, been the consequence.

Earthworks were in progress along the line altered again, and so considerable delay has to be fairly done.

The channel crosses the Pond: two vent tunnel.

What little prickly-pear there was fully removed.

near there is on the line of the channel should be carefully noted.

Trivandipuram Anicut.

62. There are three anicuts across the Guddelum, of which the Trivandipuram is the lowest. It was built in 1835-36 at a cost of Rupees 4,520.

Its length is 393 feet; crest above apron $4\frac{3}{4}$ feet, crest wall $4\frac{1}{2}$ feet thick, height of wings above crest 9 feet; 4 feet of water passed over in November 1871, and this was the highest fresh up to date, but it was probably exceeded considerably in May 1874. A gauge should be placed below the weir for recording the level of the tail water.

One channel takes off from this anicut on the right bank, and on the 11th March a good supply was passing down it, the water in the river being about 6 inches below the crest of the weir.

The anicut requires only ordinary repairs, and a little addition to the rough stone apron.

On the left or north side the flood bank from the wing terminates abruptly. It should be prolonged to ground at least 7 feet above crest of anicut. The water passed round in 1864, when the flood went over the wing walls and carried away much of the work; the anicut was then lengthened 150 feet, and probably the wings were raised at the same time.

One koten has charge of this work.

63. This anicut is about five miles higher up the river. It was built in 1862-63 at a cost of Rupees 23,297.

Vanamadvay Anicut.				higher up the river. It was built in 1862-63 at a cost of Rupees 23,200.			
Ayacut area	...	...	...	...	...	...	Acres. 565
„ assessment	...	...	...	...	...	...	Rupees. 5,765
Average cost of repairs	...	...	...	...	...	...	292

Its length is 390 feet, height of crest wall 6 feet; the wings are 6 feet high above crest, and they will require to be raised. Gauges are required above and below the weir.

About 2 inches of water were going over the anicut on the 11th March. The masonry apron is wide and was in good order, and the rough stone also was complete and in good repair.

There is one channel which takes off on the right bank. The head-sluice of two vents is of good design; the depth of water on the floor was $5\frac{3}{4}$ feet, and there was very little current, which indicated that the channel needed clearing. The channel banks are so overrun with prickly-pear that it could not be inspected; they must be cleared and kept clear.

... of the ancient is slightly lower than the south end.

64. This anicut is about five miles above the Vanamadavy weir. Its length is 360 feet, and it was built in 1847-48 at a cost of Rupees 13,981.

Trivady Anicut.		at a cost of Rupees 13,981.	
Ayacut area	...	...	Acres. 4,837
" assessment	...	...	Rupees. 29,764
Average cost of repairs	...	...	" 1,052

Average cost of repairs
The crest wall is 8 feet high and 6 feet thick; wings above crest $6\frac{1}{2}$ feet, and they require to be raised* considerably

• At the time of my visit I thought to 9 feet, but the flood of May 1874 shows that this would not be enough.

struction at the time of my inspection, and in the flood of May last was again washed away. Without flood banks carried to ground well above highest flood level, this work cannot be safe, and here and elsewhere such precautions should be taken in time; they cost very little compared with the making good of the damage to which their absence leads. Burnt clay or brick dust should be mixed with the lime used on these works. The new wing was being founded on well filled with hydraulic concrete.

There was a heavy leak under the body-wall not far from the right wing, and, as cultivation was going on, a bund would be required across the two channels of the river above the anicut to admit of the water being lowered without stopping the supply to the irrigation. The cause of the leak was to be ascertained, and effectual measures were to be taken for stopping it, as it might lead to a breach; there had certainly been a considerable displacement of soil, as the ring bund in front of the wing had given much trouble from settlements occasioned by the leak.

Overseer Narrainsawmy Naidoo, who was carrying out the repairs, evidently understood his work, and the manner in which he was doing it was much to his credit.

65. This channel was dug a great many years ago as a branch of the Puttambaukum channel from the Pooniar. Its regulating sluice has 6 feet water-way, and the sill is 18 inches above the upper sill of the Puttambaukum channel sluice, which latter has also a central vent on a level 2 feet lower for spring water. This regulator has a breach behind the right wing. The Yellamode channel has never been cut down apparently to the intended depth, and has never carried any water; at the head the bed is about 1 yard higher than that of the Puttambaukum channel. On the Puttambaukum channel a few yards above the Yellamode channel head, but on the other (left) bank, there is a surplus sluice of two vents, and this is used to supply certain lands of Periapagundy; the channel of this village was about to be improved as a Minor New Work, the estimated cost being Rupees 870, of which the villagers had agreed to pay one half.

66. A project for building an anicut across the Pooniar for the better supply of the Puttambaukum channel on the south (right) bank and the Paukum and other channels on the left bank has been investigated and discussed. The Pooniar at the proposed site has low banks and a wide, sandy bed. It is said that the freshes do not go over the ground on the south side, but probably those of May 1874 did so extensively. The present head of the Paukum channel is two miles above the proposed site, just below the Trunk Road, and the fall of the river bed is 5 feet a mile. It appeared to me that the proposed site is too low down, and that, if the anicut were there built, some of the channels which are to be connected with it would be but little benefited. There are some French interests to be considered, and these are sure to complicate matters a good deal. The project so far as the anicut site is concerned will have to be reconsidered, and probably revised.

67. This tank has a long bund in fairly serviceable order, but with a good deal of prickly-pear upon it, which should be removed. One sluice has fallen in and requires a new head. The waste weir (calingulah) appears to be or sufficient capacity, and indeed the water but seldom rises above its crest, as there were no water-marks above that level, although the spaces between the upright stones were very shallow except at the trench whence the soil for the bund was taken. The Wallajah channel from the Pooniar supplies this tank.

68. This great tank receives its supply from the Coleroon by the Vadavaur, which has its head at the Lower Anicut. The bund proper of the tank is a little more than ten miles in length, and for a little more than eight miles it carries a district road. The level of the top of the bund is not as accurate as it should be, the variations being of some importance, as the margin above full tank level is nowhere too great. The inside and outside slopes are for the most part very irregular, and even where side-ridging to the road at the north end, and for some distance to the north of Lalpett, has been recently executed, and where in connection with this some soil has been added to the slopes, this has not been done in a regular manner, and in many places the earthwork of the upper parts of these slopes rests only against bushes, and on the first heavy fall of rain it will all slide to the bottom. It should not have been necessary to repeat the often given order that all earthworks should be carried out to the proper section *from the bottom*; in no other way can stability be ensured. Money is being spent from Local Funds on sanding the road, but before this was done the bund should have been carefully levelled; now much of the expenditure on this account will be wasted, as the sanding will be buried under the soil which must be added. The interior slope of the bund should not be steeper than $1\frac{1}{2}$ to 1, and a similar slope will suffice for the rear slope. In the more exposed parts of the tank, where the water also is deep, an interior slope of 2 to 1 will be preferable. Here and there the remains of laterite revetment are visible, but only for a length of a few feet at a time. Most of the laterite has disappeared in the silt below. The work was not executed in a sufficiently substantial manner, and it could never have been of much value. It would be extremely costly to revet the bund at even the deeper part of the tank in a proper manner, and it does not seem to be necessary to do this at all. What stone there is or whatever of the buried stone may be recoverable can be used as a pitching for the bottom of the interior slope, where this meets the flat slope of the base of the bund. For the proper protection of the interior slope, a belt of nanel, 15 to 20 feet in horizontal width, commencing at 4 feet on the slope above full tank level, and extending below this some 12 or 15 feet on the slope, should be carefully planted next season wherever the slope may be ready to receive it, and after it has been planted it must be carefully preserved and restored where needful from time to time. Moreover, in order that it may be kept thick and vigorous it must be cut annually, and the best time for this is just before it begins to flower. For some time to come none of the grass will be available for sale, as it will be wanted for planting, but ultimately licenses to cut may be given, or the grass may be cut by the tank lascars and sold. On no account must cattle be allowed to graze on the bund or on its slopes.

Bushes.—All bushes are to be cleared away from the slopes. There are none which are of any use in reducing the wash on the bund, and they interfere with the proper formation of the slope, while nanel is required to take their place.

Trees.—There are some fine tamarind trees on the bund, and all that are in a vigorous state, and are not absolutely obstructive to the traffic, which is the case with one or two here and there, may remain. Any other valuable trees may also be left, but all trees which are of little or no value should be cleared off the bund, and

among these should be included the very old tamarind trees with hollow trunks and hardly any heads, of which there are a considerable number.

Sluices.—These are numerous. All, or nearly all, of them are old works of native construction, and except that they are all difficult to regulate, and that the water issuing from the outer end of the tunnel has much too high a velocity, many of them are fine works. The present state of most of them is inefficient, in many cases dangerous, and altogether very discreditable to those who have had the care of them. Two of them, the Kundavoikal and the Kinnaly sluices, were repaired about ten years ago, and they are in fair order, though they need overhauling and some repairs to the pointing of the tunnels; but the rest of the sluices are all much out of repair, the brick work and stone work of the heads are falling to pieces, tunnel lining stones have become displaced, face walls are leaning over and are ready to fall, dangerous leakage takes place through the tunnels, and in some cases parts of wings have already fallen. The condition of these works is the result of the neglect of many years, and for it there can be no excuse whatever. Several of the sluices are now so far gone that their reconstruction has become necessary, and no time must be lost in thoroughly repairing those which are capable of repair, and in building new sluices in lieu of those which have become ruinous throughout. The Karunguli sluice in the 8th mile was partly swept away by a breach which occurred at its site in the cyclone of 1871, and it had to be closed, and has not since been used. Excavations are in progress for the construction of a new sluice at a short distance to the northward of the ruined work. The estimate amounts to Rupees 1,840, and it has been sanctioned as a repair by the District Engineer. It is, however, to be an entirely new work, and though, as replacing a former sluice, it may properly be charged to the repair grant, the design should have been submitted for approval. The design indeed requires to be entirely revised, it being quite unsuited to a depth of water of 13 feet. In more than one important respect the instructions regarding works of this class, given in Circular No. 35 of March 1871, have been overlooked, and the early failure of the sluice, if constructed as designed, would have been probable. The Range Officer states that estimates for the repair of the sluices of this tank were prepared three years ago, and have since each year been brought forward for sanction which has not, however, hitherto been given. It seems to have been forgotten that hydraulic masonry works need to be maintained in perfect repair, and that year by year their requirements must be ascertained and provided for. Only inconvenience may result from other works being out of repair, but irrigation masonry works may be destroyed, revenue be sacrificed, and a large outlay be occasioned by far less neglect than is apparent in the case of this tank.

Foundations.—Nearly all the masonry works in this part of the district have suffered more or less, while some have rapidly become ruinous, owing to the inadequacy of their foundations. The soil is a strong clay, for the most part of the kind known as black cotton soil, and its condition when dry and in the presence of moisture is entirely different. Masonry works require deep wide foundations, and they need to be strongly built because they are in contact with a material which undergoes considerable movement several times annually as a result of changes in the weather. During the last few days several works which are literally all to

pieces owing to this cause have been inspected, and the teaching of experience should not be neglected. More than ordinary care is with such soil necessary in filling in around masonry works for the force evolved by the clay, if fissured and then soaked with water, is enormous, and its effects are only too apparent. Walls must therefore have a greater thickness than would be necessary if in contact with soil of unvarying volume, and their arrangement must be such as to give the most strength with any given dimensions.

Building Materials.—The bricks of the old sluices either never were good, or they have deteriorated from long submersion, with disintegration of the masonry as a result. Some apparently never were good, as they show traces of never having been burnt through, and one part of a brick is fairly hard and the rest soft. Mortar will not adhere to such bricks. The quality of the lime should also be considered. Mortar of shell lime and sand is unsuited to any hydraulic masonry, and fat limes of any kind should not be used in their natural state. Even shell lime may, where stone lime is not procurable, be made perfectly serviceable by an admixture of burnt clay, but usually stone lime is preferable, though the addition of some clay is generally requisite. A great difference in the stability and duration of masonry works in contact with water will result from a judicious use of burnt clay and lime, forming an artificial hydraulic cement. The cost is never materially greater than that of sand mortar; and, with the aid of the considerable amount of information on this subject which has recently been made available, there should be no difficulty in obtaining a good mixture for ordinary purposes. The people complained of the difficulty of getting water to the *Lalpett sluice* which is on the old line of the Vadavaur supply channel, and they asked for a new cut to the present line of the Vadavaur, but this cut would, if made, be equally in need of constant clearing, and the present approach to the sluice can be cleared periodically for the repair of the bund.

Lalpett Lock.—This was built many years ago in connection with the line of navigation from Trichinopoly by the Cauvery and Manniyaur to the Coleroon, and thence by the Vadavaur and sundry creeks to Porto-Novo, a line which, when the iron works at the latter place were in use, carried some traffic, but now there is little or none, and, it may be added, there is little probability of any. The masonry of the lock is good, but the gates, and particularly the lower ones, are very shaky. It is not worthwhile to supply new gates, and care must be taken that the old ones are not carried away; a bund should be placed across the lock above the upper gates to remove risk of accidents.

East Culingulah.—This work measures 100 feet between the wings, and there are thirty-three stones from 8 inches to 1 foot in thickness, so that the effective length is about 75 feet. It is a curved work with a brick-in-chunam crest wall and 1st apron, below this fourteen granite steps, and then a broad granite apron at the bottom of the fall. This escape is in good order; here and there a little pointing is required, and repairs to the lower apron at the west end are needed. The approach to this escape is very much obstructed by the ground, which is nearly every where higher than the crest. This ground must be cut down to 6 inches below full tank level and cleared from the calingulah to the old Vadavaur channel.

Second Calingulah.—Its length is 160 feet, and there are fifty upright stones; the clear length is about 125 feet. The crest wall is of brick-in-chunam, and the first overfall of $1\frac{3}{4}$ feet is on to a brick apron. There is a sort of pavement of brick masonry on the tank side of the crest and half a yard below the latter. From the first apron the fall is by fourteen steps, in which many of the joints need refilling. The western part of the lowest apron wants a good deal of under-pinning, and the interstices therein should be filled with concrete. There is some leakage under the work.

There is a large sluice in the body-wall which is very much out of repair; and its brick floor should be replaced by cut stone, and good shutters should be provided; there has been considerable risk of a breach here.

The west wing is very much lower than the east wing, and it should be raised to 6 feet above full tank level.

Third Calingulah, length 110 feet with twenty-five upright stones, leaving a clear length of about 85 feet. The water descends by fourteen steps in addition to the crest fall of 1 foot. The lower apron has a drop of about 7 feet into a hole, the bottom of which is kunkur. One or two of the stones (laterite) of this lower apron have been washed away. The east wing is very (unnecessarily) high. The west wing is about 4 feet above the crest, and should be raised to 6 feet above full tank level. The west wing return has a considerable crack, which should be cut out and made good. The ground on the tank side of this escape is very high, and should be cut down to 6 inches below full tank level. All necessary repairs should be executed with as little delay as possible. The crests should be raised to full tank level and coped with cut stone, sandstone will do very well; where the first overfall is on to a brick apron this should be covered with cut stone. Maximum water level should be ascertained, and the wings must not be less than 3 feet above that level which may require them to be higher than the supposed 6 feet above crest. Lastly, a perfectly free and clear approach to all the escapes must be secured, by lowering and clearing the ground above them.

The bund of the tank between the escapes, and thence towards Lalpett to where the road leaves it, is very irregular. It should be cleared, sectioned, and levelled, the top being brought to 4 feet above maximum water level.

The Lalpett Police Station-house is on the bund, which is there none too high, and probably a higher bund will have to be carried behind the house. The Taluq Overseer stated that $7\frac{1}{2}$ feet of water, or some 6 feet above full tank level, had gone over the calingulahs in the cyclone of 1871, but this appears to be very improbable, and the real maximum water level should be ascertained. The bridge on the road over the surplus channel from these escapes has but two spans of 22 feet each, but probably whenever there is a flood much of the road is submerged. The flooring of this bridge was out of repair. South of the third escape the embankment for one and a half miles is supposed to be a part of the tank bund, beyond that its continuation is the Vadavaur bank. The distribution sluices here are much in need of attention. The *Kundy sluice* has holes through the tunnel behind the head and rear walls. The *Rudrasholen sluice* is a comparatively modern work, and has only one considerable crack; a shutter is required

and another cross stone. The bund at this south end is in shockingly bad order, the water being prevented from lipping over only by small bunds a few inches high. The whole must be cleared, sectioned, and brought to a uniform level, corresponding to that of the rest of the bund when repaired.

69. This is a large channel supplying the Veeranum Tank, and much direct irrigation. It has its head at the Lower Coleroon Anicut. There are twenty-six

Vadavaur.

sluices in its right bank, and for most of its length the water in high freshes spreads over the ground on the left bank. It has no head sluice.

The sluices should all be examined, repaired, and supplied with shutters with also some convenient manner of fixing these at various levels for the regulation of the discharge through them.

Old Vadavaur head-sluice (marked No. 18).—This is the best design of sluice that I have seen hereabouts, but the whole work is too low. The shutter platform should be raised 6 feet, and the parapets and roadway about 4 feet, as in 1871 the water went over the parapets. A gauge above and another below the sluice are required. A new channel is asked for from just below this sluice for new irrigation, but, before the application can be disposed of, definite information regarding the water-supply must be obtained.

The upper part of the Vadavaur for a mile or so below the bridge is somewhat inaccessible, and a path should be cleared; the channel here is susceptible of improvement.

The bridge at the head needs some repair. The zero of the gauge on the east pier does not agree with the bed of the channel.

The concave curves of the channel are liable to erosion, and should be planted up with nanul on the best alignment available.

70. Efforts have been made from time to time to obtain grants of very considerable areas of land in the bed of the tank on durkhast, and some of these have been successful; but whenever the Lands within the water-spread of the Veeranum Tank.

true circumstances of the applications have come to light both the Revenue and Public Works Officers have refused to accede to the requests, and undoubtedly the diversion of these lands from their legitimate use would be productive of great inconvenience. Until it has been clearly shown that the tank is larger than is necessary for the great area of cultivation under it, and that a smaller storage than that now provided would suffice, no arrangements involving any diminution of capacity should be sanctioned. The lands cannot be effectively cultivated without bunding out the tank water, and their drainage must always be a matter of difficulty. The soil is rich and the temptation to acquire it is so great that considerable watchfulness will be necessary to prevent claims to it being irregularly and by oversight established. Changes of officials in the Revenue or Public Works Departments lead to renewed applications in the hope that former rejections of such may be overlooked, and an endeavour was made to obtain an opinion from me favorable to such a grant on a considerable scale when I was on tour in the district. It might perhaps be advisable, in view of the possible success of similar attempts, to notify in the District Gazette that grants of land within the contour of

full tank level here and elsewhere will, unless the situation and circumstances be clearly laid down in the grants, be cancelled without compensation directly the facts become known.

71. The Rajah Voikal has its head at the Lower Coleroon Anicut, and Rajah Voikal (Main Channel).

The left upper wing is cracked, the cutwaters need repair, the extension of the left rear water wing has fallen from undermining, and, when rebuilt, the foundations should be protected by 9 feet of apron all along; cubes cut from the fallen wall will do in part. There is no gauge above the sluice, and the one below was illegible; this matter should be attended to; water level above and below the sluice, and the area of vent open, should be regularly recorded.

For the petty work, such as clearing away prickly-pear, revetting the side slopes where steep with nanul, keeping the plantations in order, etc., provision should be made in the annual repair estimate, and then from time to time as necessity arises all such matters, which are of considerable importance to the good order of the channel, can be attended to. At present they cannot be carried out at once and they are apt to be lost sight of, because it is not worthwhile to prepare special estimates.

The channel towards the end of March was carrying a good supply. At Yelur there is a bridge of one arch of 30 feet span, the abutments of which were originally built in soil; but the channel has widened and cut away its side slopes, thereby exposing the brickwork, which should now be carefully pointed.

* Coleroon. The channel bank is also the river embankment, and it carries also a disneernochy plantations are useful; in preventing erosion, the numberless roots forming a matting which protects the soil from being washed away.

72. The revenue under the Veeranum tank, the Vadavaur, and the Rajah Revenue, etc., under Veeranum tank, etc. Voikal has been shown as one item in a statement, dated 10th March 1874, given to me by the District Engineer. The following are the principal particulars:—

	Ayacut Area.	Assessment.	Average outlay on Repairs.
	Acres.	Rs.	Rs.
Veeranum Tank	35,935	4,11,929	13,672
Vadavaur	11,566		
Rajah Voikal	20,696		

The importance of this group of irrigation is, it will be seen, very considerable, and far more attention should for the future be paid to it. The expenditure on maintenance has been but little more than 3 per cent., and this is altogether inadequate. It is not, therefore, surprising that the two former works should be in a condition so far removed from efficiency. At any rate for some years to come at least 30,000 Rupees annually will require to be spent upon them, and arrange-

ments should be made for determining what work is to be done, and then for carrying it out as speedily as possible. Then in five years perhaps a favorable report on their state may be expected.

73. Part of the bed of the Coleroon appertains to the South Arcot District. The District Engineer should obtain from Tanjore a tracing of the survey which Nanul in the bed of the Coleroon.

has recently been made, with the proposed alignment of the two banks, and he should then plant up with nanul where necessary, and also take care that no nanul is allowed to grow in the bed proper of the river. Patches of this grass spring up every year, and should be pulled up directly they can be got at. Five minutes, in the first instance, will do what five days would not accomplish after the lapse of some months.

74. The South Arcot District possesses great facilities for irrigation, and these have to a very creditable extent been appreciated and turned to account. It is necessary that the existing Irrigation works should be maintained in a thoroughly efficient state, and that such improvements and extensions as may be feasible should thereafter, or secondly, be undertaken. The area of irrigation of the entire district was, in 1872-73, 379,786 acres, yielding a revenue of Rs. 17,65,379, and besides Irrigation works there are numerous roads to be maintained and sundry public works to be attended to. The Public Works establishments were at the time of my visit quite unequal to the due performance of the duties required of them, and the remarks contained in this memorandum show that those duties had in numerous instances been very inefficiently performed with, as the inevitable result, loss of money and much discredit. There is plenty of work for a District Engineer and three Assistants of some experience, of whom the Officer in charge of the Southern Range should certainly be very well acquainted with the management and requirements of Irrigation works. The staff of the district has been considerably strengthened by the appointment of the present District Engineer, but he needs more assistance than he has at present if the work is to be properly done, and done at the proper time. Nothing is so wasteful as to leave Irrigation works to suffer decay and injury, instead of keeping them in good order and obviating, as far as possible, their liability to damage. The effect of the flood of May 1874 will be to necessitate a large expenditure, much of which will be for the repair of damage preventable by reasonable means. The accidents, too, in this district have their corresponding cases in many other districts. If floods in the Madras Presidency were very rare things, it might be reasonable to ignore them, but they are, to a greater or less extent, the regular events of every year, and their coming should be expected and prepared for. I would recommend, therefore, if only as a matter of direct economy, that the District Engineer be enabled, by giving him an adequate and competent staff of Assistants and Subordinates, to manage the public works of the district effectively.

OOTACAMUND, (Signed) JOHN MULLINS, Lieut.-Colonel, R.E.,
14th August 1874. Chief Engineer for Irrigation.

APPENDIX A.

List showing Works of Irrigation in the South Arcot District.

Number.	Names of Works.	Source of Supply.	Ayacut or Irrigable area.	Assessment.	Cost of work.	Average 5 years Repair.	Remarks.
1	Trivendipooram Anicut	Geddalum River.	1,511	rs. 10,109	rs. 4,520	904	This anicut was built in 1835-36; its total length is 393 feet, and height of crest above floor is 4½ feet, the depth of wings above crest is 9 feet. It irrigates by a channel on the north end.
2	Nanamadavy Anicut	Do.	665	5,765	23,297	192	This was built in 1863-63; its total length is 390 feet, and height of crest above floor level is 6 feet; depth of wings above crest is 6 feet. It irrigates by a channel on the south bank.
3	Trivady Anicut	Do.	4,837	29,764	13,981	1,052	This was built in 1847-48; its total length is 360 feet, and the height above the floor is 6 feet; depth of wings above crest is 7 feet. It irrigates by a channel on the north bank.
4	Ponnar Anicut	Ponnar River...	11,540	1,68,200	1,06,101	2,200	This anicut was built in 1863-64; its total length is 1,200 feet, and height of the crest above the floor is 4 feet; depth of wings above crest is 5 feet. It irrigates by one channel on north bank and four on the south bank.
5	Shattatope Anicut	Vellaur River...	18,317	1,01,734	95,271	7,494	This was built in 1847-48; its total length is 687½ feet, and the height above the floor is 9 feet; depth of wings above crest is 16½ feet. It irrigates by a channel on the north.
6	Keenanore Anicut	Manimuthanndy River.	1,091	14,155	84,846	1,433	This was built in 1869-70; its total length is 230 feet, height of the crest above floor is 6 feet, depth of wings is 9 feet above the crest.
7	Mamahoor Anicut	Do.	799	6,355	56,188	824	This was built in 1873; its total length is 400 feet, and the height of crest above the floor is 5 feet; depth of wings above crest is 7½ feet.
8	Veeranum Tank...	Lower Coleroon	35,935	4,11,929	1,29,745	18,673	
9	Yadavur Voikal...		11,566				
10	Rajah Voikal...		20,696				

16th March 1874.

(Signed) R. E. NORFOR,
District Engineer.

List of Anicuts in the Trinomallay Taluk.

Names of Rivers.	No.	Names of Anicuts.	Names of Villages and Tanks.	AYACUT.		Remarks.
				Number of Cawles.	Annual Revenue.	
Thuringlar River	1	Seelapenthal Anicut	Seelapenthal tank	21	Rs. 4 3	There is no Nanjab Ayacut for this village, but Rupees 65 is collected as Kasam for 12 Cawles of Punjab land in which Nanjab cultivation is made for the last three years.
	2	Moondal do.	Oosambady do.	47	8 0	
	3	Andapet do.	Thurimamendal tank	59	13 3	
	4	Kunnamangoo do.	Moondal do.	38	5 0	
	5	Chinnakanganor Anicut	Andapet do.	45	3 1	
	6	Davanandal do.	Kilivet do.	32	3 2	
	7	Nullambilapethal do.	Chinnakanganor tank	37	7 1	
	8	Kalingal do.	Nullambilapethal do.	49	7 1	
	9	Panagaray do.	Sorapanandal do.	33	13 1	
	10	Valanandal do.	Aroonakum do.	30	4 3	
	11	Thundaray do.	Konloor do.	133	13 0	
	12	Thiruvanimangam do.	Neikoppum do.	65	6 2	
	13	Kadaganam do.	Thundaray do.	24	14 1	
	14	Valayampet do.	Thiruvanimangam tank	37	8 3	
Chayaur River	15	Naohipet do.	Andampullum do.	171	8 0	Transferred to Poloor Taluk from 1283 Fash.
	16	Kariannungalum do.	Kadaganam do.	699	2 3	
Cullar River	17	Kariandall do.	Chengum do.	33	10 0	
	18	Kanjee do.	Kotacolum do.	45	1 1	
Morayar River	19	Perumbattan do.	Moongal Thangal do.	151	13 1	
	20	Samuthrum do.	Moothanor tank	81	3 0	
Olayar River	21	Keelanackaray do.	Thurapady do.	173	8 2	
	22	Pullicondapet do.	Narasimangalore tank	181	7 3	
Alayar River	23	Pundarapallam do.	Pady tank	113	0 1	
	24	Keelvanakumbady do.	Moodianor tank	90	3 3	
Pambanar River	25	Malangaram do.	Alathoor do.	150	0 0	
	26	Moodianoor do.	Machar do.	107	8 2	
	27	Naryanacoppum do.	Kanjee do.	97	9 3	

(Signed) R. E. NORFOR,
Executive Engineer in charge of No. 2 Range, South Arcot.

Cuddalore,
2nd May 1874.

List of Anicuts in the Tinnevely Taluk.

Names of Rivers.	No.	Names of Anicuts.	Names of Villages and Tanks.	ATACUT.		Remarks.
				Number of Canals.	Amount.	
Gingee River	1	Sathiamangalam Anicut	Sathiamangalam large tank	258 7 1	1,664 2 11	
	2	Therpalay do.	Do. small do.	60 13 0	237 4 10	
	3	Retipallam do.	Therpalay large tank	43 14 3	245 4 8	
	4	Goodappel do.	Do. small tank	103 4 0	611 3 6	
	5	Seeyapoondy do.	Alampoonny tank	119 4 0	839 12 4	
	6	Modayoor do.	Engoodpet tanks and fields	8 9 1	12 3 1	
	7	Pathipatti do.	Jeger do.	13 5 3	63 8 6	
	8	Savoor do.	Serudamboor tank	90 7 0	284 7 2	
	9	Agaloor do.	Serudamboor tank	270 12 3	595 2 1	
	10	Arugavoor do.	Vadapalay fields	128 8 0	2,169 8 7	
Thondiar River	11	Malahoor do.	Modayoor do.	193 6 3	798 7 8	
	12	Alagramam do.	Calava tank	84 5 3	1,151 4 2	
	13	Chendoor do.	Perumbigay large tank	99 15 3	450 9 9	
	14	Pathasampulloor do.	Anathoor tank	79 5 3	756 6 3	
	15	Cunharocoppum do.	Sairanoor tank	18 1 0	579 2 3	
	16	Kundadco do.	Retanay fields and thangal	47 12 1	100 11 5	
	17	Royanellore do.	Ayeyoor fields and thangal	897 13 0	376 6 10	
	18	Omanthoor do.	Panapakum and Malathoor Hissa tank	6 10 0	2,912 14 7	
	19	Kondamoor do.	Arugavoor, Pullicolam, and Inderiscoppum H. tank	33 3 3	29 15 4	
	20	Minnoor do.	Chithamoor tank	843 1 1	374 8 1	
Wongoor River	21	Jaincoondan do.	Yullum tank	83 2 3	2,397 5 1	
	22	Covilpurloor do.	Alagramam tank	701 2 1	533 10 0	
	23		Chendoor fields	24 3 1	435 8 0	
	24		Pathasampulloor tank	63 6 3	4740 2 7	
	25		Do.	53 0 1	185 0 11	
	26		Pathir fields	4 8 0	43 2 4	
	27		Wongoor large and small tanks	233 5 3	1,575 9 6	
	28		Karcumpet tank	46 8 1	295 4 11	
	29		Kundadco fields	330 7 3	1,114 15 9	
	30		Managapetti fields	57 9 1	379 11 11	
Gadagal Oday	31		Royanellore fields	175 10 1	1,436 2 9	
	32		Omanthoor tank	124 15 3	731 13 8	
	33		Kondamoor fields	181 6 0	1,554 15 1	
	34		Kilmanoor large tank	96 2 1	679 1 3	
	35		Kadaly Mavandul and Kannacoppum Hissa tank			
	36		Jambuday tank	85 4 1	432 12 2	
	37		Jaincoondan do.	12 12 2	63 12 3	
	38		Covilpurloor tank	43 6 3	334 11 10	
	39					
	40					

(Signed) R. E. NORFOLK,
Executive Engineer in charge of No. 2 Range, South Arcot.

Cuddalore,
2nd May 1874.

19

With reference to the Right Honble The Governor's remark in the last para. of this draft, it is submitted that Lt Col. Mullins's several representations of deficiency of Executive Staff in the Irrigation Districts of the Presidency have been already met by G.O. No. 1011 of 2nd April 1873 with reference to the Godavery, Krishna, & Saurashtra Districts. As regards The South Arcot there are at present

1. 4. Sup. 3rd grade, against 1 4. Sup. 3rd gr.
 - 1 Sup. 2nd 1st — — — — 1 Sup. 2nd 1st gr.
 - 1 Superior 1st grade — — — 1 Do Do 2nd —
 - 2 1st 2nd — — — 1 Superior 2nd —
- before the Reorganization, in addition to an experienced Irrigation Engineer in charge

to have been in the pop-

The District; this staff
 of which has not only
 been thus strengthened
 in numbers, but since
 proved as to quality.
 More cannot be expected
 to be done with existing
 resources - an administrative
 in the District - land on
 Establishment. and at
 least one or two more
 of 25 per cent on the
 set funds on the
 it would not be sufficient
 to keep an address as a
 necessary preliminary
 to obtaining any increase
 in the proposed in
 the (any purpose in
 of Indian be collected to
 provide the necessary
 means for the continuing

Immigration Work of this
 President of

Governor General C.R.S.
 J. C. D. S. D. P. S.

17.10.74

If it be the fact, as
 Col. Muller appears
 to state, that Col. Lore
 recently left in charge
 of the establishment - the
 S. I. still selected to
 increase their staff
 on the ground of security.
 But / undecided
 Col. Walker not to go
 with Col. Muller in
 this respect: and
 that there were therefore

Admit General
 in charge. But I think
 too that in preparing
 report have had their
 share in the results re-
 ported from March
 We must insist
 on better work from the
 District -
 20/10/74 M

The simple cannot
 afford better establishment. un-
 less we get more + spend
 as it is from 25 to 30 %
 of the whole grant - & 2 %
 for on 20/10 M

to have been in the p

23/6

14th Aug 1947

44-3148

The Memorandum of the Chief Engineer for Irrigation, containing notes of his inspection of a large number of irrigation works in the South West District, will be communicated to the District Engineer, whose attention will be given to the remarks therein made.

2. The flood bank at the North end of the Poorias ancient, mentioned in para 7, should be in charge of the P.W.D. It is observed that the m which was supposed to have been in the p of view of the Forest Com

10/10
2000

10

3/10

servancy Department
has been washed away

3. The remarks, contained
in para 22, on the dis-
creditable way in which
the Sepakhum channel,
forming a part of the
Katumylun ancient pro-
ject, has been carried
out require the District
Engineer's early attention,
and the report which
has been called for by
the Chief Engineer for
Irrigation should be
submitted at an early
date.

4. The District Engineer
will, with reference to
the proceeding in con-
nection with the Paral-
lin dividing dam, no-
ticed in para 25, consult
the Magistrate as to
the most effectual way
of preventing further
injury to or interference
with

3. Adverting to
para 21 of the Memorandum
the Chief Engineer for Irrigation
will ascertain and report
who is answerable for the
substitution of rubble
masonry for dressed stone
in the Apron of the
Katumylun Ancient

MD

SV

with the work and
if necessary, with his
concurrence, a reward
for information lead-
ing to the conviction
of the offending per-
sons may be offered.

5. The estimate for
closing the breach of
the Tylor's Tank, para
26 with the report
required in connection
with the very unsat-
isfactory way in which
the construction of this
work was carried out
should be submitted
as soon as possible.

6. The breaching of
the Periakurich Tank
(para 27) very shortly
after its restoration
was manifestly due
to insufficient care

in

in the execution of the work.

7. The management of the Pelandorai ancient works has from the first been very far from satisfactory, and the particulars given in paras. 29 to 51 of the memorandum show that there has been much want of attention to the details upon which the efficiency of the works must in a great measure depend. The present District Engineer will doubtless ere this have made a complete examination of the works, and the several matters noticed as needing attention should be put to rights or estimated for. The provision of

of such additional storage as may be feasible should receive early consideration.

8. The Government have learnt with much regret from the observations on many of the old irrigation works of the District, some of which, as the Pal-lajah and Teranum Tanks, are very fine works, that their upkeep has been greatly neglected, and their efficiency consequently impaired. No time should be lost in thoroughly repairing them, and the District Engineer will impress upon his Range officers the responsibility which will attach to them.

if

if they omit to inspect
all existing irrigation
works regularly, and
of to provide for their wants

9. The latter part
of para 7 suggesting
precautions against
the improper acquisition
of lands in the bed
of the Venamini and
other tanks will be con-
sidered in the Revenue
Department.

10. The observations
contained in the con-
cluding paragraph
of the memorandum
on the need of a more
efficient staff of Asis-
tants and subordinates
in this important De-
partment are the Govern-
ment considered, fully
supported by the par-
ticulars given of the
works inspected; and
at the earliest possible
moment

moment, which it is
hoped may be within
a few months, the
more pressing require-
ments in this respect
will be provided for.
It is much to be re-
gretted that the dif-
ficulty of allotting
to this and other Dis-
tricts a sufficient num-
ber of competent Asis-
tant Engineers has led
to much waste of
money as well as to
the neglect of existing
works; and it may
safely be inferred
that Public works of
classes other than ir-
rigation have suffered
in a similar manner
from this cause. The
remedy is sufficiently
obvious, but its ap-
plication must unfor-
tunately

[Faint handwritten notes, possibly "Lester"]

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Rev. 1/10/74

★
Govt. of British Honduras.

PUBLIC WORKS.

¹⁰
The Dir. Insp.
S. A. C.

Dated

Recd.

Encl.

G. O. S. L. No. 3143

Nos 78-79

Irrigation Works at
the South Arcot Dist.

Passing orders on
Memorandum from the
Chief Insp. for Dir.
containing the result
of his inspection of the
works ~~made~~ in July
and March last—