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## MADRAS RECORD OFFICE.

Government of Madras.

*P. Subbarao* DEPARTMENT.  
*Com 2076/60*

|          |       |       |
|----------|-------|-------|
| G.O. No. | 752   | Press |
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| Dated    | 16-4- | 18 60 |

Not to be folded or roughly handled

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*Proceedings of the Madras Government, Public Works Department,  
for the month of April 1860.*

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No. 55. From Major F. H. SCOTT, Deputy Quarter Master General of the Army, to Colonel H. MARSHALL, Acting Secretary to Government, Military Department, dated 20th March 1860, No. 91.

The Proceedings of Government regarding the supply of Water to the Cantonment of Bangalore, whereon the Order of Government is dated 25th February last, No. 413, by Order of the Commander-in-Chief, I forwarded to the Commandant of Engineers, and invited that Officer's report on the letters of Sir Mark Cubbon and Colonel Green. This I have now the

1. Plan of Site of the Mailkotta Tank.
2. Memorandum on the Mailkotta Reservoir.
3. Memorandum showing the amount expended monthly in supplying Water to the Horse Brigade, Madras Artillery.

honor to enclose for submission to Government, with documents as per margin. His Excellency observes, that with all before Government that has been said on both sides, he trusts that there

will be no difficulty in arriving at a decision, with respect to securing an ample supply of good, pure, and wholesome Water for the Military station of Bangalore; and it is very important that the question, which has been so long under discussion, should now be finally settled, and immediate action taken upon it. In the opinion of Sir P. Grant, Colonel A. Cotton has fully established his point in every particular.

*Memorandum by Colonel A. T. Cotton on the Bangalore Water supply, in reply to Sir M. Cubbon's and Colonel Green's letters transmitted with the Government Proceedings, 25th February.*

I would first reply to these letters. Sir M. Cubbon first states that he is not satisfied that sufficient water can be collected near Nandidrúg, as little rain falls in that quarter, and he proposes to raise Water for the Barracks from near the Alsúr Tank.

First. The quantity of water required merely for the Barracks is so very small that it would be quite insignificant compared with the area draining into the Mailkotta Tank, which is about nine square miles, or 27 millions of cubic yards, so that a single inch of rain caught on that area and flowing into the Tank would be 750,000 cubic yards a year, or 80 gallons a day for 4,000 people.

From the information I obtained, I think we are safe in allowing nine inches to run off the surface of the land there (which is very steep and rocky) in a bad monsoon, and 18 inches in an ordinarily good one, which would supply nearly seven millions of cubic yards in the former and 13½ millions in the latter, and these quantities would be abundant for irrigation as well as for household purposes for all Bangalore.

As these letters contain no calculations, I am unable to compare this with the data from which Sir M. Cubbon drew his conclusion.

The Commissioner next states his opinion that good wholesome water can be raised from wells below the Alsúr Tank.

My objections to this are these:—

1. The Alsúr Tank has been for half a century the sole receptacle of the drainage from a large portion of the Cantonment, and all the upper part of it is in consequence one mass of putridity. To make use of such water for the Troops seems to me out of the question. It is proposed now to surround the upper part of the Tank with drains to intercept the washings of the Town; but in the first place this will not dispose of the old accumulations of putrid matter already forming the whole bed of the upper part of the Tank; and 2ndly, if you intercept the whole of the water, of course the Tank will be dry, and whatever is admitted into it must still be the washings of the Cantonment. I do not consider it sufficient to filter this water through a short distance into wells adjoining the Tank. I cannot but think that the Troops ought to be supplied with water that had never been so thoroughly contaminated.

2. This plan would involve the expense of raising the water about 40 feet.

3. It would only supply the new Barracks and would leave the whole of the rest of the Cantonment as badly supplied with water as at present. The supply to the Horse Artillery alone costs 1,270 Rupees a year, according to the Statement appended, and the total expense to the Government and the population of the Cantonment must be very great; and this is all either well water, or from Tanks which are polluted, both of them very inferior to pure soft water collected on clean ground and stored in a large body.

4. The water supplied in this way, carried in Carts and on Bullocks, is necessarily used in insufficient quantities, so that neither are the people encouraged to keep their houses well cleaned, nor is there any surplus to flow off and flush the drains.

These seem to me decisive against the use of the Alsúr Tank.

What I beg to urge is that the whole Cantonment should be abundantly supplied with soft pure water, brought so near to the different parts of the Cantonment that the whole population shall be encouraged to use it most freely, and that thus also there may be a continual flow down the drains. Surely all the late enquiries respecting the health of Towns show that economy requires that such a supply of water as is here proposed should be procured if possible.

In reply to some further points contained in Colonel Green's letter, I beg to reply:—

About the enlarging of the Mailkotta Tank, which I visited, I beg to state that it can be enlarged to a much greater degree than I have proposed, by raising the Bund. On the 5th paragraph, I do not know why he objects to a fall of six inches a mile for the channel: we have channels with every degree of fall from one inch per mile and upwards.

On the 6th and 7th, when I speak of a copious monsoon, I mean of course what constitutes a copious monsoon there.

On the 10th, I beg to state again that I know of no objection to the fall of the channel.

On the 12th, I am not acquainted with the Ganrambaddi Tank. The proposed channel will not intercept any drainage.

On the 13th, I reply that I examined the line of country and could see no difficulty in carrying the channel along it, and providing for the very small extent of drainage that must pass under it. A great part of the channel is on the watershed, and no drainage water will pass that part.

Whatever is done, of course a Reservoir to contain a store of water for four or five months within the Post is essential, as the supply from without must always be liable to be cut off, and this must be provided for.

I append a Memorandum respecting the plan I propose. I examined the country all round the Mailkotta Tank with Captain Puckle, who had all the necessary levels taken, and also the line from the Tank to the Cantonment, and feel satisfied that there is no serious objection to the works, though of course the Estimate is only a rough one, and a detailed one must be prepared.

The area of the country draining into the Tank will be nine square miles; the contents of the Tank 10 millions cubic yards, with a bund of 36 feet height. I suppose that this will allow of two and a quarter million cubic yards for the houses of Bangalore, or 20 gallons a day per head for 50,000 people, besides two or three millions for irrigation in the Cantonment, two millions for the use of the villages below Mailkotta, and about four for evaporation from the Tank.

This allows of only nine inches of rain draining from the land in a bad monsoon, and 18 in a copious one, but it will be seen that this would provide more than double a most abundant supply for 50,000 people, so that if the quantity estimated should be much more than the drainage ground actually supplies, there might still be ample for the population. The rain fall at Bangalore varies from 25 inches to more than 40, and I have no reason to believe that there is less at Nandidrúg.

The catch drain on the western side of the hill can also be extended to any length, so as to drain a much greater area than nine square miles if necessary.

The rough Estimate for this is 1,35,000 Rupees, which allowing 8 per cent. for interest and management, would be an annual expense of about 11,000 Rupees; and it will be seen that the present cost for the Horse Artillery alone is above 1,200 Rupees, so that the whole expense to the Government and individuals must, I suppose, much exceed 11,000 Rupees for the restricted supply of inferior water now used.

Further, if three millions of cubic yards are allowed for irrigation, this would supply about 1,000 acres of garden and grass land, which might pay 4 or 5 Rupees an acre, leaving only 6,000 or 7,000 Rupees to be paid by Government and house-owners.

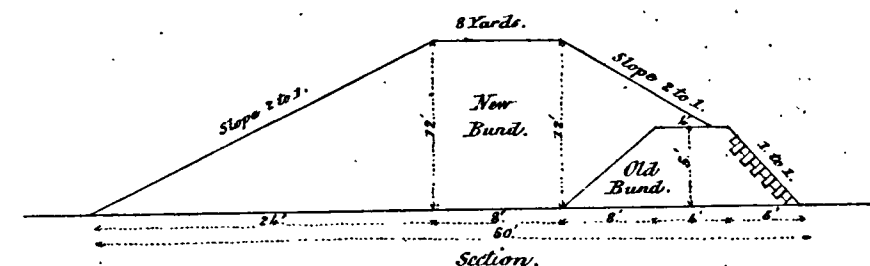
I append also some data of the flow from a certain area into the Hebbál Tank, a few miles from Bangalore, from which we calculate that about seven millions flowed off the land out of 25, in an extremely unfavorable year, when that small fall was spread over 116 days, and the land is not steep and rocky as at Nandidrúg. In the other two years given, 30 inches fell in 65 days, and 40 inches in 60 days, in which cases of course a much larger proportion would flow off, for the proportion flowing off depends upon the rapidity with which the rain fall takes place.

(Signed) A. COTTON, Colonel,  
Commandant of Engineers.

### MAILKOTTA RESERVOIR.

#### MEMORANDUM.

|                          |        |                                                                       |
|--------------------------|--------|-----------------------------------------------------------------------|
| Length of Bund           | ... .. | $\frac{1}{2}$ miles.                                                  |
| Height of water          | ... .. | 10 yards.                                                             |
| Length of Tank when full | ... .. | 1 mile.                                                               |
| Extreme breadth          | ... .. | 14 do.                                                                |
| Mean do.                 | ... .. | $1\frac{1}{2}$                                                        |
| Area                     | ... .. | $1\frac{1}{2}$ square mile or $2\frac{1}{2}$ millions of cubic yards. |
| Mean depth               | ... .. | 4 yards.                                                              |
| Height of Bund (deepest) | ... .. | 12 do.                                                                |



$$\frac{50 \times 8}{2} = 30 \times 12 = 360 \text{ new Bund.}$$

$$\frac{50 \text{ deduct for old do.}}{310}$$

|                                                                      |         |                                                 |
|----------------------------------------------------------------------|---------|-------------------------------------------------|
| 600 × 310 =                                                          | 186,000 |                                                 |
| 600 × 150 =                                                          | 90,000  | Rs.                                             |
|                                                                      | 276,000 | cubic yards earth at 10 cubic yards per Rupee.. |
|                                                                      |         | 27,600                                          |
| 600 × 16 × $\frac{1}{2}$ =                                           | 4,800   |                                                 |
| 600 × 8 × $\frac{1}{2}$ =                                            | 2,400   |                                                 |
|                                                                      | 7,200   | stone work at 3 cubic yards per Rupee .....     |
|                                                                      |         | 2,400                                           |
| Sluice and Kalingal                                                  | ... ..  | 3,000                                           |
|                                                                      |         | 33,000                                          |
| Supply channel across watershed, 5 miles at 3,000 Rupees per mile... | ... ..  | 15,000                                          |
|                                                                      |         | 48,000                                          |

#### Contents.

|                      |                      |                                                                    |
|----------------------|----------------------|--------------------------------------------------------------------|
| Surface area.        |                      |                                                                    |
| Breadth at Bund.     | ... $\frac{1}{2}$ }  | $1\frac{1}{2}$ square mile or $2\frac{1}{2}$ million square yards: |
| Greatest             | ... $1\frac{1}{2}$ } |                                                                    |
| Least                | ... 0 }              |                                                                    |
| Million square yards | yards                |                                                                    |
| $2\frac{1}{2}$ × 4   | (Mean depth) =       | 10 million cubic yards.                                            |

*Demand.*

|                                                                             |                        |     |     |                        |
|-----------------------------------------------------------------------------|------------------------|-----|-----|------------------------|
| Bangalore 1,000,000 People, including Horses, at 10 gallons per man per day | 360 million Gallons or | ... | ... | 2½ million cubic yards |
| Irrigation 300 acres at 6,000 cubic yards per acre...                       | ...                    | ... | 1½  | do.                    |
|                                                                             |                        |     | 4   |                        |
| Villages below Tank                                                         | ...                    | ... | 2   | do.                    |

*Evaporation.*

|                                               |     |          |                       |
|-----------------------------------------------|-----|----------|-----------------------|
| When full, dry season 2½ million square yards | ×   | 1½ yards | 3 million.            |
| Monsoon                                       | ... | ×        | ½ 1½ do.              |
|                                               |     |          | 4½ million cubic yard |
| At 7 yards depth, dry season, 1½ million      | ×   | 1½ yards | ...                   |
| Monsoon...                                    | ... | ×        | ½ do. ... ½           |
|                                               |     |          | 2½ do.                |

*Dry season.*

|               |     |           |     |          |     |     |     |
|---------------|-----|-----------|-----|----------|-----|-----|-----|
| At 4 yards... | ... | ½ million | ×   | 1½ yards | ... | ... | ... |
| Monsoon...    | ... | ½ do.     | ... | ...      | ... | ... | ... |

|                                                                    |                       |
|--------------------------------------------------------------------|-----------------------|
| Supposing Tank is full at the end of the monsoon, there will be... | 10 miles cubic yards. |
| Deduct Bangalore Water supply in the dry weather...                | 1½                    |
| Irrigation do.                                                     | ...                   |
| Villages below...                                                  | ...                   |
| Evaporation...                                                     | ...                   |

|                                                                |        |
|----------------------------------------------------------------|--------|
| Deduct received during these six months 27 mill. sq. yards × ½ | 1      |
|                                                                | 4½     |
| Remaining at the end of dry season...                          | 5½ do. |

*In a very bad monsoon.*

|                        |                                  |                       |
|------------------------|----------------------------------|-----------------------|
| Received...            | 27 million square yards × ½ yard | 6½ miles cubic yards. |
| Consumed—              |                                  |                       |
| Bangalore Houses...    | ...                              | 1                     |
| Irrigation to Lands... | ...                              | ½                     |
| Evaporation...         | ...                              | 1½                    |
| Villages...            | ...                              | 1½                    |

|                                                                      |           |
|----------------------------------------------------------------------|-----------|
| Add to this 2½ the 5½ remaining at the end of dry season previous... | 5½ 7½ do. |
|----------------------------------------------------------------------|-----------|

|                                    |    |
|------------------------------------|----|
| Consumed during second dry season— |    |
| Bangalore, &c. &c...               | 3  |
| Evaporation...                     | 1½ |

|                                                     |        |
|-----------------------------------------------------|--------|
| Received during dry season...                       | 1      |
| Remaining at end of dry season after bad monsoon... | 4½ do. |

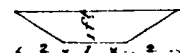
|                                                             |     |
|-------------------------------------------------------------|-----|
| Received during good monsoon 27 million square yards × ½... | 13½ |
|-------------------------------------------------------------|-----|

|             |      |
|-------------|------|
| Consumed... | 4½ 9 |
|-------------|------|

|                       |    |
|-----------------------|----|
| The Tank will hold... | 10 |
|-----------------------|----|

|                                       |        |
|---------------------------------------|--------|
| Will be discharged over waste weir... | 3½ do. |
|---------------------------------------|--------|

Delivery channel to convey water from Reservoir to Bangalore  
1½ millions in 6 months, or 350 cubic yards per hour. Fall 4  
feet in 60 miles, or 8¼ inch per mile.

Section about  = ½ square yard.

|                                                                     |     |
|---------------------------------------------------------------------|-----|
| Allowing 2 square yards for following closely the contour, then per | Rs. |
| mile at 1 anna per cubic yard...                                    | 225 |
| For 60 miles...                                                     | 60  |

|                                                                   |        |
|-------------------------------------------------------------------|--------|
|                                                                   | 13,500 |
| Add for rock cutting and difficulties, &c...                      | 10,000 |
| Planting Aloes on both sides in Trench, &c...                     | 6,000  |
| Passing places and cattle troughs, 60 at 50 Rupees each...        | 3,000  |
| Escapes for surface drainage...                                   | 3,000  |
| Covered channel in Cantonment, 5 miles, at 6,000 Rupees per mile. | 30,000 |

|                      |        |
|----------------------|--------|
|                      | 65,500 |
| Cost of Reservoir... | 48,000 |

|                                               |          |
|-----------------------------------------------|----------|
|                                               | 1,13,500 |
| Superintendent and Sundries at 10 per cent... | 11,350   |

|                                                                  |          |
|------------------------------------------------------------------|----------|
|                                                                  | 1,24,850 |
| Compensation for land submerged 500 acres at 20 Rupees per acre. | 10,000   |
|                                                                  | 1,34,800 |

|                                          |                   |
|------------------------------------------|-------------------|
| Interest and Management at 8 per cent... | 10,800 per annum. |
|------------------------------------------|-------------------|

NOTE.—By information and calculation, Hebbál Tank, in the year 1857, when 30 inches fell in 65 days, discharged (by a low calculation) 1½ million cubic yards. Drainage area about nine square miles, which is partly intercepted by seven smaller tanks above. This is independent of the water for the cultivation below Hebbál Tank, and that running to waste through sluice. In 1858 (rain-fall 40 inches in 60 days), by the same calculation five and a quarter million cubic yards escaped. In 1859 no water was discharged over the waste weir.

Rain-fall 25 inches in 116 days.

Cultivation below Hebbál Tank (average 95 acres.

Do. do. all the others do. 275 „

Total... 370

|                                                   |    |
|---------------------------------------------------|----|
| Used in cultivation...                            | 3  |
| Evaporation on 4 million square yards at ½ yards. | 2½ |

5½

Or on 27 million square yards... ½ yard or seven inches  
out of 25 do.

(Signed) A. COTTON,  
Commandant of Engineers.

No 935.

Memorandum showing the amount expended monthly in supplying water to the Horse Brigade, Madras Artillery, prepared agreeably to Instructions conveyed in a Circular from the Deputy Assistant Quarter Master General, Mysore Division, Bangalore, dated 19th December 1859.

|                                                                        |     |
|------------------------------------------------------------------------|-----|
| 2 Water Carts employed in supplying Water to the Wash-houses at Rupees | Rs. |
| 20 each per month                                                      | 40  |

|                                                                                                                                              |    |
|----------------------------------------------------------------------------------------------------------------------------------------------|----|
| 2 Pairs of Draught Bullocks with Drivers complete, employed in working with Water and Lime Carts, at 15 Rupees per month per pair per Troop. | 30 |
|----------------------------------------------------------------------------------------------------------------------------------------------|----|

*Proceedings of the Madras Government, Public Works Department,  
for the month of April 1860.*

|                                                                            |     |
|----------------------------------------------------------------------------|-----|
| 2 Pairs of Draught Bullocks with Drivers complete, employed in drawing     | Rs. |
| Water from the Wells for the use of the Horses, at Rupees 15 per month     |     |
| per pair... ..                                                             | 30  |
| 2 Coolies employed to fill the watering Troughs for the use of the Horses, |     |
| at Rupees 3 .. ..                                                          | 6   |
| Total.....                                                                 | 106 |

(Signed) F. BURGOYNE, Lieut.-Colonel,  
Commanding Horse Brigade,  
Madras Artillery.

(A true Copy.)

(Signed) A. COTTON, Colonel,  
Commandant of Engineers.

(True Copies.)

(Signed) A. HOWLETT, Major,  
Dy. Asst. Qr. Mr. Genl. of the Army.

No. 56.

ORDER THEREON, 14th April 1860, No. 752.

Before passing an Order on the question discussed in these papers, the Government resolve to refer them for the opinion of the Chief Engineer as their constituted professional adviser.

(Signed) J. D. BOURDILLON,  
Secretary to Government.

*From the  
Quarter Master General's Office*

*Quarter Master General's Office.  
No. 91.*

*The Quarter Master General  
of the Army*

*To,*

*The Secretary to Government  
Military Department.*

*Sir,*

*The Proceedings of Government  
regarding the supply of water to the Canton-  
ment of Bangalore, whereon the order of Govern-  
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*By order of the Commander-in-Chief, I for-  
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- 2. Memoranda on the Mailkottah Reservoir*
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I have the honor to be

Sir

Fort Saint George }  
20<sup>th</sup> March 1860 } Your Most Obedt Servt  
M. S. Cotton  
D. M. S.

12  
Memorandum on Bangalore water supply, in reply to Sir M. Cubbon's and Colonel Green's letters transmitted into the Government proceedings 25<sup>th</sup> February.

I would first reply to these letters. Sir M. Cubbon first states that he is not satisfied that sufficient water can be collected near Kundydroog, as little rain falls in that quarter, and he proposes to raise water for the Banacks from near the Ulsor Tank.

First, the quantity of water required merely for the Banacks is so very small, that it would be quite insignificant compared with the area draining into the Mailcottab tank, which is about 9 square Miles, or 27 Millions of C. Yards, so that a single inch of rain caught on that area and flowing into the tank would be 750,000 C. Yards, a year, or 80 Gallons a day for 4,000 people.

From the information I obtained I think we are safe in allowing 9 inches to run off the surface of the land there (which is very steep and rocky,) in a bad season, and

and 18 inches in an ordinarily good one, which would supply nearly 7 millions C. Yds<sup>2</sup> in the former and 15½ M<sup>2</sup> in the latter, and these quantities would be abundant for irrigation as well as for household purposes for all Bangalore.

As these letters contain no calculations I am unable to compare this with the data from which Sir M. Cubbon drew his conclusion.

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My objections to this are these  
1<sup>st</sup>. The Ulesor Tank has been for half a century the sole receptacle of the drainage from a large portion of the Cantonment and all the upper part of it is in consequence one mass of putridity. To make use of such water for the troops seems to me out of the question. It is proposed now to surround the upper part of the Tank with drains to intercept the washings of the Town, but in the first place this will not dispose of the old accumulations of putrid matter already

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These seem to me decisive against the use of the Moor Tank.

What I beg to urge is that the whole Cantonment should be abundantly supplied with soft pure water, brought so near to the different parts of the Cantonment that the whole population shall be encouraged to use it most freely, and that thus also there may be a continual flow down the drains. Surely all the late inquiries respecting the health of Towns show that economy requires that such a supply of water as is here proposed should be procured if possible.

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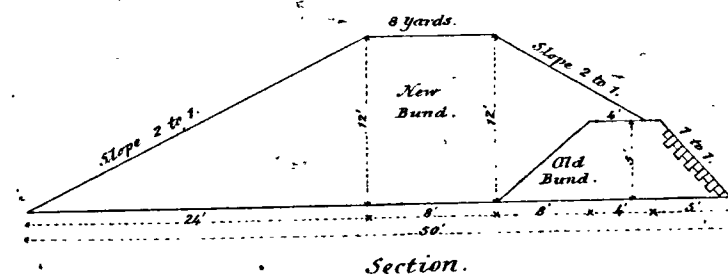
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Madras }  
 March 9<sup>th</sup> 1860. }  
 J. A. Cotton Esq.  
 Comd<sup>g</sup> of Engineers.

## Mailcattah Reservoir

### Memoranda.

Length of Bund - - - - -  $\frac{7}{8}$  miles  
 Height of Water - - - - - 10 yards  
 Length of Tank when full - - - - - 1 mile  
 Extreme Breadth - - - - -  $1\frac{1}{4}$  do  
 Mean - - - do - - - - -  $\frac{1}{2}$  do  
 Area - - - - -  $\frac{13}{16}$  sq. miles or  $2\frac{1}{2}$  mill. C. Y.  
 Mean depth - - - - - 4 yards  
 Height of Bund (deepest) - - - - - 12 do



$$\frac{50 + 8}{2} = 30 \times 12 = 360 \text{ new Bund}$$

$$\frac{50}{2} = 25 \text{ deduct for old}$$

$$310$$

$$600 \times 310 = 186,000$$

$$600 \times 160 = 96,000$$

$$276,000 \text{ Cubic Yds Earth @ } 10 \text{ Cyp. per } 27,600$$

$$600 \times 16 \times \frac{1}{2} = 4,800$$

$$600 \times 8 \times \frac{1}{2} = 2,400$$

$$7,200 \text{ Stone Work - at } 3.6 \text{ Cyp. per } 2,400$$

Supply channel across water shed } 3,000  
 5 miles at 3,000 Rs per mile } 15,000  
 48,000

### Contents.

Surface area.  
 Breadth at Bund - - -  $\frac{3}{4}$   
 Greatest - - - - -  $1\frac{1}{4}$   
 Least - - - - - 0  
 Mill. sq. yds }  
 $2\frac{1}{2} \times 4$  (Mean depth) = 10 mill = Cubic yards

## Demand -

Bangalore 1000,000 People, including Horses, at 10 Gal<sup>ts</sup> per man  
per day - 360 Mill. Gallons or -  $2\frac{1}{4}$  Mill. Cys<sup>ts</sup>  
Irrigation - 300 acres - at 6,000 - Cys<sup>ts</sup> per acre -  $1\frac{3}{4}$  do  
Villages below Tank - - - - - 2 do

## Evaporation.

When full - dry season -  $2\frac{1}{2}$  Mill. Cys<sup>ts</sup>  $\times 1\frac{1}{4}$  Cys<sup>ts</sup> 3 Mill  
Monsoon - - - - -  $\times \frac{5}{8}$  -  $\frac{1}{2}$  do  
 $4\frac{1}{2}$  Mill. Cys<sup>ts</sup>

At 7 yards depth dry Season -  
-  $1\frac{1}{4}$  Mill  $\times 1\frac{1}{4}$  Cys<sup>ts</sup> -  $1\frac{1}{2}$   
Monsoon - - - - -  $\times \frac{5}{8}$  do -  $\frac{3}{4}$   
 $2\frac{1}{4}$  - do.

## Dry Season -

at 4 yards, - - - - -  $\frac{1}{2}$  Mill.  $\times 1\frac{1}{4}$  Cys<sup>ts</sup> -  $\frac{6}{8}$   
Monsoon - - - - -  $\frac{1}{2}$  do  $\times \frac{5}{8}$  -  $\frac{5}{16}$  do  
 $\frac{1}{16}$  do

Supposing Tank is full at the end of  
the Monsoon, there will be - - - - - 10 Mill. Cys<sup>ts</sup>

Deduct Bangalore Water supply in the  
dry weather - - - - -  $1\frac{1}{4}$

Irrigation & - - - - -  $1\frac{1}{4}$ ,  $2\frac{1}{2}$

Villages below - - - - -  $\frac{1}{2}$

Evaporation - - - - -  $2\frac{1}{2}$  -  $\frac{3}{8}$

Deduct received during these months  
27 - Mill - Cys<sup>ts</sup>  $\times \frac{1}{24}$  -  $\frac{1}{4}$  -  $4\frac{1}{2}$

Remaining at the end of dry season - - - - -  $5\frac{1}{2}$  do

## In a very bad Monsoon -

Received - - - - - 27 Mill. Cys<sup>ts</sup>  $\times \frac{1}{4}$  Cys<sup>ts</sup>  $6\frac{3}{4}$  M. Cys<sup>ts</sup>

Consumed

## Consumed -

Bangalore Houses - - - - - 1

Irrigation to Lands - - - - -  $\frac{1}{2}$

Evaporation - - - - -  $1\frac{1}{2}$

Villages - - - - -  $1\frac{1}{2}$   $4\frac{1}{2}$  Cys<sup>ts</sup>

Add to this  $2\frac{1}{4}$  the  $5\frac{1}{2}$  remaining at the  
end of dry season previous - - - - -  $5\frac{1}{2}$  -  $7\frac{3}{4}$  do

## Consumed during 2<sup>d</sup> Dry Season -

Bangalore - - - - - per - 3

Evaporation - - - - -  $1\frac{1}{2}$   $4\frac{1}{2}$  do

Received during dry season - - - - -  $3\frac{1}{4}$

Remaining at end of dry season after Bad monsoon - -  $4\frac{1}{4}$  do

Received during good Monsoon 27 M: Cys<sup>ts</sup>  $\times \frac{1}{2}$  -  $13\frac{1}{2}$

Consumed - - - - -  $4\frac{1}{2}$  - 9

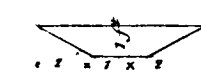
The Tank will hold - - - - -  $13\frac{1}{4}$  do

will be discharged over waste weir - - - - -  $3\frac{1}{4}$  do

Delivery channel to convey water from  
Reservoir to Bangalore - - - - -

$1\frac{1}{2}$  Mill. in 6 months, or 350 Cys<sup>ts</sup> per hour

Fall 4 feet in 6 miles, or  $8\frac{1}{4}$  in: per mile

Section about  =  $\frac{1}{3}$  sq. yard.

Allowing 2 sq. yds for following closely the  
contour. then per mile at 1 anna per Cys<sup>ts</sup> - - - 225

For 6 miles - - - - - 1350

Add for Rock cutting & difficulties &c - - - 10,000

Planting aloes on both sides in Trench &c - - - 6,000

Passing places and cattle troughs - - - - - 3,000

to at 50 Rs each - - - - -

Escapes for surface drainage - - - - - 3,000

Covered

Memorandum shewing the Amount expended monthly in supplying water to the <sup>1st</sup> Brigade & Madras Artillery prepared agreeably to instructions conveyed in a Circular from the Deputy Asst. M<sup>g</sup> Mysore & Bangalore dated 19<sup>th</sup> December 1859.

- 2. Water Carts employed in supplying water to the Wash Houses at Rs. 20 - - - each month } 40 - - -
- 2 Pairs of Draught Bullocks with Drivers complete employed in working with water & lime carts at 15 - - - Rs. per month per pair per day } 30 - - -
- 2 Pairs of Draught Bullocks with Drivers complete employed in drawing water from the Mills for the use of the Horses at Rs. 15 - - - per month per pair - - - - - } 30 - - -
- 2 Coolies employed to fill the watering troughs for the use of the Horses at Rs. 3 - - - } 6 - - -

Total Rs. 106 - - -

Bangalore  
27<sup>th</sup> December 1859.

/S/ J. Burgoyne Esq.  
Comd. Horse Brigade Madras

/True Copy/  
/S/ A. Cotton Esq.  
Commandant of Engineers.  
True

|                                                                        |          |
|------------------------------------------------------------------------|----------|
| Covered channel in Cantonment 5 Miles at 6,000                         |          |
| Rs. per mile - - - - -                                                 | 30,000   |
|                                                                        | 65,500   |
| Cost of Reservoirs - - - - -                                           | 48,000   |
|                                                                        | 1,13,500 |
| Superintendent & Sundries at 10 per cent - - -                         | 11,350   |
|                                                                        | 124,850  |
| Compensation for land submerged 500 acres at 20 Rs. per acre - - - - - | 10,000   |
|                                                                        | 134,850  |

Interest and Management at 8% - - - Rs. - 10,880 per annum.

Note - By information and calculation - Hebbaul Tank, in the year 1857 - when 30 in; fell in 66 days - discharged (by a low calculation)  $1\frac{1}{4}$  mill. Cys. Drainage area about 9 sq. miles. which is partly intercepted by 7 smaller Tanks above - This is independent of the water for the cultivation below Hebbaul Tank, and that running to waste thro' sluice - In 1858 (Rainfall 40 in; in 66 days) by the same calculation -  $5\frac{1}{4}$  mill; Cys. escaped - In 1859 no water was discharged over the waste weir.

|                                                   |     |
|---------------------------------------------------|-----|
| Rain. fall 25 in. in 116 days - -                 |     |
| Cultivation below Hebbaul Tank (average 95 acres) |     |
| Do. Do. all the others                            | 275 |
| Total                                             | 370 |

|                                                                      |                           |
|----------------------------------------------------------------------|---------------------------|
| Used in cultivation - - - - -                                        | 3                         |
| Evaporation on 4 mill. sq. yds. at $\frac{5}{8}$ yds. $2\frac{1}{2}$ |                           |
|                                                                      | $5\frac{1}{2}$            |
| or on 27 Mill. sq. yds. - - - - -                                    | $\frac{1}{5}$ or 7 inches |
| 1279 a. Cotton - - - - -                                             | out. 825 25               |

(True Copies)

Enoch Major

Of Asst. Major General  
of the Army

27<sup>th</sup>  
4-27<sup>th</sup> February 1830 - 1831  
10 November 1839 - 1840 323

1<sup>st</sup> of 1830  
203<sup>rd</sup> March 1830

Transferred to the  
Public Works Department

Memorandum  
of the 1<sup>st</sup> of 1830

2-21-70

1830-1831

1830-1831

Copy to the Council  
of the 1<sup>st</sup> of 1830  
1830-1831

Public Works  
1830-1831  
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1830-1831

Before passing

an order on the question  
discussed in these papers,  
the Govt. resolve to refer  
them for the opinion of the  
Chief Engineer as then  
constituted his opinion  
= as advised -

1830-1831

1830-1831