

*Proceedings of the Madras Government, Revenue Department,
31st August 1871:*

No. 350. Read the following Proceedings of the Board of Revenue, dated 27th July 1871, No. 3,141:—

Read the following letters:—

From the Collector of the Godavery District, dated 10th February 1871, No. 48, recorded in Board's Proceedings, 14th March 1871, No. 1,114.

From the Collector of Nellore, to the Acting Secretary to the Board of Revenue, dated 8th February 1871, No. 256.

ADVERTING to Proceedings of Board dated 3rd May 1870, No. 2,931, I have the honour to subjoin a report on the working of Norton's Tube Wells by Mr. Williams, late of the Department Public Works, and now Manager of the Municipal Office at Nellore.

From W. C. WILLIAMS, Esq., Manager, Municipal Office, to the Collector of Nellore, dated 6th February 1871, No. 86.

IN continuation of my No. 55, dated 11th October 1870, on the subject of Norton's Tube Wells, and being since supplied with the gutta-percha required therein, I now beg to submit the report called for by the Board of Revenue in their Proceedings dated 10th November 1870, No. 6,594.

2. In the month of July last I received three of Norton's 2-inch Tube Wells, with a set of driving apparatus from Mr. Master, the then District Collector, and put them down in different localities where water for drinking purposes was most required.

3. The first was put down at Nabobpett, a 16-foot well, on sandy soil, with 5 feet water in the tube, the second at Fattedekhanpett, a 16-foot well, on sand and laterite soil, with 9 feet water in the tube, and the third at Subadarpett, a 26-foot well, on sand, laterite, and mud soil, with 12 feet water in the tube.

4. The wells in the two first localities worked very favourably for a few days, and produced a good supply of drinking water, when suddenly the pumps refused to work; on examining them I found that the valves were not air-tight, owing to the gutta-percha strips attached to them being destroyed, substituted tanned hide, but failed to produce the desired effect; the third well I could not work at all, owing to the same defect in the pump.

5. Since being supplied with fresh gutta-percha and the valves of the pumps made air-tight, I got the two first in working order, but failed with the third, owing to, I think, either from the great depth or the extreme density of the clay which prevents free percolation. I intend drawing this up and giving it another trial in another locality.

6. The driving apparatus supplies every requisite, but the driving down of the tubes is most laborious (particularly on compact soils); it requires three able men at each rope's end attached to the monkey, who ought to be relieved every now and again; thus working, with the assistance of a smith, it occupied me two hours in driving in and fitting up each of the small wells, and three hours the large.

7. Independent of the defects in the pumps I found that the screws of the tubes are not turned out with sufficient exactness, and the threads more or less of the whole of them injured, thereby making the coupling portion of the work most difficult and imperfect. In no case did I succeed in getting the screws (male and female) to butt.

8. Each of the two wells now in working order produce with easy pumping 132 gallons of clear water per hour of a metallic taste.

9. The Board's Proceedings No. 6,594, forwarded with docket No. 3,163, is herewith returned.

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From the Acting Sub-Collector, to the Collector of Cuddapah, dated Gurrumcondah, 17th November 1870, No. 413.

IN reply to your docket No. 253 of July 28th, 1870, requesting me to report after trial of Norton's Tube Wells, I have the honour to state that I concur generally with the opinion expressed by Mr. Boyle in his report of July 19th, 1870.

2. The tubes were put down in only two places. The first was in the bed of the stream running to the east of the village of Madanapally, near which water is ordinarily found at the depth of about 20 feet. The tubes were easily driven for about 15 feet, after which they apparently met a bed of clay, and driving became difficult. They were, however, finally put down to a depth of 22 feet, but no result could be obtained. My own impression is that the clay had so completely stopped up the holes of the lower tube, that the water could not percolate. No force pump was sent with the wells, and it was in consequence impossible to clear them.

3. Water was poured down the tubes, and pumped out again and again, but no result followed. During this pumping the top of the pump broke clean away from the body. The iron where it broke is excessively thin, and is quite unable to stand any ordinarily rough usage.

4. A new pump was obtained from Cuddapah, and the well tubes taken up and put down in the bed of another stream to the north of Madanapally. Here water was obtained at about a depth of 10 feet and flowed freely from the pump.

5. The general depth of the wells near Madanapally is from 25 to 35 feet, so that the well tubes would not be of much use in the town itself.

6. I did not find the same difficulty experienced by Messrs. Boyle and Arundel in screwing the pipes home. Before using them I had the screws thoroughly cleaned out with the apparatus sent with the pump, and easily screwed them home with the help of a little oil.

7. The tubes were taken up by putting on the clamp, and then lifting it up by levers. No difficulty was experienced in withdrawing them.

8. I consider that ordinarily the services of a skilled mechanic would be necessary for driving and fixing the pumps. It is not without a reason that a suggestion is made at the end of the prospectus, that when a well cannot be successfully made, a guinea a day, with man's expenses and railway fare, should generally meet the case. Had it not been that Mr. Assistant Engineer Brickwell was at Madanapally at the time the experiments were made and gave his advice and manual assistance, I do not think we should have succeeded in setting up the pumps at all.

9. I should have made more experiments with the wells had I seen any prospect of their being of any practical use in this part of the country. The small depth from which they draw water (without the aid of a bucket and valves) renders them far less useful than they might otherwise be.

10. The pump handles are far too short, and the pumps generally seem too weak to last long. The wells and apparatus have been returned to Cuddapah.

11. I enclose a memorandum of the charges incurred by me, and request that the amount may be remitted.

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No. 210.

SUBMITTED for the information of the Board of Revenue, in continuation of Mr. VansAgnew's letter and enclosure recorded in Board's Proceedings dated 26th September last, No. 5,862.

CUDDAPAH
25th November 1870.

(Signed) C. G. MASTER,
Collector.

From the Collector of Kurnool, to the Acting Secretary to the Board of Revenue, dated 6th May 1871, No. 150.

WITH reference to the Board's official memorandum No. 703, dated 18th July 1870, I have the honour to inform you that I have experimented on the Norton Tube Wells within the town of Kurnool with the following results:—

2. These tubes are so small that they are only fit for supplying water for drinking purposes, and that in small quantities. For irrigation purposes they are useless.

3. In this district water is not generally found near the surface, and during the hot season it has to be sought for at great depths, and as the water sinks gradually the tubes have to be driven occasionally deeper.

4. These tubes were driven into the dry bed of the Tungabudra with success at the time the town supply from the Irrigation Canal had ceased.

But some of them has damaged them, and as attempts have been made to steal them I have been obliged to have them removed.

In any case they would have to be removed as the freshes come down the river.

It would be useless to keep them without the driving apparatus, and at best they can be only looked upon as temporary contrivances, but valueless when a large and plentiful supply of water is required.

5. I have had applications to sell them. If the Board would fix a price, and let me dispose of as many as I can, and allow me to return the remainder with the driving apparatus to Madras, I think that would be the best course to adopt.

6. I regret the delay that has occurred in replying to the Board's call; it is owing to my having sent a pump with driving apparatus to Cumbum, where many changes of Head Assistant Collectors have been made. A pump was sent to Mr. McCarthy before he tried to put it down; Mr. Gribble was put into the appointment, and was not at Cumbum for more than a few days. Then Mr. Turner succeeded, and his attempt to drive the tube down to water was unsuccessful. The driving apparatus was all that time in Cumbum, and I had to wait till I had it returned to me lately by Mr. Turner.

From the Acting Collector of Chingleput, to the Acting Secretary to the Board of Revenue, dated Sydapet, 12th June 1871; No. 252.

WITH reference to the Board's Proceedings dated 3rd May 1870, No. 2,931, four Norton's Tube Wells, with two sets of driving apparatus, were supplied from the Public Works Stores and Workshops. Mr. Crole having expressed a desire to

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exhibit these wells in each of the talooks of the sub-division, three together with a set of driving apparatus were forwarded to him, only one being retained for experiment by the late Acting Collector.

2. Although several trials appear to have been given last year to the one well retained by the Collector, the result of the experiments was not recorded by Mr. Blair. I am informed, however, that the tubes were sunk in four places; first, in this Cutcherry compound, where no water was reached after driving nearly 30 feet. The well was next taken to the Home's Gardens Cutcherry, and, after one unsuccessful trial, water was reached at 27 feet, but the supply was both scanty and muddy, and ceased after some days' pumping. The tubes were again removed at the end of last year to the race course, where, I am informed, the attempts were again unsuccessful, boring being stopped by rock.

3. Reporting second-hand is not satisfactory; but, from all I can gather, the failure of these experiments arose from sinking in unsuitable places. Mr. Barter particularly mentions in his pamphlet that the wells can only raise water when there is water, and if the soil admits of boring, and cannot perform impossibilities, or pierce rocks. I found this last to be true to my cost at Chingleput when I tried last year to sink a tube well of my own for several successive lays, and at twenty different places in my compound. I always came on rock at about 15 or 20 feet according to the undulation of the ground. At Home's Gardens, when Mr. Blair reached water, had the well been sunk a few feet deeper when the supply ran short the result might have been different.

4. When there is water, and the strata admit of sinking the tubes, there can be no question that the wells are a success, as shown by the one sunk by Mr. Crole at Chingleput, and which I have often tested myself.

5. I am going to try the one well still lying here at the Police huts at the Vallur Salt-pans; when there a fortnight ago the men complained bitterly to me of the straits they are put to for sweet, drinking water in the hot weather; the soil will, I think, allow of the tubes being sunk.

6. I enclose copy of Mr. Crole's report; at paragraph 11 of it he correctly estimates, I think, the chief value of these wells as being for raising drinking water in crowded localities. The Sub-Collector, after experiments in different parts of his division, has left the three wells supplied to him in the Government garden at Chingleput, and the Local Fund topos at Mamundur and Manamai; at the first place for public inspection, and at the topos with a view to watering the young trees. Mr. Crole is not satisfied with these pumps, which he considers very inferior both as regards fittings and workmanship; I think, however, unskilful handling may have had something to do with the breakages. He wishes to be supplied with another pump (pump only, not tubes) for use at Mamundur, the one sent having broken as described by him; I beg that his request be complied with.

7. The cost of the experiments in the sub-division has amounted to Rs. 9-7-6, and I now request that this sum may be sanctioned from the "Land Revenue Contingencies."

8. I have directed the despatch of one driving apparatus to the Superintendent of Public Works Stores and Workshops, as required by the Board in their

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official memorandum, No. 703 of the 18th July last; the other will be returned as soon as the experiment alluded to at paragraph 5 of this letter has been tried at the Police huts, Vallur Salt-pans.

ENCLOSURE No. 1.

From the Acting Sub-Collector, to the Acting Collector of Chingleput, dated Mamundur, 31st March 1871, No. 202.

WITH reference to Proceedings of the Board of Revenue, dated 10th November 1870, and numbered 6,594, I have the honour to give you the results of my experiments with Norton's Tube Wells.

2. As you are aware three were sent to me.

3. The first one I sank at the second attempt (after bending the tubes) through a bed of quartz, flint, and chalk, 20 feet thick, into a bed of coarse sand. This was in the Government Garden at Chingleput. The percolation being free, it works as well as can be expected of a small tube. I must add, however, that besides the bending of the tube, it suffered many other mishaps. In spite of the greatest care, parts of the head split off, as if composed of crockery ware instead of English iron work.

4. I next tried another in gravel with a bed of decaying rock below. After going down 25 feet we were stopped by harder rock, and withdrew the tubes which were bent.

5. I afterwards sank this same tube through sand and a bed of very stiff clay, 19 feet thick, into fine sand, which was reached at a depth of 26 feet. This brought us a little below the bed of the neighbouring river. This was in the Local Fund tope at Mamundur. After an extreme amount of labour, and several days on and off, with no result, the water suddenly sprung up the tube, and is now standing 19 feet deep in ft, that is 14 feet from the sucker. The head of this pump also behaved in the same way as the last, and is now, though patched, a complete wreck. I should be much obliged for another, as this pump will be very useful in watering the young trees to be kept in stock in the above garden for the other topos and avenues on that side of the Madurantakam Talook.

6. I had intended the third well for Conjeveram, and drove it in the compound of the Talook Cutcherry during a visit paid to the place in December last, leaving instructions to pump on till water came. It had been driven 28 feet through sand and clay. On my re-visiting the place in February, I found that the result was only the smallest quantity of very dirty water. I tried in another part of the compound with like results. The failure in this case is attributable to the springs at that end of Conjeveram being very slow and weak.

7. I subsequently attempted to sink the same well in the Local Fund tope at Guduvancheri on the Trunk Road. It was found impossible to drive it beyond 14 feet, owing to its meeting with a sort of whitish, reddish rock.

8. It was then sent down to the Sea Coast to the Local Fund tope at Manami, on the bank of the East Coast Canal, and, on the 16th instant, was sunk in sand, and an abundant supply of water, slightly brackish, was found at a depth of 18 feet. Having determined to allow it to remain there for the present, in order to water the young trees, I directed the despatch of the driving apparatus to you via the Canal on the 21st instant, in obedience to the request contained in your Nos. 534 and 761, dated respectively 28th July 1870 and 25th October 1870.

9. In all cases it was found necessary to use the sand filter. Without that, the pump invariably became choked up, and the little water that was obtained prior to its ceasing to draw was muddy and gritty to a degree, entailing of course great wear and tear to the sucker.

10. The workmanship of these wells is so very inferior as to preclude any prospect of the successful introduction of the present kind. They would not last any time in ordinary use by Natives. There is also a patent defect in the length of stroke and of the handle. The screws are ill-fitted, which very considerably weakens the tube in driving through stiff soil. None broke

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with me however. On the other hand, the driving apparatus, with the exception of the smaller keys, is well made.

11. The supply of water, where the springs are free, would be enough for household consumption, and if a stronger and more useful well could be supplied for, say, Rs. 40, its introduction would be a great boon in many localities where unhealthiness is, with reason, traceable to the contamination of the sources of water-supply by surface drainage. Little Conjeveram is such a place, and the Municipality might do worse than try some in suitable localities in the streets as public wells.

12. For irrigation purposes they are mere toys, and will never be of the slightest use.

13. I have to apologize for the delay which has taken place in submitting this report. It has resulted solely from my desiring not to give any opinion until I had convinced myself by personal inspection of the probable value of these wells in their suitability or otherwise to this part of the country.

14. In conclusion, I beg to inform you that an expense of Rs. 9-7-6 has been incurred in driving, repairing, and carrying about the tube wells, and to request that you will obtain the sanction of the Board for the disbursement of the amount.

From the Collector of South Arcot, to the Acting Secretary to the Board of Revenue, dated Porto Novo, 28th February 1871, No. 60.

With reference to Board's Proceedings, No. 2,931, dated 3rd May 1870, I have the honour to forward copy of a letter from my Sub-Collector, reporting the result of the experiment made at Virdachellum with Norton's Tube Wells.

2. The well had previously been tried in the vicinity of my own office at Munjacoopum. Water is readily procurable all over the place and at no great depth, but it is difficult to get it free from saline matter, and it might have to be put down fifty times within a fixed area before good water would be secured.

ENCLOSURE No. 1.

From the Acting Sub-Collector, to the Collector of South Arcot, dated Virdachellum, 8th February 1871, No. 65.

With reference to your official memorandum, No. 1,158, of 23rd November 1870, forwarding a Norton's Tube Well for experiment in this place, I have the honour to report the result of several experiments made by Mr. Roberts, as recorded by him.

2. "The Norton's Tube Well was first sunk in my compound, the level of which may be 30 or 40 feet above the river bed. The well was driven to a depth of 20 or 21 feet, but for the last few feet the ground was so hard that the driving was very slow, no water was obtained. It seemed as if after the red soil was passed the tube had entered a hard clay and sand formation. It is called Namakatti. It looks like stone, but is easily broken by flinging one piece on another."

"The tube was next sunk in the Cutcherry compound, but at 6 or 8 feet struck rock."

"A third experiment was made on the north bank of the river Manimuktanadi, but though there was plenty of water it could not be raised."

"This was due, I believe, to the choking up of the orifices in the tube, as the ground there is regur or black soil, with very hard red soil or stone beneath. The tube was sunk about 20 feet, the last portion with great difficulty."

"A fourth experiment was made in the river bed and a copious supply of water was obtained this morning, 16th December 1870. The tube was sunk to a depth of about 10 or 11 feet. But the water had a bad odour. The soil was all sand."

"I also tried it near a pond in my garden, but it struck rock at about 2 feet depth."

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"On the road to Cuddalore, about two miles out, there is a well 19 or 20 yards deep. The top of the water is 18 yards from that of the ground. At this depth the well will not work. But in the red soil of the talook water is generally found only at this or greater depths, so that I think the tube well is not suited to this talook, for it cannot work in the black soil which also prevail here."

3. As desired in paragraph 2 of your memorandum, the driving and other apparatus and the well, etc., are returned in charge of a peon.

From the Acting Collector of Trichinopoly, to the Acting Secretary to the Board of Revenue, dated 19th May 1871, No. 142.

With reference to the Proceedings of the Board, under date the 10th November 1870, requesting me to report on the result of the experiments made with Norton's Tubular Wells, I have the honour to state that I had two experiments made in the grounds reclaimed from the old Fort ditch at this station. In these experiments, the tubes were driven of course with ease, but in the first the pointed end of the pipe chanced to strike on a stone, at a depth of about 18 feet, and had to be withdrawn. On the other occasion, the pipes were driven to a depth of 22 feet. When water was obtained, it was, however, of a very muddy and dirty description, and the quantity raised, (though with much exertion, owing to the shortness of the stroke,) was ludicrously small.

2. On two other occasions, when the wells were attempted to be driven on the dry beds of naddy fields the clay proved so tenacious and stiff that they could only be driven above 6 feet, and in both instances had to be withdrawn.

3. I was present also when two other experiments were made with wells belonging to the Municipality, both of which were also failures; one owing to the stiffness of the clay, and the other to the tube having chanced to hit on a boulder beneath the surface.

4. I am, therefore, of opinion that these wells are not adapted to this district, although in sandy and more porous soils they may doubtless prove useful.

From the Collector of Madura, dated 20th December 1870, No. 366, recorded in Board's Proceedings, dated 21st January 1871, No. 307.

From the Collector of Madura, to the Acting Secretary to the Board of Revenue, dated 1st February 1871, No. 30.

With reference to the Proceedings of the Board of Revenue, No. 307, dated 21st January 1871, I have the honour to state that the Norton's Tube Well was tried close to the bank of the Vigai river, but the experiment was a failure, and the tube had to be extracted by digging it out of the ground.

From the Acting Collector of Coimbatore, dated 23rd November 1870, No. 310, recorded in Board's Proceedings, dated 19th December 1870, No. 7,185.

From the Collector of Malabar, to the Acting Secretary to the Board of Revenue, dated Vytry, 1st December 1870, No. 396.

With reference to the Proceedings of the Board of Revenue, dated 10th November 1870, No. 6,594, I have the honour to inform you that the large Norton

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Tube Well was tried near the beach at Calicut, but that with the exception of bringing up, at first a few buckets full of water it proved an utter failure, owing apparently to defect in the pumping apparatus.

2. In this case water was reached at less than 10 feet. Another trial has been made with one of the small wells which has been placed in an open well at the new market place, the well being boarded over. The object of this is to ascertain whether the pump will stand regular use, and it has not yet been long enough in use to admit of a decision being arrived at. One great objection is, that it is necessary first to pour water down before the pump will work, a process which destroys the advantage that would otherwise arise from the certainty of the water brought up being certain to be uncontaminated.

3. It is proposed to try some of the tubes in Wynaad, and Major Kennedy has undertaken to do this as soon as the effect of the monsoon has so far ended as to admit of the value of the tubes in searching for water being fairly tested.

4. On the whole the wells do not seem to be adapted for any useful purpose in this district.

From the General Superintendent of Public Works Stores and Workshops, to the Acting Secretary to the Board of Revenue, dated Chepauk, 14th November 1870, No. 924.

WITH reference to the ~~Proceedings of the Board of Revenue~~ dated 26th September 1870, No. 5,862, requesting my opinion as to the general character of the workmanship of Norton's Tube Wells, I have the honour to state that, having examined the pumps in store, I have not found anything defective either in material or workmanship.

2. There is no doubt that lightness of material was one of the objects aimed at by the Patentee in the construction of these wells for the sake of easy and ready transport, and if care is taken to select proper ground for putting down these wells, avoiding rocky soils whenever practicable, there will be little danger of damage or breakage to them.

3. In fitting the tubes they were taken promiscuously, and I found that they screwed on easily and without any difficulty. In my several experiments with these wells, I found no difficulty in bringing up the water after a few strokes of the pump, and although the water obtained was at first muddy, it became clear after a few gallons had been discharged.

4. It is immaterial if the screws do not butt closely when fourteen out of nineteen threads are screwed on, the tubes are well put together and a little white or red lead putty should be used at the joints in order to make them *air-tight*.

5. The failure of Mr. Arundel to raise water during his experiments is possibly owing to the putty not having properly been applied to the joints, and thus allowing air to leak into the tubes. It is rather surprising that so many as six men should be required to raise a monkey 89lbs. in weight, with the additional aid of two pulleys attached to the lifting gear; a little stretching and greasing of the ropes and oiling of the boss of the pulley would have overcome any resistance offered by both. These points I have noted are very often overlooked, but if

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attention is paid to these matters the wells would be found to work very satisfactorily.

IN May 1870 the Board requested the Superintendent of Public Works Stores and Workshops to despatch to the Col-

Malabar.	Madras (Collector).
Cuddapah.	Do. (Sub-Collector).
Godavery District.	Trichinopoly.
South Arcot.	Coimbatore.
Madura	Nellore.

lectors mentioned in the margin several of Norton's Tube Wells for experiment.

The letters above recorded contain the replies of the several Collectors to whom the wells were supplied.

2. MALABAR.—The Collector of Malabar reports that the large well was tried on the beach near Calicut, but proved an utter failure, apparently owing to a defect in the pumping apparatus: water was reached at a depth of less than 10 feet.

A small well was placed in an open well in the market place.

The only objection to this experiment is said to be that water must be first pumped down the tube which neutralizes the advantage the tube well would otherwise possess of ensuring the water pumped up being free from surrounding contamination.

Major Kennedy is to make further experiments in the Wynaad, but the Collector thinks that on the whole these wells are not adapted to any useful purpose in the Malabar District.

3. CUDDAPAH.—In the Cuddapah District a thorough trial was given by the Sub-Collector, the Head Assistant, and Assistant Collectors.

Complaints are made by all these officers of the faulty construction and material of the pumps. The screws are reported to be not accurately fitted, the valves not air-tight, and the interior of the tubes are found to get choked up with clay and grit.

In almost every case the failure was due to the pump coming in contact with tenacious clay or rock: and Mr. Boyle reports that after repeated and prolonged efforts nothing but a muddy dribble of water was obtainable.

The Head Assistant reports that when water was obtained it had, though clear, a nasty metallic taste.

Mr. Boyle stated, moreover, that the labour of driving in the tubes is most severe, three men at least being required to each of the two ropes.

4. NELLORE.—The experiments made by Mr. Williams, late of the Department Public Works in the Nellore District, gave much the same result.

Two wells put down in 16 feet wells in sandy and laterite soils worked freely and well for some days, but failed then owing to the valves not being air-tight. They lifted 132 gallons of clear water per hour, but it had a metallic taste.

The third experiment was a failure owing to the tube being sunk in clay.

5. KURNOOL.—The Collector of Kurnool reports that the wells are too small to be of any use for agricultural purposes: and, as water is obtainable generally only at great depth in his district, these pumps are not likely to be

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generally used with success. A good supply of water was, however, obtained by sinking a well in the Toongabuddra river after the town supply from the Irrigation Canal had ceased.

6. Permission is required to sell as many of the wells as are wanted—some having been already applied for—the rest to be returned to Madras with the driving apparatus, and the Board approve of these proposals.

They find from a letter of the Collector of Malabar, recorded in their Proceedings of the 6th July 1868, that the then selling price was as follows:—

	£
10 feet well and pump fixed	6
15	7
20	8
25	9
30	12

plus about 30 per cent. as delivered at Madras. The Board resolve to request Government to authorize the Collector to dispose of the wells now at Kurnool at not less than half the cost thus estimated.

7. CHINGLEPUT.—The Collector of the Chingleput District states that success did not attend three attempts made, one in the Collector's Catcherry compound, where water was not obtainable at a depth of 30 feet, nor in Home's Gardens, where at a depth of 27 feet water was raised, but scanty in quantity and muddy, and the supply ceased after a few days; an experiment made on the face-course failed in consequence of the tube coming in contact with rock. Mr. Barlow, however, asserts from personal experience that where the soil admits of these wells being driven, and where there is water, they are a complete success.

8. The Sub-Collector complains of defects in the fittings and workmanship, and though his experiments were not altogether successful request that another may be sent as it will be very useful for watering the trees in the Mamaundur topo and in other nurseries, and thinks that the tube wells will answer well where springs are free and the soil not rock or clay. He thinks that larger sized wells would prove effective in crowded localities where the object is to get water free from the impurities inherent in the surface soil, but that they are useless for irrigation purposes.

The cost incurred in the sub-division, viz., Rs. 9-7-6, is sanctioned, and will be debited to Land Revenue Contingencies.

9. SOUTH ARCOT.—The Collector says there is no difficulty in getting water anywhere at no great depth from the surface, the only difficulty is to get it free from saline matter.

The Sub-Collector says water cannot be raised where the ground is hard and rocky, and that the wells are not suited to the sub-division as water is not generally found at a less depth than 18 feet in red soil, and the wells will not work at all in the regur or black soil.

He found that on the banks of the river, where there was plenty of water, a well would not work, owing to the choking of the orifices of the tube with black soil and stones.

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10. TRICHINOPOLY.—Two trials were made in the old Fort ditch at Trichinopoly. In the first, rock was struck at a depth of 18 feet: in the second at a depth of 22 feet water was arrived at, but it is said to have been "ludicrously small in quantity and very muddy and dirty."

11. COIMBATORE.—The Collector of Coimbatore reports very favourably on the wells sent to him. One was found to answer very well in a spot above the water spread of the large tank on the Pothanoor road. The Collector says the pump is easily worked by boys, and does not consider the workmanship defective: he thinks that a greater length of stroke is required, but suggests that the failure reported by Mr. Boyle in the Cuddapah District may have been due to the tube having been strained and wrenched in putting down, and to have been not due to faulty workmanship nor material.

Three large pumps have been sent to the Collector since this report was received. The result is not known to the Board.

12. MADURA.—The only trial which seems to have been made in the Madura District is said to have been a complete failure, and the tube had to be dug out. The cause is not stated.

13. The Superintendent of Public Works Stores, to whom a reference was made in consequence of the unfavourable comments on the machinery of the wells, states that these latter are not defective in workmanship or material: that lightness was no object of the chief objects aimed at in their construction, and therefore they cannot be expected to have the same strength as greater weight would give; but he reports that no difficulty was found with the screws; taken at hazard they fitted sufficiently accurately, and can be made air-tight by the use of a little red or white putty at the joints, and that it is immaterial if the screws do not butt closely provided 14 out of 19 threads are screwed in. Further that by greasing and stretching the ropes and oiling the boss of the pulley resistance will be overcome, and that it is not intelligible that with such precautions and with proper management six men should be required to raise a monkey only 89 lbs. in weight with pulleys and lifting gear attached.

14. The Board do not attach much importance to the very unfavourable reports received from districts where the tubes have been forcibly driven into rocky ground and thick tenacious clays: here they naturally failed, for, as before remarked in the correspondence on this subject, the wells cannot be expected to perform impossibilities, but the result of these trials is to confirm the Board in their opinion that under favourable circumstances the wells are a success; if they are used only in soft soils containing water at a moderate depth they achieve all that is expected, but in rocky or tenacious clay soils they are of no use. Sunk in ordinary pot wells and worked by a crank and wheel attached to the head of the pump, instead of the lift handle with which they are sent out, they raise water free from impurities of the drainage surface in quantities sufficient for domestic or farm-yard purposes, but not for irrigation.

They would also be of great use in districts like Kurnool, or the Guntur portion of the Kistna District, in a time of drought, if used in the sandy beds of rivers, water-courses, and other suitable places.

*Proceedings of the Madras Government, Revenue Department,
31st August 1871.*

No. 351, ORDER THEREON, 31st August 1871, No. 1,495.

Miscellaneous.

COMMUNICATED to the Department
Public Works.

(True Extract.)

(Signed)

W. HUDLESTON,
Secretary to Government.

To the Public Works Department.
,, the Board of Revenue.

Govt. of 1871; and

REVENUE.

70

THE PUBLIC WORKS DEPARTMENT,

etc., etc., etc.

Dated August 31st.

Recd.

Encl.

G. O., 31st August 1871, No. 1,495.

AUGUST.

Doc. 350-31.

Arton's Tube Wells.—Revenue Board's Proceedings submitting reports from certain Collector on experiments made with—, communicated to the Department of Public Works.

Gentleman.

PROCEEDINGS, 27TH JULY 1871, No. 3,141.

Received.

Encl. 2

Gen. H. B. Wood

JULY.

No. 3,141.

Norton's Tube Wells.—Reports from certain Collectors on experiments made by them with, submitted to Government.

No. 1495
 Council of the S.W.

31 Aug. / 71