

(1) Number of pages 38(2) Date of repair 26-7-40(3) Initials of the Referencer GP**MADRAS RECORD OFFICE.****Government of Madras.***Public Works* **DEPARTMENT.**G.O. No. 1741 P.W.D Press
MGDated 2nd July 1863.Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
2nd July 1863.*

Read the following papers :—

No. 28. From W. FRASER, Esq., Civil Engineer, to Colonel W. I. BIRDWOOD, R. E., Secretary to Government, Public Works Department, dated Chepauk, 8th June 1863, No. 12.

SIR,

1. I have the honor to report that, in accordance with your instructions, I proceeded on Saturday last, the 6th instant, to examine the springs of fresh water which were said to exist in the sandy ridge lying between Cochrane's Canal and the sea, and extending from Madras to Ennore; and which it was considered by many people, well acquainted with Madras and its vicinity, could readily be made available for the supply of the Fort, Black Town, &c.

Whilst I was out on this duty I obtained information on several subjects which are at present under consideration, with reference to the improvement of Madras.

In this letter I will therefore have something to say about :—

First.—The Seven and other Wells in Black Town.

Second.—The springs between Madras and Ennore.

Third.—The necessity for reverting to the Red Hill Lake project, and the present position of that question.

Fourth.—High floods in Madras caused by freshes in the Coromandel.

Fifth.—How this could be prevented by reclaiming the waste lands along the back-water.

I. *The Seven and other Wells in Black Town.*

2. I learned that the deterioration of the water of the Seven Wells is not of recent date. That it was noticed eight or nine years ago; but that it has rapidly progressed during the last three or four years.

This deterioration is not confined to the Seven Wells.

All the wells in the same locality, and also on the south and west, and for nearly a mile to the north of it, have, within the same period, become similarly affected.

Some of the Black Town wells which, a few years ago, were considered tolerably good, have been altogether abandoned, the water having become vitiated to such an extent as to be offensive to the smell.

The deterioration of the water appears to proceed from south-west to north-east.

The wells on the east and north-east of Black Town are still tolerably good; but the cause of vitiation, whatever it is, is said to be gradually approaching them from the south and west.

3. The people connect the great change in these wells with the excavation of the channel and basin at the Trevelyan water works.

It is possible that the fresh water bearing stratum was then cut into, and that, whilst the sides were fresh, the brackish and filthy water from the Canal percolated to the wells.

However this may be, it seems certain that the great change in the quality of the water, took place about the time the basin was excavated; and that so satisfied were the people that their wells would be injured that they petitioned Government against the completion of the works.

It is unnecessary to look to any circumstances of this kind for an explanation of the deterioration of wells situated as these are.

Placed in a narrow strip of sandy soil, with the sea on one side, a filthy canal on the other, filthier drains flushed with filthy water, all over the surface, and with a rapidly increasing population drawing from them, it is only a question of time when they shall all become unfit for use.

II. *Springs between Madras and Ennore.*

4. The fresh water bearing stratum which extends northward consists of the same white sand which yields the fresh water at Madras.

As we proceed from Black Town the quality of the water gradually improves until we reach a place called Malayala Tottam (3½ miles from the Fort and marked A upon the Plan) where it is decidedly good.

It stands, here, 16 feet below the surface of the ridge, but the depth diminishes to 6 or 9 feet as we approach Tiruvattūr (6½ miles from the Fort); but about half a mile north of that village we find it close to the surface, and here commence the springs of which we had heard so much.

5. The principal springs are found over about 2 miles in length of the ridge, from about half a mile north of Yēranavūr, 8½ miles from the Fort.

They consist generally of pools, which, evidently, were excavated at some remote period.

The water is used for irrigating some patches of cultivated land, for which purpose it is raised by peccottas from some of the springs, whilst from others it is led directly to the fields in small channels.

It is said that these springs never become dry. In some of them the water may be seen bubbling up, and it is very delicious water to drink.

6. I levelled along the site of these springs, and across the land from the back-water to the sea. The surfaces of the pools stand at various heights from 2 to 5 feet above the mean sea level. One small water hole was 7 feet above the sea.

Opposite to the Canal Lock the highest part of the sandy ridge is 12 feet above the mean sea level, and it appeared that good water could be found any where by digging a hole 3 or 4 feet in depth.

7. The opinion I have formed is that these springs cannot be made available for the supply of any portion of Madras. They are now considerably below the level of Black Town; and if they were extensively drawn from, their height would be at once reduced.

The wealthy Native population is gradually leaving Black Town and extending itself in garden houses towards Ennore.

I believe that the whole of the present sandy ridge, will, in the course of a few years, be built and planted over; and that then the supply of fresh water will not be superabundant.

8. It thus appears that if any thing is to be done speedily to meet the rapid deterioration of the Seven and other wells, immediate and definite attention must be given to the Red Hill Lake, as I had the honor of suggesting to you a few days ago.

I have gone as carefully as the present surveys and the want of personal inspection of the ground permit, into the relative merits of the southern and northern sources of water supply, and it is clear to me that it would be unsafe to rely altogether on the former; and that of the two, the Red Hill Lake is the more certain.

9. Whilst at Yeranavur I had an opportunity of examining the lower reach of the Cortilliar, and of obtaining some information about the height and duration of its freshes, &c., and the result is favourable as regards the capabilities of the Cortilliar and Naggery rivers.

Along the sides of the back-water, about Ennore, and along both sides of the Canal up towards Madras thousands of acres of low land are, from fifteen to thirty days during the north-east monsoon, covered with water to a depth of from 4½ to 6 feet; two-thirds of which, at the least, are waters from the Cortilliar and Naggery rivers. This shows that by proper arrangements a vast body of surplus water may be secured for the supply of the Red Hill Lake.

III. *The necessity for reverting to the Red Hill Lake project, and the present position of that question.*

10. The Red Hill project has been so fully discussed by Captain O'Connell, and Messrs. Roberts and Stephenson have surveyed and levelled so much in connection with it, during the last twelve months, that we have nearly all the information necessary to enable Government to decide on what should be done.

11. There is one point on which I differ in opinion from what has hitherto been proposed, and it is necessary that a decision should be come to on this point before anything further is undertaken.

Captain O'Connell proposed to raise the Red Hill Lake 9 feet and to supply it by a channel taken off the Cortilliar at Pashalā, 8 miles above the junction of the Naggery river.

This channel, about 23 miles in length, was intended to supply a large number of tanks for the purpose of irrigating the lands lying between the Cortilliar and the Lake. Thus only the surplus water of the tanks could reach the Lake, and the Naggery river a most important source of supply, was left out.

From all the information I have received, I am of opinion that the quantity of water obtained by this plan would be quite insufficient.

12. Every other proposition put forward except one contemplated, the combination of irrigation and water supply; still leaving the Lake dependent on a doubtful quantity of surplus water.

The exception is a trial line surveyed by Mr. Roberts to ascertain the lowest point on the Cortilliar from which the supply channel could be taken.

This survey shows that if the Lake be raised only 9 feet, the supply channel need not exceed 8 miles in length.

The point of departure from the Cortilliar would be about 25 miles below the junction of the Naggery river; and thus would be secured not only the surplus waters of that stream, but also that of all the others which enter the Cortilliar within those 25 miles.

I am therefore of opinion that the supply channel should be taken off the Cortilliar at the lowest point which the increased height of the Lake will permit, and that irrigation be not considered except as a secondary object.

13. If this opinion be approved of, the whole matter will be greatly simplified, as the points to be investigated may be clearly defined as follows:—

I. The height to which the Lake should be raised.

II. The site of the Anicut on the Cortilliar, and the best line for the supply channel.

III. The best line by which to bring the water into Madras; and where the basin or basins should be situated.

These questions would require a good deal of consideration, and some trial surveys should still be made; but with the aid of two or three good Assistants, the Plans and Estimates could be prepared in two months.

14. I have not forgotten that a very important question is not touched upon above, namely, the distribution of the water.

Of whatever system may be adopted, high pressure or low, the details will be very troublesome and tedious to work out; but for this, there would be ample time before the Red Hill water was actually in Madras.

15. In the meantime I would recommend that no new tanks, channels nor anicuts, be constructed on the Cortilliar, the Naggery or their tributaries, until further orders.

IV. *The Cortilliar freshes.*

16. Whilst enquiring about the Cortilliar this morning, I ascertained a fact which is very important as regards the improvement of the Cooum.

I found that the heavy floods to which Madras is occasionally subject are due, not to the Cooum, but to the Cortilliar.

High freshes in the Cortilliar rise to a height of about 6 feet above the present surface of the Cooum and Canal, which surface, for present purposes, may be assumed to be the mean sea level. Very high freshes, such as that of 1858, rise 12" to 15" higher, or over 7 feet above the present water in the Cooum.

The flood waters flow along the flats on both sides of the Canal, and by the Canal itself, southwards to Madras, and so continue to flow until twenty-four or thirty hours after the Ennore Bar is fully opened, when it begins to flow northwards.

It follows from this, that no matter what we do towards disposing of the surplus water of the Cooum in the higher reaches of that river; Madras will be subject to inundation from the Cortilliar, so long as the Canal and the flooded lands remain in their present condition.

*Proceedings of the Madras Government, Public Works Department,
2nd July 1863.*

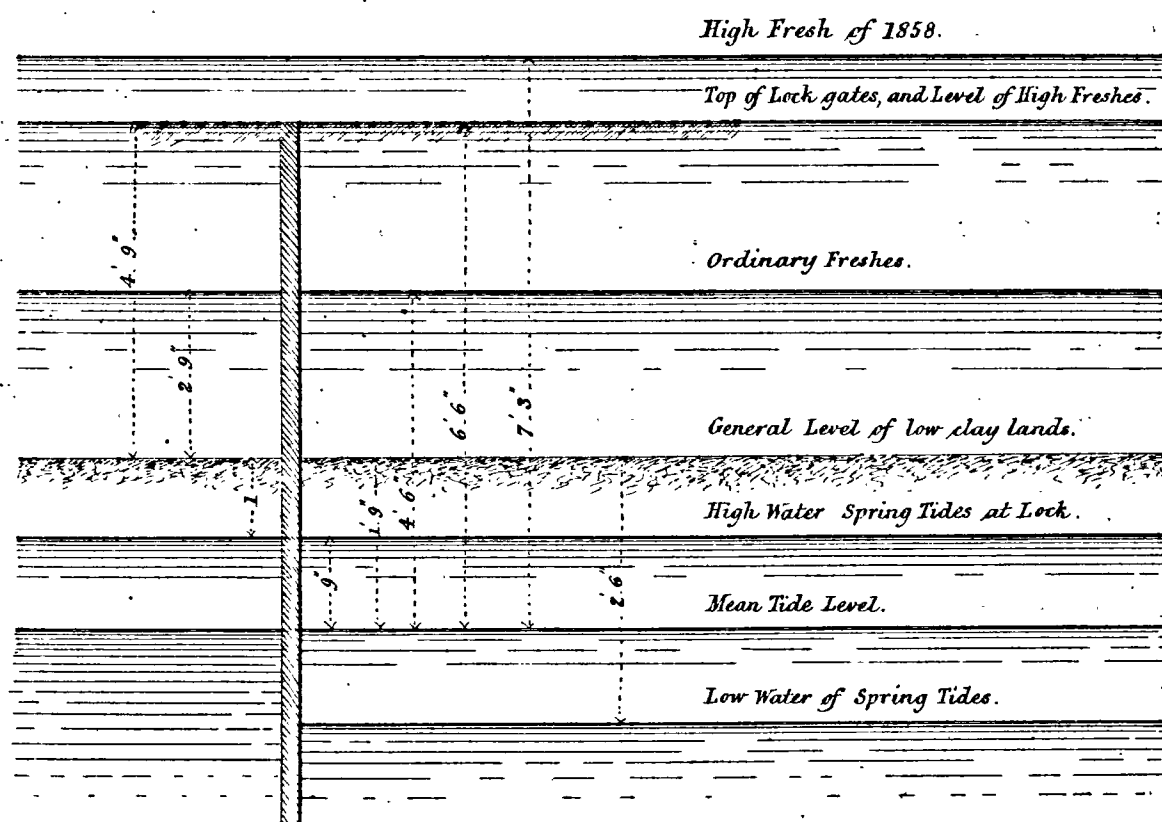
V. How the inundation of Madras from the Cortilliar may be prevented. Reclamation of waste lands.

17. To make my remarks under this head intelligible, it would be necessary to show how the Canal is affected by the floods and tides.

Upon the accompanying Plan the limits of the submerged lands are edged thus:—



The following sketch shows the approximate heights of the tides, floods, &c.,



I believe the Lock was built for the purpose of keeping the water in the Madras reach as high as possible during the dry season.

In furtherance of this object there is a dam across the back-water, at the point marked B, where there is also a foot bridge.

18. At all times, but especially when the Ennore Bar is open (which it is for about seven months in the year) the tides ebb and flow up to the Lock. The range of spring tides is about 18 inches; that of neaps about 9 inches. The time of high water, at full and new moon, is about eight and half hours; or about two hours later than the time of high water at the Bar.

Generally, the level of *high water* in the Ennore reach is higher than the water in the Madras reach, so that twice in the twenty-four hours the Lock gates are forced open and the tide flows up towards Madras; but when it begins to ebb the gates are (said to be) shut, and the water kept up in the Madras reach.

Uninfluenced by winds or freshes, the Madras reach can never be more than 18 inches higher than the Ennore reach.

19. The Lock gates are level with the coping of the chamber. High freshes in the Cortilliar rise to the same level; ordinary freshes are 2 feet lower, and extraordinary freshes are 9 inches higher.

*Proceedings of the Madras Government, Public Works Department, 5
2nd July 1863.*

Every fresh forces the gates, which are then tied open; the Canal not being embanked, is then undistinguishable from the surrounding waters; and the boats avoid the Lock and pass over the low ground to the eastward of it.

20. When the fresh has attained a certain height the Ennore Bar is cut open; and if the fresh happen to be strong enough to scour the Bar deep, it soon subsides; but if it be a small one it remains up for a considerable time.

21. If the only object were to save Madras from inundation, perhaps the simplest and cheapest plan to adopt would be to embank across the flooded lands at their narrowest part near Madras (or to make use of the Railway embankment for this purpose), and to construct a Lock at the same place with gates opening towards the north. This Lock would be required only during the freshes, and the present Lock at all other times, so that no new establishment would be required.

22. This however is not the plan I would recommend.

Of the flooded lands alluded to above, there are about ten or twelve thousand acres between the Cortilliar and Madras, and by embanking these somewhat as sketched in red on the Plan, not only would Madras be relieved from the Cortilliar floods, but this vast tract of land would be reclaimed and brought under cultivation.*

23. The above sketch shows that these lands are about 1 foot above high water, and 2' 6" above low water of spring tides. That they are covered to a depth of 2' 9" by ordinary, and 4' 9" by high freshes in the Cortilliar.

The portion I walked over is a *rich loamy clay*, and I was informed that the rest is of the same quality.

24. If the Red Hill Lake were enlarged, and the supply channel taken off low down on the Cortilliar, the surplus water of that river would be greatly reduced; and, were it found necessary, it could be reduced still further by constructing reservoirs on the upper part of the Cortilliar and Naggery ár, or by enlarging some of the present numerous tanks.

In this way the floods at the back-water could be reduced to perhaps 2 or 3 feet in depth, which would render the embanking of the lands very easy and inexpensive.

25. The embankment as sketched on the Plan is about 17 miles in length. It should probably be 6 feet in height.

It would be necessary to extend the Lock (at a higher level) and to put in a pair of gates opening towards the north.

There would also be many subsidiary works required; such as catch-water, back, and other drains; fixed and self-acting sluices; wind or other machines to lift the water which could not be discharged by the sluices, &c.

26. Should the embanking of these lands be ever undertaken a daily registry of the height of the water at the Lock would be useful, as the Lock-keeper has no proper means of measuring the heights. I would recommend that two gauges be provided, one for the Ennore and one for the Madras reach; the zeros to be placed at the level of the sills; the tops should be 2 feet above the coping. The *time* of high and low water as well as their *heights* should be observed.

27. It is right that I should state, that I am of opinion that if the surplus water of the Cortilliar and Naggery ár were utilized, as proposed above, the Ennore Bar would be permanently closed.

28. In conclusion, I have to state that what I have written above is the result of a very small amount of personal observation, aided by such information as I could obtain from the Lock-keeper and some villagers on the Cortilliar.

* NOTE.—The reclamation of the submerged lands north of the Cortilliar does not affect the present question. It might be taken up as a distinct project.

6 *Proceedings of the Madras Government, Public Works Department,*
2nd July 1863.

No. 29.

MINUTE BY THE HONORABLE THE PRESIDENT.

1. I have read Mr. Fraser's paper with great interest. I think that his suggestions as to the cause of the deterioration of the Black Town springs is probably correct, and I quite agree with him that the mere soakage of the small tract upon the sea coast can never be made sufficient for the supply of Madras.

2. I have always been of opinion that it would not be safe to trust to the Adyar water for the supply of the whole of Madras, and that we ought to look to the Red Hill Tank for the supply of the Town to the north of the Cooum, while the Adyar would take in the whole of the Town and suburbs to the south of that river.

3. Backed, then, by the opinion of Mr. Fraser, and looking to the rapid deterioration in the character of the water from the Seven Wells and other springs, it is my opinion that no further time should be lost, and that Mr. Fraser should be directed to set to work at once and to prepare the necessary Plans and Estimates for turning the Cortilliar water into the Red Hill Tank, leaving the distribution of the water to be gone into after the plans for procuring a sufficient supply of water are matured.

4. It is evident that a large portion of the Cortilliar water makes its way into the sea during freshes and is wasted. It would be very desirable that the surplus after the Red Hill Tank is filled should be made available as far as possible for irrigation. In maturing, therefore, his project for the Red Hill Tank, Mr. Fraser should be directed to ascertain by what means this retention of water could be managed; and it seems to me that he might embrace in one scheme the Red Hill Tank and its affluents, also the embankments, and what he has suggested as a means of securing the Town of Madras from the floods of the Cooum.

5. With reference, however, to this, I would observe that unless the whole flood water of the Cooum can be stopped at different points by Anicuts, some outlet must be provided for this flood-water, and it may be that in the reduced state of the freshes on the Cortilliar, the Cooum without rising too high might over-ride the former river and make its way into the back-water. This however will be a matter for consideration when the details of the plan are under consideration.

6. As Mr. Fraser's plan may effect in some way the navigation of Cochrane's Canal, he should put himself into communication with Mr. Kennedy, to whom it is intended to intrust the management and extension of this Canal as far as Kistnapatam. And this leads me to allude to this Officer and to the duties which it may be advisable to impose upon him in his position as one of the special Officers in the Department of Public Works. Mr. Kennedy has hitherto had charge of the Southern Canal, which he has extended as far, I believe, as the Palar. It would be as well that he should have charge of the inland navigation to the north as well as to the south of Madras, and should be called upon to prepare Plans and Estimates for the extension of the Northern Canal as far as Kistnapatam, where it will meet the works of the Irrigation Company, and by proper arrangements might benefit by any supply of water brought down from the Pennar.

7. It would be worthwhile, considering whether it would be wise, to make use of the various back-waters. The water in them is variable, being affected by the tide in many instances. The banks are shifting, and it is seldom I suppose that a depth of 3 feet can be maintained throughout. Means might be provided of securing a supply of water for the Canal at high-water, so as to keep up the supply always within a few inches of high water of neap tides, which might be made the datum level.

8. Both Mr. Fraser and Mr. Kennedy will require assistance; they should be called upon to state the nature and amount of assistance which they require in order to enable them to furnish these Plans and Estimates within a given period, which they may be called upon to name.

7 *Proceedings of the Madras Government Public Works Department,*
2nd July 1863.

9. Some of the Officers whose services are about to be dispensed with may be employed on this work, but care must be taken not to furnish Messrs. Fraser and Kennedy with inferior hands, and they must be directed to report the names of those who do not work satisfactorily.

24th June 1863.

(Signed) W. T. DENISON.

No. 30.

ORDER THEREON, 2nd July 1863, No. 1,741.

1. The Government have read Mr. Fraser's paper with great interest. They think that his suggestions as to the cause of the deterioration of the Black Town springs is probably correct, and they agree with him that the mere soakage of the small tract upon the sea coast can never be made sufficient for the supply of Madras. Looking to the rapid deterioration in the character of the water from the Seven Wells and other springs, the Government are of opinion that no further time should be lost, and that Mr. Fraser should set to work at once and prepare the necessary Plans and Estimates for turning the Cortilliar water into the Red Hill Tank, leaving the subject of the distribution of the water to be gone into after the plans for procuring a sufficient supply are matured. It is evident that a large portion of the Cortilliar water makes its way into the sea during freshes and is wasted. It would be very desirable that the surplus, after the Red Hill Tank is filled, should be made available as far as possible for irrigation. In maturing his project for the Red Hill Tank, therefore, Mr. Fraser is requested to ascertain by what means this retention of water could be managed. It seems to the Government that he might embrace in one scheme the Red Hill Tank and its affluents, also the embankment, and what he has suggested as a means of securing the Town of Madras from the floods of the Cooum. With reference, however, to this, the Government would observe that unless the whole flood water of the Cooum can be stopped at different points by Anicuts, some outlets must be provided for this flood water, and it may be that in the reduced state of the freshes on the Cortilliar, the Cooum without rising too high might over-ride the former river and make its way into the back-water. This however will be a matter for consideration when the details of the plan are being considered.

2. As Mr. Fraser's plan may affect in some way the navigation of Cochrane's Canal, he should place himself in communication with Mr. Kennedy, to whom it is intended to intrust the management and extension of this Canal as far as Kistnapatam.

3. Mr. Fraser is requested to state the nature and amount of assistance that he requires in order to enable him to furnish the Plans and Estimates called for within a given period, which he will be good enough to specify.

(Signed) W. I. BIRDWOOD, Colonel, R. E.,
Secretary to Government.

No 12

Chepauk
8 June 1863

19

From

W. Fraser Esq
Civil Engineer

To

Col. Birdwood R.E.
Secretary to Government P.W.D.

Sir,

I have the honor to report that, in accordance with your instructions, I proceeded on Saturday last, the 6th instant, to examine the springs of fresh water which were said to exist in the Sandy ridge lying between Cochrane's Canal and the Sea, and extending from Madras to Ennore; and which it was considered by many people well acquainted with Madras and its vicinity, could readily be made available for the supply of the Fort, Black Town &c.

Whilst I was out on this duty I obtained information on several subjects which are at present under consideration with reference to the improvement of Madras:

In this letter I will therefore have something to say about.

1st The Town and other wells in Black Town:—

2nd The Springs between Madras and Ennore:—

3rd The necessity for reverting to the Red Hill Lake project; and the present position of that question:—

4th High floods in Madras caused by freshes in the Coortiliv:—

5th How this could be prevented by reclaiming the waste lands along the Back water—

6th ~~Planting Casuarina and other Trees in the Sandy Ridge between Timavallur and Ennore~~

2:

The Seven

It is said that these springs never become dry: In some of them the water may be seen bubbling up, and it is very delicious water to drink.

6. I travelled along the site of these springs, and across the land from the Back Water to the Sea: The surfaces of the pools stand at various heights from 2 to 5 feet above the Mean Sea Level: One small water hole was 7 feet above the Sea.

Opposite to the Canal Lock the highest part of the Sandy Ridge is 12 feet above the Mean Sea level, and it appeared that good water could be found ~~unaffected~~ by digging a hole 3 or 4 feet in depth.

7. The opinion I have formed is that these springs cannot be made available for the supply of any portion of Madras: — They are now considerably below the level of Black Town; and if they were extensively drawn from, their height would be at once reduced:

The wealthy native population is gradually leaving Black Town and extending itself in garden houses towards Ennore:

I believe that the whole of the present Sandy Ridge, will, in the course of a few years, be built and planted over; and that then the supply of fresh water will not be ~~found~~ superabundant.

8. It thus appears that if anything is to be done speedily to meet the rapid deterioration of the ~~present~~ and other wells, immediate and definite attention must be given to the Red Hill Lake, as I had the honor of suggesting to you a few days ago:

I have gone as carefully as the present ~~surveys~~ and the want of personal inspection of the ground permit, ^{into} the relative merits of the Southern and Northern sources of water supply, and it is clear to me that it would be unsafe to rely altogether

13
on the former; and that of the two, the Red Hill Lake is the more certain.

9. Whilst at Yeranavur I had an opportunity of examining the lower reach of the Cortilliar and of obtaining some information about the height and duration of its rushes &c. and the result is favourable as regards the capabilities of the Cortilliar and Kaggery Rivers.

Along the sides of the Back Water, about Ennore, and along both sides of the Canal up towards Madras thousands of acres of low land are, from 15 to 30 days during the N.E. Monsoon, covered with water to a depth of from $1\frac{1}{2}$ to 6 feet; $\frac{2}{3}$ of which, at the least are waters from the Cortilliar and Kaggery Rivers. — This shows that by proper arrangements a vast body of surplus water may be secured for the supply of the Red Hill Lake.

10. The Red Hill Project has been so fully discussed by Captain O'Connell, and Messrs Roberts and Stephenson have surveyed and levelled so much in connection with it, during the last 12 months, that we have nearly all the information necessary to enable Government to decide on what should be done.

11. There is one point on which I differ in opinion from what has hitherto been proposed, and it is necessary that a decision should be come to on this point before anything further is undertaken.

Captain O'Connell proposed to raise the Red Hill Lake 9 feet and to supply it by a channel taken off the Cortilliar at Pashala, 8 miles above the Junction of the Kaggery River:

This channel, about 28 miles in length, was intended to supply a large number of Tanks for the purpose of irrigating the lands lying between the Cortilliar and the Lake: Thus only the surplus water of the Tank

2. The Sewer and other wells in Black Town.

I learned that the deterioration of the water of the Sewer wells is not of recent date. That it was noticed 8 or 9 years ago, but that it has rapidly progressed during the last 3 or 4 years.

This deterioration is not confined to the Sewer wells:

All the wells in the same locality, and also in the South and West, and for nearly a mile to the North of it, have, within the same period become similarly affected.

Some of the Black Town wells which a few years ago were considered tolerably good, have been altogether abandoned, the water having become vitiated to such an extent as to be offensive to the smell.

The deterioration of the water appears to proceed from S.W. to N.E.

The wells in the East and N.E. of Black Town are still tolerably good; but the cause of vitiation whatever it is, is said to be gradually approaching them from the South and West.

3 The People connect the great change in these wells with the excavation of the channel and Basin at the Trivelpam water works.

It is possible that the fresh water bearing stratum was then cut into, and that, whilst the sides were fresh, the brackish and filthy water from the Canal percolated to the wells:

However this may be, it seems certain that the great change in the quality of the water, took place about the time the Basin was excavated, and that so satisfied were the people that their wells would be injured.

41
injured that they petitioned Government against the completion of the works.

It is unnecessary to look to any circumstances of this kind for an explanation of the deterioration of wells situated as these are:

Placed in a narrow strip of sandy soil with the sea on one side, - a filthy Canal on the other, - filthy drains, flushed with filthy water, all over the surface, - and with a rapidly increasing population drawing from them, - it is only a question of time when they shall all become unfit for use.

4. Springs between Madras & Ennore.

The fresh water bearing stratum which extends northward, consists of the same white sand which yields the fresh water at Madras.

As we proceed from Black Town the quality of the water gradually improves until we reach a place called Kealayala. Tottam (3½ miles from the Fort, and marked A upon the Plan) where it is decidedly good.

It stands here, 16 feet below the surface of the Ridge, but the depth diminishes to 6 or 9 feet as we approach Tiruvattur (6½ miles from the Fort) but about half a mile North of that Village we find it close to the surface, and here commence the Springs of which we had heard so much:

5 The principal Springs are found over about 2 miles in length of the Ridge, from about half a mile North of Yeranavur, 8½ miles from the Fort:

They consist generally of Pools, which, evidently, were excavated at some remote period.

The water is used for irrigating some patches of cultivated land, for which purpose it is raised by Scoffas from some of the Springs, whilst from others it is led directly to the fields in small channels:

It.

Tanks could reach the Lake, and the Naggery River, a most important source of supply, was left out.

From all the information I have received I am of opinion that the quantity of water obtained by this plan would be quite insufficient.

12. Every other proposition put forward except one. Contemplated the Combination of Irrigation and water supply; still leaving the Lake dependent on a doubtful quantity of surplus water.

The exception is a trial line surveyed by Mr Roberts to ascertain the ^{lowest} ~~lowest~~ point on the Cortilliar from which the supply channel could be taken.

This survey shows that if the Lake be raised only 9 feet, the supply channel need not exceed 8 miles in length.

The Point of departure from the Cortilliar would be about 25 miles below the Junction of the Naggery River; and thus would be secured not only the surplus waters of that Stream, but also that of all the others which enter the Cortilliar within those 25 miles.

I am therefore of opinion that the supply channel should be taken off the Cortilliar at the lowest point which the increased height of the Lake will permit, and that Irrigation be not considered except as a secondary object.

13. If this opinion be approved of the whole matter will be greatly simplified, as the points to be investigated may be clearly defined as follows.

- I. The height to which the Lake should be raised. ✓
- II. The site of the Anicut on the Cortilliar, and the best line for the supply channel. ✓
- III. The best line by which to bring the water into Madras; and where the Basin or Basins should be situated.

These

These questions would require a good deal of consideration; and some trial Surveys should still be made; but with the aid of two or three good assistants, the Plans and Estimates could be prepared in 2 months. I have not forgotten that a very important question is not touched upon above; namely the distribution of the water.

Of ~~the~~ ^{the} system may be adopted, High pressure or low, the details will be very troublesome and tedious to work out; but for this, there would be ample time, before the Red Hill water was actually in Madras.

15. In the mean time I would recommend that no new Tanks, Channels, nor Anicuts, be constructed on the Cortilliar, the Naggery or their tributaries, until further orders.

4th The Cortelliar Freshes.

16. Whilst enquiring about the Cortelliar this morning I ascertained a fact which is very important as regards the ~~improvement~~ ^{improvement} of the Coorn.

I found that the heavy floods to which Madras is occasionally subject are due, not to the Coorn, but to the Cortelliar.

High freshes in the Cortelliar rise to a height of about 6 feet above the present surface of the Coorn and Canal, which surface, for present purposes, may be assumed to be the Mean Sea Level. Very high freshes, such as that of 1858, rise 12 to 15 higher, or over 7 feet above the present water in the Coorn.

The flood waters flow along the flats on both sides of the Canal, and by the Canal itself, Southwards to Madras, and so continue to flow until 24 or 30 hours after the Coorn Bar is fully opened, when it begins to flow Northwards.

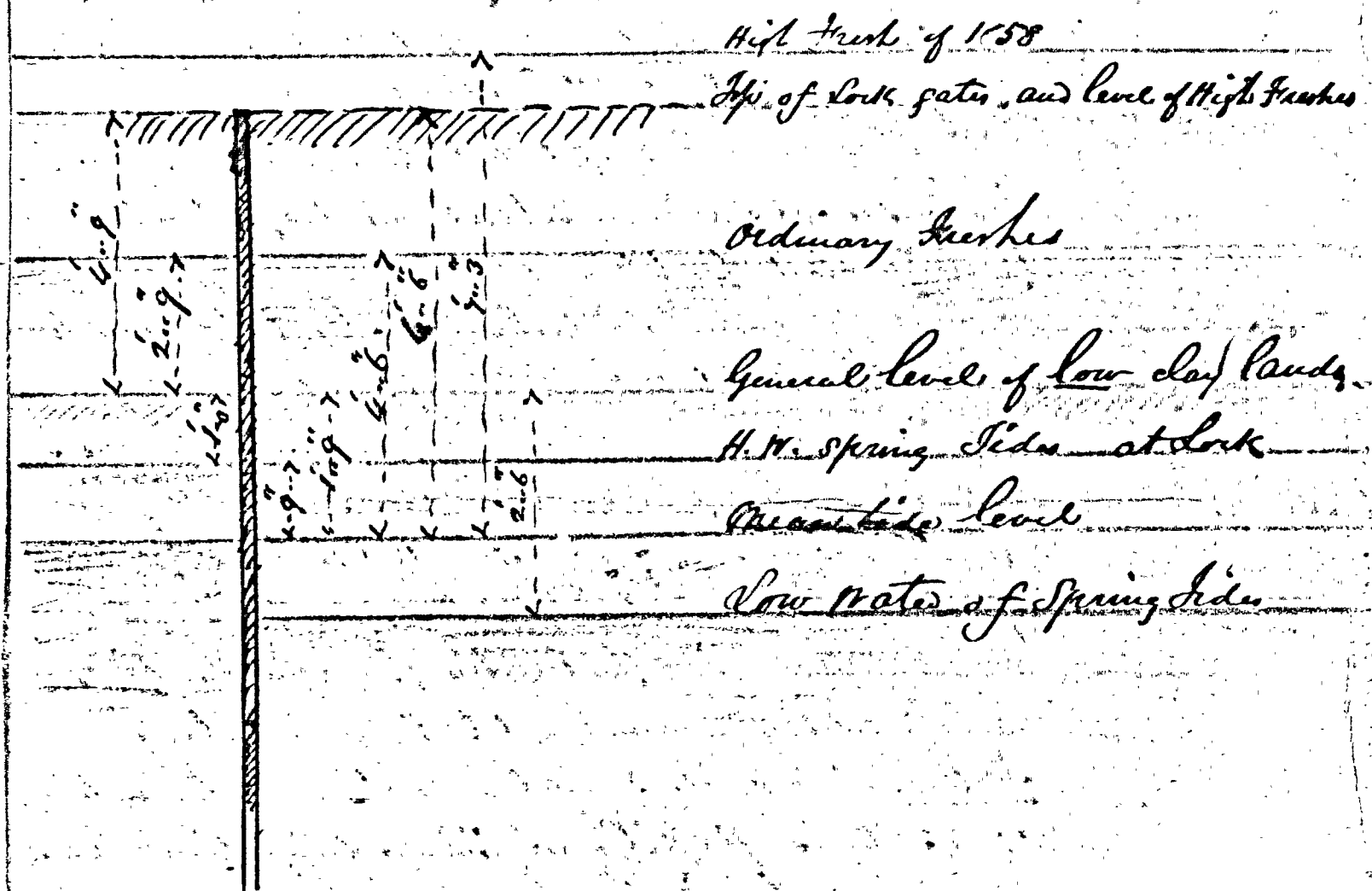
It

It follows from this, that no matter what we do towards disposing of the surplus water of the Coromandel in the higher reaches of that River; Madras will be subject to inundation from the Correllian, so long as the Canal and the flooded lands remain in their present condition.

5^c How the inundation of Madras from the Correllian may be prevented.
Reclamation of waste lands.

17. To make my remarks under this head intelligible it would be necessary to show how the Canal is affected by the floods and tides.

Upon the accompanying Plan the limits of the latter are edged thus -
 The following Sketch shows the approximate heights of the Tides, floods &c.



167
 I believe the Lock was built for the purpose of keeping the water in the Madras reach as high as possible during the dry season:

In furtherance of this object there is a dam across the Back water, at the point marked B where there is also Fort Bridge:

18. At all times, but especially when the Ennore Bar is open (which it is for about 7 months in the year) the tides ebb and flow up to the Lock: The Range of Spring tides is about 18 inches; that of Neaps about 9 inches: The time of high water, at full and new moon is about 8½ hours; or about 2 hours later than the time of high water at the Bar.

Generally, the level of High Water in the Ennore reach is higher than the water in the Madras reach; so that twice in the 24 hours the Lock gates are forced open and the tide flows up towards Madras, but when it begins to ebb the gates are (said to be) shut and the water kept up in the Madras reach.

Uninfluenced by winds or freshes, the Madras reach can never be more than 18 inches higher than the Ennore reach.

19 The Lock gates are level with the coping of the Chamber: High freshes in the Correllian rise to the same level; ordinary freshes are 2 feet lower and extraordinary freshes are 9 inches higher:

Every fresh forces the gates, which are then tied open; The Canal not being embanked is then indistinguishable from the surrounding water; and the Boats avoid the Lock and pass over the low ground to the Eastward of it.

20. When the fresh has attained a certain height the Ennore Bar is cut open; and if the Fresh happens to be strong enough to scour the Bar deep, it
 soon

it soon subsides; but if it be a small one it remains up for a considerable time.

21. If the only object were to save Madras from inundation perhaps the simplest and cheapest plan to adopt would be to embark across the flooded lands at their narrowest part near Madras (or to make use of the Railway Embankment for this purpose) and to construct a lock at the same place with gates opening towards the North. This Lock would be required only during the freshes, and the present Lock at all other times, so that no new establishment would be required.

22. This however is not the plan I would recommend:

Of the flooded lands alluded to above there are about 10 or 12 thousand acres between the Cortellian and Madras, and by embanking these somewhat as sketched in red on the Plan, not only would Madras be relieved from the Cortellian floods, but this vast tract of land would be reclaimed and brought under cultivation.*

23. The above sketch shows that these lands are about 1 foot above high water, and 2" 6" above low water of Spring Tides. That they are covered to a depth of 2" 9" by ordinary, and 4" 9" by high freshes in the Cortellian.

The portion I walked over is a rich loamy clay, and I was informed that the rest is of the same quality.

24. If the Red Hill Lake were

Note: - * The reclamation of the submerged lands north of the Cortellian does not affect the present question. It might be taken up as a distinct project.

were enlarged, and the supply channel taken off low down in the Cortellian the surplus water of that River would be greatly reduced, and, were it found necessary, it could be reduced still further by constructing Reservoirs on the upper parts of the Cortellian and Nagerry ar, or by enlarging some of the present numerous Tanks:...

In this way the floods at the Backwater could be reduced to perhaps 2 or 3 ft. in depth, which would render the Embanking of the lands very easy and inexpensive.

25. The Embankment as sketched on the Plan is about 17 miles in length. It should probably be 6 feet in height.

It would be necessary to extend the Lock (at a higher level) and to put in a pair of gates opening towards the North:

There would also be many subsidiary works required; such as, Catches water, back, and other drains; Fixed and self-acting sluices; Wind or other machines to lift the water which could not be discharged by the sluices, &c.

26. Should the Embanking of these lands be ever undertaken a daily registry of the height of the water at the Lock would be useful: as the Lock Keeper has no proper means of measuring the heights I would recommend that two gauges be provided, one for the Ennore and one for the Madras reach: The Zeros to be placed at the level of the sills: The tops should be 2 feet above the coping. The time of High and low water as well as their heights should be observed.

27. It is right that I should state that I am of opinion that if the surplus water of the Cortellian

Cortillier and Raggery are were utilized as proposed above, the Emme Bar would be permanently closed.

28. In conclusion I have to state that what I have written above is the result of a very small amount of personal observation aided by such information as I could obtain from the Lock Keeper and some Villagers on the Cortillier.

I have the honor to be
Sir
Your most Obedient Servant
William Fraser
Civil Engineer

Report on the Wells of
Black Town and the
Spring and its path
towards Emme.

Dated 5th Dec 1863
Received 24th Dec 1863
Gued.
1863

Secretary to the
Emme Bar

To
Col. Biddisford

Civil Engineer

1863
1863
1863

1863-1864

1863

217

I have read Mr Fraser's paper with great interest. I think that his suggestions as to the cause of the deterioration of the Black Town Springs is probably correct and I quite agree with him that the mere supply of the small tract upon the sea coast can never be made sufficient for the supply of Madras. I have always been of opinion that it would not be safe to trust to the Adyar water for the supply of the whole of Madras and that we ought to look to the Red Hill Tank for the supply of the Town to the north of the Causeway while the Adyar would take care of the whole of the Town & suburbs to the South of that Place. — I was struck by this opinion of Mr Fraser and although the rapid deterioration in the character of the water from the seven wells & other springs is in my opinion that no further time should be lost &

Wm Fraser

that Mr. Fraser should be
directed to set to work at
once and to prepare the
necessary Plans and
Estimates for turning
the Cortellian water into
the Red Hill Tank
leaving the distribution
of the water to be provided
after the Plans for procuring
a sufficient supply of
water are matured -
It is evident that a large
portion of the Cortellian
water makes its way into
the sea during freshets
and is wasted. It would
be very desirable that
the surplus after the
Red Hill Tank is filled
should be made availa-
ble as far as possible
for irrigation. In
maturity therefore his
project for the Red Hill
Tank Mr. Fraser should
be directed to ascertain
by what means the
retention of water could
be managed and
it seems to me that he
might embrace in one
scheme the Red Hill
Tank & its appurtenances
also the embankment

what he has suggested
a means of securing the
Lower reaches from the
floods of the Coom.
With reference however
to this I would observe
that unless the whole
floodwater of the Coom
can be stopped at
different points by
ancients some other
means be provided for
the flood water - it
may be that in the re-
= duced state of the freshets
on the Cortellian the Coom
without rising too high
might override the fr.
= river & make its
way into the backwater
this however will be a
matter for consideration
when the details of the Plan
are under consideration
As Mr. Fraser's Plan may
affect in some way the
navigation of Cochrane's
Canal he should put
himself into commu-
= nication with Mr. Kennedy
to whom it is intended
to intrust the manage-
= ment & extension of
the Canal as far as
Kistnapatan - and
this leads me to allude

to this office and to the
duties which it may be
advisable to impose upon
him in his position as
one of the special officers
in the Dep't of Works.
Mr Kennedy has hitherto
had charge of the Southern
Canal which he has ex-
tended as far as Belvoir
in the Palat. It would
be as well that he should
have charge of the inland
navigation to the North as
well as the South of
Madras and should be
called upon to prepare
plans and estimates
for the extension of the
Northern Canal as far
as Kistnapatnam where
it will meet the working
the Irrigation company
and by proper arrange-
ments might benefit
by any supply of water
brought down from the
Deccan - -
It would be worth while
considering whether it
would be wise to make
use of the various back-
waters - the water in
them is variable being
affected by the tides in
many instances - the
banks are shifting and
it is seldom that there

that a depth of 3 feet ^{2 1/2} can
be maintained throughout
means might be provided
of securing a supply of
water for the canal at
high water so as to keep
up the supply always
within a few inches of
high water of Great Tides
which might be made
the datum level - -
Messrs Fraser and Kennedy
will require assistance
they should be called upon
to state the nature and
amount of assistance
which they require in order
to enable them to furnish
their plans and estimates
within a given period
which they may be called
upon to name - -
Some of the officers whose
services are about to be
dispensed with may
be employed on their
work, but care must be
taken not to furnish
Messrs Fraser & Kennedy
with inferior hands, &
they must be directed to
report the names of those
who do not work satisfac-
torily. The best talent be brought
before the Council on Monday

MR

Public Works Dept

17/1/1863

Proceedings of the Madras Government

Under date the 2nd July 1863

Read the following

papers.

From W. Fraser Esq. Civil Eng.

Report on the wells of
Black Town and the Springs and
the further towards Ennad-

Minute by the Honble the

(Here enter 8th June 1863 No 12)

(Here enter 25th June 1863)

The Govt have read Mr
Fraser's paper with great interest.
They think that his suggestion
as to the cause of the deterioration
of the Black Town Springs
is probably correct, & they
agree with him that the more
the stages of the small branch
upon the sea coast can be
made sufficient for the supply
of the Madras. Looking to
the rapid deterioration and the
character of the water from the
Seven Wells & other Springs, the
Govt are of opinion that no further
time should be lost, & that
Mr Fraser should be authorized
to make & prepare the necessary
plans & estimates for carrying

20th 1863
J. W. Fraser Esq. Civil Eng.

Minute by the Honble
the President

21st 1863
J. W. Fraser Esq. Civil Eng.

17th 1863

Resolving that the sug-

gestion of Mr Fraser as to the cause
of the deterioration of the Black Town
Springs is probably correct, and they
agree that he is the authority
to be consulted to prepare plans and estimates,
and to forward for carrying out
the same, and to submit the necessary
plans and estimates for carrying out
the same.

Cochitiari water into the
Red Hill Tank, leaving the subject of the
distribution of this water
to be gone into after the
plans for procuring an sufficient
supply are matured. It is
indeed that a large portion
of the Cochitiari water makes
its way into the River during
floods & is wasted. It should
be very desirable that the
surplus, after the Red Hill
Tank is filled, should be
made available as far as
possible for irrigation. For the Red Hill Tank,
regarding his project, therefore,
Mr. Fraser is requested to be
certain by what means the
distribution of water could
be managed. It seems to
the Dept. that he might
include in one scheme the
Red Hill Tank & its affluents,
also the embankment, &
what he has suggested
as a means of securing
the Town of Madrid from the
floods of the Coconino. With
reference however to this,
the Dept. would observe that
unless the whole floods water
of the Coconino can be
stopped at different points

29
by Avicento, some outlet must
be provided for this floods water
& it may be that in the reduced
state of the fresher on the
Cochitiari, the Coconino without
rising too high might override
the former river & make its
way into the Backwater. This
however will be a matter for
consideration when the details
of the Plan are being considered.

As Mr. Fraser's Plan
may affect in some way the
navigation of Cochran's Canal,
he should place himself in
communication with Mr. Kennedy
to whom it is intended to
submit the management & ex-
pension of this Canal as
far as Mesquapaham.

Mr. Fraser is requested
to state the nature & amount
of assistance that he requires
in order to enable him to pre-
pare these Plans & to submit them
within a given period which he
will be good enough to specify.

4
W. Fraser Esq. C. P. D. 6th July. With 2 Plans.
Supy. Eng. & D. S. S.
R. Kennedy Esq. S.

2189 1863 Dup
Pro. of Lyant for
N. 1741
Pro. of the Lyant
2 July 63

Mr. Fraser requested to
prepare Plans & Estimates for turning
the Cortellier water into
the Red Hill Tank, Madras.

N. 282 1863