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(2) Date of repair _____

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*Q***MADRAS RECORD OFFICE.****Government of Madras.***Pulitai works* **DEPARTMENT.**
con 10/6/60

G.O. No.	<i>690</i>	Press Mis.
<i>31.32</i>	Dated <i>4-4</i> — 18	<i>60</i>

Not to be folded or roughly handled*Q*

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

No. 31. Read the following letter from Captain F. H. RUNDALL, Consulting Engineer, Irrigation Company, to J. D. BOURDILLON, Esq., Secretary to Government, Fort Saint George, dated Dowlaishwaram, 1st February 1860, No. 36.

I have the honor to submit for the information of Government, the following account of my late Tour.

2. At Bangalore, I met the Chief Engineer of the Company, who laid before me a general outline of the series of works he purposed at first proposing. At the discussion of their respective merits, we had the benefit of the advice and opinion of Colonel Arthur and General Fredrick Cotton. We then determined on visiting the site of each of the proposed works in turn, and there making such investigation on the nature and levels of the country as would enable us to arrive with some certainty at the description, direction and cost of the main works, of the areas likely to be affected, and the probability of return sufficient to justify the outlay.

3. One of the principal benefits to be derived from the operation of the Company is certainly the prevention of the present waste of water. This can be best done by the timely collection of the, at all times sufficient and generally superabundant but uneven, rain-fall, and by its subsequent economical distribution, so that a regulated stream may be conveyed exactly to the locality where, and at the time when, it is most urgently required.

4. On this account the formation of extensive reservoirs must occupy the attention of the Company at the outset.

5. Of these the first in importance at present known is the proposed Mári Tank in the territory of Mysore, to be formed by damming up a gorge through which the river fluggry passes, about 13 miles above the village of Harriour.

6. Starting accordingly from Bangalore, we proceeded thither and were kindly met by Major Dobbs, the Superintendent of the Chittledrug Division, who supplied us with important information, and enabled us to arrive at some degree of certainty regarding the quantity of water available for storage.

7. This project, which has already formed a subject of correspondence, and has been seriously entertained by the Government of Mysore, has for some reason not been carried out. As all circumstances combine to point it out as a most eligible and desirable work, the Chief Engineer has, I believe, addressed the Commissioner of Mysore, offering on behalf of the Company to carry it out on terms which would prove more beneficial to the Mysore territory than if that Government constructed it at their own expense, inasmuch as they would be saved all the attendant risk.

8. The size of reservoir calculated as sufficient to contain the whole of the rain falling within the Catchment Basin gives a capacity sufficient for 7,000 millions of cubic yards. After deducting loss by evaporation, a reserve supply for a second year, and sufficient for the irrigation of 50,000 acres in Mysore, there would remain available for irrigation and navigation in Bellary a supply throughout the year of 450,000 cubic yards per hour, sufficient for 300,000 acres.

9. The width of the river itself is under 100 yards, but the length of the Bund, which would have to be 210 feet high, would be much more. The distributing sluices would be placed in the hillside far away from the Bund, and the waste weir constructed on one of the saddles in the range, the level of which corresponds with the proposed surface of the reservoir.

10. The Estimate for this work, framed approximately on tolerably good data, is about 10 lacs; and taking the quantity stored during a year, 7,000 millions give 7,000 yards per rupee of capital as the cost of the water.

11. From Harriour we proceeded to Bellary, where we were met by Captain Fisher, the District Engineer, who kindly placed at our disposal various surveys and levels, and gave us much valuable information, by which we were enabled to arrive sooner at a definite decision regarding the line of the proposed Canal than we could possibly have otherwise done, and we accordingly set out for Bijanagar on the banks of the Tumbaddra, and examined the river above and below, as well as the line of country through which the Canal would have to pass.

12. In this neighbourhood, that is from Wallabapur to Kompli, the Tumbaddra has a fall of about 10 feet per mile; immediately above, as far as the confluence of the Wurdah, it has little more than one foot per mile, and is consequently quite practicable for navigation. From Kampli downwards to Karnool, the fall varies from three and a half to six feet per mile.

13. The elevation of the town of Bellary above the sea having now been ascertained for a certainty to be 1,512 feet, determined the point from which a Canal must be led off in order to command it. The difficult nature of the country about Bijanaggar, however, led to some doubts as to the advisability of carrying a Canal on so high a level. But further investigation showed that the higher level would, notwithstanding a very heavy excavation through rock, prove the cheaper and more practicable line of the two.

14. The features of the country here are singular; contour lines of level show that on the crest of the rising ground, the lay of the land is more regular and the variations of level fewer, whereas by keeping 200 or 300 feet lower down, the line has to follow a succession of spurs, and the length of the Canal would have to be treble that of the direct distance, for to carry the line over the intersecting valleys instead of skirting them, would, on account of their great width and low level, be enormously expensive. The character of the ground is not inaptly represented by the back of the human hand when spread out on the table, with the middle slightly raised; the back being the crest of the rising ground, and the fingers the projecting spurs. It will be thus easily seen how a Canal may be carried on the crest of a country in a tolerably direct line without encountering great intermediate undulations, and how by proceeding on a lower level, though more favorable soil for excavation may be obtained, the advantage will be more than counterbalanced by the greatly increased length of the Canal.

15. Such is precisely the case in the present instance. I am quite of opinion myself that were there not even the important military station and town of Bellary, containing not less than 30,000 inhabitants to be supplied, it would be more economical to carry the Canal on the high level, and encounter the difficult excavation at the head rather than to follow the lower line. In the first place, an additional 300 feet in level is gained, and consequently a very large increased area of land commanded. In the next, the drainages are all crossed at much more favorable spots; smaller masonry works will suffice, and the embanked approaches rendered more secure by being considerably reduced in length and height; and, lastly, the length of the Canal itself will be lessened by at least one-half. Guided by these considerations, it was resolved to commence the Canal from the site of the present Wallabapúr Anicut, carrying it over the ridge known as the Nallapúr Pass, and thence continuing it along the foot of the hills by Mettrá into the Dároji Tank, the Kalingal of which being raised six or nine feet, the capacity of the tank will be greatly increased. From it a Canal can easily be led through the cantonment into the large tank at Bellary, and on to the Huggry, over which it must be carried by a large aqueduct near the village of Páramdévahulli.

16. The area commanded in this triangular space is roughly estimated at 300,000 acres; the Canal, therefore, will be of a capacity sufficient to ensure the requisite supply for this quantity.

17. From Páramdévahulli, the Canal will be carried, if the elevation of the water-shed permits, it in the direction of Adoni, from whence it will be led direct to Karnool; but in the event of the cutting proving too formidable, it will have to be carried parallel with the river Huggry until it reaches the low lands descending to the Tumbaddra, the course of which it will nearly follow, but at a level commanding a belt of land from 10 to 15 miles in breadth, until it reaches the town of Karnool.

18. The country in the neighbourhood of Karnool being comparatively low, it would increase the length of the Mári Canal too much to follow the contour. So the line for navigation will be taken straight to that town, and the land in the valley of the Hindri will be irrigated by branch Canals taken off at the requisite levels.

19. The area proposed to be irrigated at present in the three valleys of the Huggry, Tumbaddra and Hindri amounts to 600,000 acres. Of this the portion lying to the east of the Huggry would be most easily and cheaply supplied from the Mári Tank, for it would be needlessly expensive to double the size of the Bellary Canal in order to convey the water for this tract, the proper course being to let the bed of the Huggry itself convey the water from the Mári Tank till it reaches the requisite level from whence it may be diverted into the navigable Canal at Páramdévahulli.

20. In like manner for the land in the valleys of the Tumbaddra and Hindri, the water can be conveyed by the former river as far as the confluence with the Huggry, at which place another Anicut should be built and a head cut to convey the water into the main line.

21. It will be probably necessary to cross the Hindri by an aqueduct at Karnool, but this point has yet to be decided by more detailed surveys and levels.

22. Leaving Bellary, we proceeded to Karnool to determine the site for the Anicut and head works for the Kúndár Valley Canal. Our examination led us to fix on a spot a little below the village of Abunpúr, where the bed of the river is covered with rock and below which there is a sudden fall. Immediately above there is a long pool in the river reaching nearly to Karnool; by taking advantage of this, about six miles of river navigation will be secured, and a corresponding excavation in the Canal through some rocky spurs be saved.

23. By numerous lines of levels kindly furnished us by the District Engineer of Karnool, we were enabled to trace the line of the Mári Canal pretty accurately across the water-shed which separates the two valleys. Here there will be a very heavy cutting for a length of about four miles, but from the section of the ground as indicated in the numerous wells found in the villages along the line, the rock is by no means of a hard description, and the excavation, though heavy, will not be so troublesome or costly as at the head of the Bellary Canal; after examining this locality, we proceeded to Yellagóla to inspect the feeder of the Kúndár into which the water from the Tumbaddra will first be thrown, and we found the river to be of such a section as will prove quite fit for the purpose of navigation.

24. The land in the villages of the Kúndár included between the Tumbaddra and Pennár cannot be less than one million acres. It is, however, proposed only to provide 300,000 of these at present with water, both on account of the additional outlay of capital it would involve at first, and also from the probability that that is as much as the population of the valley could at present take up.

25. The total quantity of land for which water will be provided by the works above enumerated, amounts to 1,200,000 acres; three-fourths of this will be supplied for the first crop by water direct from the Tumbaddra, the remaining quarter, as stated above, will be irrigated from the Huggry.

26. From enquiries made on the spot, I gather that between the months of June and December, the water in the Tumbaddra passing the Wallabapúr Anicut, varies from thirty to two millions of cubic yards per hour; the average quantity being probably five millions. The present quantity of land irrigated on either bank cannot exceed 100,000 acres, requiring only 1/3rd part of the water passing down the river. The remainder, therefore, during these months at present, runs to waste, and of this surplus the Company propose to utilize only one-third.

27. During the remaining months, however, the small quantity in the Tumbaddra cannot be touched, and the Canals must remain dry, unless recourse be had to reservoirs.

28. It would be manifestly bad economy to close the communication for six months of the year, when the cost of storing additional water is comparatively so small. To say nothing of the summer irrigation, half the utility of the works would be lost if the navigation was interrupted; and there can be no question but that reservoirs must be made for securing the summer supply. Indeed one of the principal benefits looked for from the Company's operations is their utilizing the surplus water of the freshes, which is at present lost.

29. It has been shown that the Mári Tank will supply enough for 300,000 acres, and suffice for the Canal between Páramdévahulli and Karnool. For the Kúndár Valley Canal, I have recommended the Chief Engineer to examine a site on the Hindri, about 10 miles above Karnool, where it is probable the whole rain-fall of its basin may be collected. At present no use whatever is made of that river. I believe there is not a single acre of land to which a drop of its water is led, and that thus more than 2,000 millions of cubic yards of water are annually lost.

30. The whole basin of the Hindri lies within the District of Karnool. Its water will, therefore, be appropriately turned to account when distributed over that District. The storage of 2,000 millions of cubic yards will ensure a daily supply of 300,000 cubic yards per hour for 180 days—much more than sufficient to maintain a first-rate navigable Canal; and judging from information I have lately received, render also the Pennár quite accessible to boats drawing three feet of water. The District Engineer of Cuddapah, in answer to my enquiries, informed me that, on the 10th December last, the Pennár was flowing two and a half feet deep at Chennúr just below its confluence with the Kúndár, and that the water was just what it should be for boat navigation, neither too much, "nor too little." What the quantity was passing down the river at Chennúr and Nellore at that time, I have requested the District Engineer of Cuddapah and Nellore to inform me.

31. By means of these two reservoirs, therefore, uninterrupted navigation will be maintained from Madras as far as Páramdévahulli or the Huggry. For the Canal from thence to Dároji, the small supply required for navigation may be obtained partly from the Mári Tank, and partly from the Dároji Tank. It is proposed not to extend the navigation further for the present, but I must not omit to mention that the District Engineer of Bellary pointed out the existence of a very favorable site for an extensive reservoir on a feeder which enters the Tumbaddra just above Wallabapúr.

32. No mention has been made of the small branch navigation Canal necessary to connect the Tumbaddra with the Krishna above the barrier on the latter, as no examination of it was made. No communication also has as yet been made to His Highness the Nizam regarding it, but it is one of the most important links in the whole line, and is, I believe, now being investigated by one of the Company's Officers.

33. The investigation already made both by the Government Officers in the Districts affected, and by the Company's Chief Engineer, being sufficient to allow of a tolerably near

estimate of the cost being arrived at, the Chief Engineer and myself entered together into the details as far as we could, and found that the total cost of the works inclusive of superintendence in this country would be nearly 130 lacs.

34. This is 30 lacs more than the limit fixed by the Home Government for the first project, and, therefore, if that limit is to be adhered to, some section of the project must be abandoned, but which shall it be? If the storage of the water of the Huggry be sacrificed, then the portion of the Canal above its confluence with the Tumbaddra must be given up, all connection with Bellary be an end, and this unfortunate tract of country still be left to the mercy of the seasons.

35. The Canal from Wallabapúr through the town of Bellary to the Huggry will then be comparatively of little benefit. Irrigation, it is true, will still be supplied to a large area, but the benefits will be considerably diminished by its exclusion from the advantage of cheap carriage. That navigation will eventually be given to it cannot be doubted, but if not provided for at once, and the Canals be designed for irrigation simply, the expense will be greatly enhanced, as in order to provide for irrigation alone, Canals of small section and greater slope are the most economical; but the direction in which these would be carried would never answer for the navigable Canal. An entirely fresh line would have to be excavated, involving additional masonry works for the drainage, and thus make the cost nearly as great as would be incurred by planning the Canals to serve both purposes at the same time.

36. No one who has travelled through the northern taluqs of Bellary and Karnool, could fail to be struck with the dreary aspect of the country; but to one like myself coming from an abundantly irrigated district, the contrast between the luxuriant garden of Rajahmundry and the treeless and waterless plains of Bellary was most marked and painful. To an eye accustomed to the sight of an active and busy population, the almost total absence of life in the villages one passed through, caused it to resemble more the country of the dead.

37. The few Raiyats I met on the road to Karnool pointed to their unploughed fields, and asked where the means of defraying the Government demand was to come from; and when I explained the probability of their soon being called upon to assist in the excavation of channels from the Tumbaddra, they brightened up and said, "If such be the case we shall not have to leave our homes to seek a livelihood in another and a better country." This people, poorly clad, poorly housed, poorly fed, without water in summer, without fuel in winter, and exposed to periodical visitations from famine, present as pitiable a picture of the results of an unimproved country as can well be imagined.

38. With the opportunity and means of rescue in our hands, can the responsibility be incurred of withholding them? Having myself during the last 16 years seen the result of similar works in raising an equally depressed population from poverty to plenty, and from a listless apathy to an wholesome activity, I cannot conscientiously recommend that this portion of the project should be laid aside, but, on the contrary, feel it my duty earnestly to urge its execution.

39. This year the rain registered in Bellary was only 10 inches—four inches less than in the famine year 1854. That great distress will consequently be felt is apparent from present prices, though it will be somewhat mitigated by the season having been more favorable in the adjoining district of the Rachore Doab, and in the Kúndár Valley; yet there is no guarantee for such a mitigation in the coming year, and every succeeding year of scarcity only adds to the depression of the people. The expenditure of the Company's money will not only of itself afford temporary relief and create a stimulus for exertion, but every rupee expended will be productive of permanent benefit, while it is almost certain that if their expenditure is restricted, the Government will, as in 1854, have to incur a considerable outlay on their own account.

40. The abandonment of this section of the project being thus impossible both on the score of economy and humanity, the remaining section of the Kúndár Valley remains to be considered. The inhabitants of this valley it cannot be denied, are far better off than their unfortunate neighbors in Bellary. The contrast in passing from one to the other is most striking. The people appear to be ready to take immediate advantage of the improvements. Wherever there is a patch of irrigated land, the care in the cultivation is most marked. These islands bear a very high assessment, and are consequently worked highly. The valley, however, is locked out from the rest of the Peninsula. There is at present access to no port, and nothing, save the unimproved surface by way of communications. To curtail this section would be not only to shut out Bellary from the port, but to keep the produce of the whole basin of the Krishna locked up as at present. The mere completion of the water communication from Karnool to Madras will immediately bring all the cotton of Bellary, Adoni, and the assigned districts into the Madras market at a greatly reduced price. Instead of toiling over from four to 500 miles by bandies as at present, at a cost of at least 40 Rupees, it will be conveyed without risk from the weather for about 6 or 7 Rupees per ton.

41. With respect to the irrigation, the Collector informed me that there is a long belt of land covered with jungle skirting the foot of the Nallamalai Hills, which would certainly be cleared and taken up as soon as water was led to it; the soil being of that particular description which is unremunerative for the cultivation of dry crops, but only requiring water to make it produce abundantly. Firewood could be supplied in any quantity to Madras, which would in return send up its greatly coveted Salt.

42. This section is accordingly the keystone of the whole, and could not possibly be given up without spoiling the entire project.

43. From these considerations, I do not see what else can be done than to send up the whole scheme as it stands. The several sections are so connected and the whole tract of country affected so urgently calls for water, that I cannot but hope that if the circumstance be urgently represented to the Council for India, the necessary sanction will not be withheld. At all events, it will be some years before the whole of this sum can be expended, and, therefore, there will be ample time to consider the question.

44. Meanwhile, however, the section for which Plans and Estimates are submitted need not be delayed, but should be commenced upon immediately, for the sooner each portion can be finished, the sooner will the Government be relieved of the guaranteed interest, and ample evidence furnished of the importance of carrying out the project in its entirety.

45. Before leaving the District, the Chief Engineer and myself had arranged to visit the Nallamalai Hills together for the purpose of exploring the large plains found there, with a view to determining on an eligible site for the settlement of the Company's Head Quarters. Our servants, however, having mistaken our orders, we missed our tents for two or three days, and so our plan was frustrated. I, however, happily met with the Collector on his way up and so was enabled to see a portion of the hills.

46. Though prepared in some measure by Colonel Arthur Cotton's description, I was yet greatly surprised at the general character of the hills. Unlike other mountain ranges of the Peninsula which I have visited, they are covered with dense forest to their highest peaks.

47. The highest hill, on which there is a considerable extent of table land, has by two or three distinct methods of observation been found to be 3,300 feet above the sea. This hill I was unable to visit, but had an opportunity of examining the plain about 150 feet below the Collector's bungalow, which is built on an elevation of 2,850 feet; and crossing the water shed which separates the Kúndár from the Cummum Valley, ascertained sufficiently well the practicability of getting from this part of the hills to the plain, which is reached by the Yellagóđ Pass. These plains form a curious feature in these hills—they stretch right across for about 15 miles without any great undulation or variation in level, so that the ascent and descent are steep and immediately overlook the low country on both sides.

48. There are most beautiful forest trees from 30 to 50 feet in height without a branch. They principally consist of black and white Madthi, Yégis and Ippi. I saw a great deal of Teak also, but most of it was young. There were, however, the stumps of what must have been considerable-sized trees two and a half feet in diameter.

49. These forests are regularly worked by the Natives, but for want of a proper road they are unable to carry away the largest trees.

50. The Collector informed me that the forest now yields a revenue of about 4,000 Rupees a year, but this is only for the supply of Karnool and the neighbourhood. When once the Canal to Madras is open, the trade, and consequently the revenue, will rapidly increase. The bamboo jungle is also very fine, bamboos being found from four to six inches diameter. The principal Pass by which the wood is carried is that which leads to the village of Bandi Atkúr and passes the foot of the Yerrachelma Hill, where the Collector's bungalow is situated.

51. So little regarding these forests appears as yet to have been communicated to Government that I cannot but think their importance is not known.

52. I am not certain that large Teak is now to be found in them, but I am certain that extensive plantations might be made from the trees which already exist. The forests have been comparatively so little explored, that it is not known what Timber there really is; and as they cover an area of nearly 2,000 square miles, I would strongly urge a thorough examination of them, as I feel sure they will prove to be a most valuable addition to the revenue of the State.

53. Though perhaps somewhat foreign to my more legitimate duties, yet I think I may be excused recommending that the several Passes which now exist may all be opened up sufficiently to admit of loaded carts travelling down them, and then that roads may be cleared through the forest, connecting these Passes with one another; by this means the forest may be completely opened and access had to every part. The plains now covered with dense forest trees will

then offer fair sites for European settlers, the temperature during my stay varying from 57° to 68°. Water, I feel sure can be found on them at a small depth below the surface, as they are surrounded by hills from 200 to 300 feet above them, and the rock is sand—stonea stratum in which water is almost invariably formed. The soil is of the richest vegetable mould, but the best criterion of its fertility is the timber which grows on it. As a commencement, I would beg that Rupees 5,000 be placed at the District Engineer's disposal to clear a road from the Yellag6d to the Bandi Atkúr Pass, so as to open at once this portion of forest hitherto untouched. The Company will carry a Canal to the foot of the hills, and a valuable and extensive trade in timber will at once be established.

54. Before closing my Report, I would beg to say a few words on the value of the water to the districts of Bellary and Karnool.

55. From enquiry I find that the assessment on dry land varies from 1 to 4 Rupees per acre, making an average of about 2½.

56. That on irrigated land from 8 for one crop, to 12 for two, making an average of 10 Rupees per acre; the difference 7½ represents the value given to the land by the water.

57. In some instances the assessment on the land reaches very high, especially in the Kúndár Valley. The soil is there exceedingly good, and the crops must no doubt be proportionately fine. Under the Nandial Tank, the land pays Rupees 20 per acre, and at Kalwa actually Rupees 40, but these are of course exceptional cases; it only tends to show the value of water, and that the generally received opinion of the maximum water-rate that can be levied is considerably below the mark. It shows also that there is ample room for levying a remunerative water-rate on the area proposed above to be irrigated, viz. 1,200,000 acres.

58. In Bellary under the present Tumbaddra channels there is a considerable extent of sugar cultivation. The value of this crop at present prices I ascertained from the Raiyats, the Tahsildár, and the Village authorities to be about 270 Rupees per acre, and that, as might be expected, the cultivation of the cane is steadily increasing. Under the Dároji Tank, which is said to irrigate 1,500 acres, one-half appeared to be sugar-cane, so that there was sufficient at this one spot to maintain a large sugar factory. When the Canals are once open, I cannot conceive a finer locality for the establishment of factories for the manufacture of sugar direct from the cane.

59. The days for refining factories in India are, I think, at an end, as the great differential value between the raw materials in this country and in England can never again exist. The great objection to the risk of plantation by Europeans will, I expect, be overcome in this locality; as the people appear to be so eager to extend the cultivation, they would doubtless be induced by the European capitalist to sell the juice instead of the jaggery. The intermediate expense of manufacture would then be saved, and a much larger per-centage be secured by saving that portion of crystallizable sugar now destroyed in the first process of conversion into jaggery.

60. Saltpetre is likewise an article found in abundance in the Bellary District. From not being able to stand the expense of a long land carriage, the manufacture of the article is not carried on largely; the price, however, in the villages is only 7 to 8 Annas per maund of 25 lbs. The saltpetre refiner will understand from this what a harvest exists for him there.

I have entered into these particulars in the hope of their proving interesting to the mercantile community.

61. In conclusion, I would beg to touch on two most important points. One is, the compensation to be paid by the Company for all the private property taken up by them. I am of opinion that before any work is commenced the price of every piece of land should be paid to the owners.

For the adjustment of these claims and the transfer of the Government land it appears to me that the services of an intelligent European Revenue Officer invested with Magisterial power, should be specially secured. At present the Collector of Karnool has no one to whom he could entrust this duty and a great deal of additional work will be imposed upon him on the commencement of operations.

62. The second is, an early commencement of the Revenue Survey in the districts of Karnool and Bellary. It appears to me essential that the area likely to be affected by the Company's operations should be properly classified before water is led to it, as otherwise it will be difficult to ascertain the precise extent to which it has been benefited.

It is quite possible that the works may be sufficiently advanced to afford water to some portions ere the next cultivating season comes round. At all events the distribution when once commenced will rapidly extend. No time, therefore, should be lost by the Survey Department in organizing their arrangements.

I trust the Government will take these two points into their early consideration.

63. As one end of the Anicut will rest on the territory of His Highness the Nizam, and a small portion of the Kúndár Canal will have to pass through his land, it will be necessary to obtain his permission for the same.

64. Agreeably to the Orders of Government, the several proposals of the Chief Engineer shall be communicated to and discussed with Mr. Wilson, the Executive Engineer of the Assigned Districts; but it has occurred to me that it would probably still more facilitate matters were I afterwards to proceed to Hyderabad and consult with the Chief Engineer there, as also wait on the Resident, and explain personally the proposals of the Company and the views of Government concerning them.

65. Having thus personally ascertained the practicability of this grand Project and the existence of no Engineering difficulties that a little ordinary ability and perseverance may not overcome, I have only to urge its speedy commencement at all points as soon as the detailed Plans and Estimates have been approved by Government.

No. 32. ORDER THEREON, 4th April 1860, No. 690.

The Government have read this Report with much interest. They now resolve to forward it for the information of the Home Government, as containing a clear outline of the several parts of the works which the Irrigation Company are about to undertake. The Report being general, there are not many points requiring any order here; but the Government will notice such as these are.

2. With the information now before them, the Government are not prepared to give a decided opinion as to allowing the Company to undertake the construction of the Mári Tank; but they resolve to refer the question for the early report of the Chief Engineer whether that Tank properly forms a part of the system of works about to be undertaken by the Company. Should it ultimately appear to us that that work properly forms a portion of their general plan, the Government will then strongly recommend that it should be made over to them, and also that they should be permitted to increase the amount of their guaranteed capital, to the extent sufficient to enable them to undertake it. All the other parts of the scheme of works sketched out in this Report seem strictly connected as members of a general whole, so that no portion could be properly omitted.

3. In paragraph 44 the Consulting Engineer speaks of Plans and Estimates having been submitted for one section of the works, and recommends that those works should be commenced immediately. No Plans or Estimates for any part have yet come before Government; but the works here referred to are believed to be those at and near Karnool for turning water from the Tumbaddra into the Kúndúr and the Pennár. The instructions of the Directors of the Company require, however, that the detailed Plans and Estimates shall be submitted to them for approval before work is commenced; the Government is, therefore, precluded from ordering the commencement of work, as the Consulting Engineer has already been informed.*

4. Paragraphs 47 to 53 will be communicated to the Conservator of Forests, and his attention drawn to what is there said of the forests of the Nallamalai Hills.

5. The Government will be prepared, at the proper time, to give the Collector of Karnool such aid as may be necessary for giving over to the Company the land required for their works. They quite agree with Captain Rundall that all such land, when in occupation, should be paid for before being so made over.

6. The Government do not expect to be able to make arrangements for commencing the Revenue Survey of Karnool immediately.

7. The Consulting Engineer will forward a copy of the Sketch map which accompanied his letter, with the localities of the proposed works distinctly marked on it, for transmission to the Home Government; and he will understand that all projects requiring to be referred to the Home Government are to be furnished with similar Sketch maps.

(Signed) J. D. BOURDILLON,

Secretary to Government.

N^o 36.

Bowlaiswaram

15 February 1860.

From Captain F. M. Dendall

Consulting Engineer, Irrigⁿ Company.

To. The Secretary to Government.

Fort Saint George

Sir 1. I have the honor to submit for the information of Government the following Account of my late Tour.

2. At Bangalore I met the Chief Engineer of the Company who laid before me a general outline of the series of works he purposed at first proposing. At the discussion of their respective merits we had the benefit of the advice and opinion of Colonel Arthur and General Frederick Cotton. We then determined on visiting the site of each of the proposed works in turn, and there making such investigation on the nature and levels of the Country, as would enable us to arrive with some certainty at the description, direction, and cost of the main works, of the Areas likely to be affected, and the

the probability of Return sufficient to justify the outlay.

2 One of the principal benefits to be derived from the operation of the Company is Certainly the prevention of the present waste of water. This can be best done by the timely Collection of the — at all times sufficient and generally superabundant but uneven Rain fall, and by its subsequent economical distribution, so that a regulated stream may be conveyed exactly to the locality where and at the time when it is most urgently required.

On this account the formation of extensive Reservoirs must occupy the attention of the Company at the outset.

5 Of these the first in importance at present known is the proposed ^{Madri} ~~Mary~~ Dam in the Territory of Mysore, to be formed by damming up a gorge through which the River Huggly passes about 13 miles above the village of Harrioir.

Starting

this village all the water
the about 14 miles
of the River

6 Starting accordingly from Bangalore we proceeded thither and were kindly met by Major Dobbs the Superintendent of the Chittledroog Division, who supplied us with important information and enabled us to arrive at some degree of Certainty regarding the quantity of water available for storage.

7 This Project which has already formed a subject of Correspondence, and has been seriously entertained by the Government of Mysore has for some reason not been carried out. As all circumstances combine to point it out as a most eligible and desirable work, the Chief Engineer has I believe addressed the Commissioners of Mysore offering on behalf of the Company to carry it out on terms which would prove more beneficial to the Mysore Territory than if that Government constructed it at their own expense, inasmuch as they would be saved all the attendant risk.

The size of Reservoir calculated as sufficient

sufficient to contain the whole of the rain falling within the Catchment Basin gives a Capacity sufficient for 7000 millions of Cubic yards. After deducting loss by evaporation a reserve supply for a second year and sufficient for the Irrigation of 50000 acres in Mysore there would remain available for Irrigation and Navigation in Bellary a supply throughout the year of 4,50,000 Cubic yards per hour sufficient for 30000 acres.

The width of the River itself is under 100 yards, but the length of the Bund, which would have to be 210 feet high would be much more. The distributing sluices would be placed in the left side far away from the Bund, and the waste weir constructed in one of the saddles in the Range, the level of which corresponds with the proposed surface of the Reservoir.

10 The estimate for this work framed approximately on tolerably good data is about 10 Lacs, and taking the quantity stored

stored during a year 7000 million gallons, 7000 yards per rupee of Capital as the cost of the water.

11 From Keriore we proceeded to Bellary where we were met by Captain Fisher the District Engineer who kindly placed at our disposal various surveys and levels, and gave as much valuable information by which we were enabled to arrive sooner at a definite decision regarding the line of the proposed Canal than we could possibly have otherwise done, and we accordingly set out for Bejjanaggar on the banks of the Tumbaddra, and examined the River above and below, as well as the line of Country through which the Canal would have to pass.

12 In this neighbourhood that is from Wallaabapoor to Kunpli, the Tumbaddra has a fall of about 10 feet per mile. immediately above as far as the Confluence of the Buraah, it has little more than 1 foot per

close to Kunpli
ride from 12
Bijanaggar

17 miles in a
straight line
Kunpli

42 miles at the
Buraah
to the mouth

per mile and is consequently quite practicable for navigation. From Kumply downwards to Hurmool the fall varies from $3\frac{1}{2}$ to 6 feet per mile.

Kumply
about
125 miles
in a nearly
straight line

13 The elevation of the town of Bellair above the sea having now been ascertained for a certainty to be 1512 feet, determined the point from which a Canal must be led off in order to command it. The difficult nature of the Country about Beijanaffer however led to some doubts as to the advisability of carrying a Canal on so high a level. But further investigation showed that the higher level would, notwithstanding a very heavy excavation through Rock, prove the cheaper and more practicable line of the two.

14 The features of the Country here are singular - contour lines of level show that on the Crest of the rising ground, the lay of the land is more regular and the variations of level fewer, whereas by keeping
200 m

200 or 300 feet lower down the line has to follow a succession of spurs and the length of the Canal would have to be treble that of the direct distance, for to carry the line over the intersecting Valley, instead of skirting them, would, on account of their great width and low level, be enormously expensive. The character of the ground is not vividly represented by the back of the human hand when spread out on the table, with the middle slightly raised, the back being the Crest of the rising ground, and the fingers the projecting spurs. It will be thus easily seen how a Canal may be carried on the Crest of a Country in a tolerably direct line, without encountering great intricate undulations, and how by proceeding on a lower level, though more favorable soil for excavation may be obtained, the advantage will be more than counterbalanced by the greatly increased length of the Canal.

Such

Such is precisely the case in the present instance. I am quite of opinion myself that were there not even the important Military Station and Town of Bellary, containing not less than 30,000 inhabitants to be supplied, it would be more economical to carry the Canal on the high level, and encounter the difficult excavation at the head, rather than to follow the lower line. In the first place an additional 30 feet in level is gained, and consequently a very large increased area of land commanded. In the next the drainages are all crossed at much more favorable spots, smaller masonry works will suffice, and the embanked approaches rendered more secure by being considerably raised in length and height; and lastly the length of the Canal itself will be lessened by at least one half, guided by these considerations it was resolved to commence the Canal from the site of the present ⁱⁿ Mallabapoor.

17
Ancient Mallabapoor ⁱⁿ Ancient Carrying it over the Ridge known as the Mullapoor Ridge, and thence containing it along the foot of the Hills by Gether into the Darogee Tank. the Caluzila of which being raised 6 or 9 feet the Capacity of the Tank will be greatly increased. From it a Canal can easily be led through the Cantonment into the large Tank at Bellary, and on to the Kuggery, over which it must be carried by a large Aqueduct near the village of Parandionhelli.

Kalingal
1500 ft.

16 The area Commanded in this Triangular space is roughly estimated at 30,000 acres, the Canal therefore will be of a Capacity sufficient to ensure the requisite supply for this quantity.

Adm
17 From Parandionhelli, the Canal will be carried, if the elevation of the water there permits it in the direction of Solawannij from whence it will be led direct to Earnool. but in the event of this latter proving too formidable it

It will have to be carried parallel with the main
River Kuggery until it reaches the low lands
 descending to the Tumbaddra, the course of
 which it will nearly follow, but at a level
 commanding a belt of land from 10 to 15 miles
 in breadth, until it reaches the town of Thurnool.

The Country in the neighbourhood of Thurnool being comparatively low it would in-
 crease the height of the main Canal too much
 to follow the Contour. So the line for navigation
 will be taken straight to that Town and the
 land in the valley of the Kuidri will be
 irrigated by branch Canals taken off at the
 requisite levels.

The area proposed to be irrigated at
 present in the 3 valleys of the Kuggery, Tumbad-
 dra and Kuidri, amounts to 60,000 acres
 Of this the portion lying to the east of the
Kuggery would be most easily and cheaply
 supplied from the Maury Tank, for it would
 be needlessly expensive to double the size of
 the Bellari Canal in order to convey the
 water.

13
 water for this tract. the proper course being
 to let the bed of the Kuggery itself convey
 the water from the Maury Tank till it reaches
 the requisite level from whence it may be
 diverted into the navigable Canal at
Parandivankulli -

20 In like manner for the land in the
 valleys of the Tumbaddra and Kuidri, the
 water can be conveyed by the former river
 as far as the Confluence with the Kuggery at
 which place another Canal should be
 built and a head cut to convey the water
 into the main line.

21 It will be probably necessary to crop
 the Kuidri by an aqueduct at Thurnool
 but this point has yet to be decided by more
 detailed surveys and levels.

22 Leaving Bellari we proceeded
 to Thurnool to determine the site for the Canal
 and head works for the Koonduin valley
 Canal. Our examination led us to fix on a
 spot a little below the village of Alumpoor
 where

where the head of the River is covered with Rock
and below which there is a sudden fall. Im-
mediately above there is a long pool
in the River, reaching nearly to Turnool; by
taking advantage of this about 6 miles of
River navigation will be secured and a cor-
responding excavation in the Canal through
some Rocky Spurs be saved.

By numerous series of levels kindly
furnished us by the District Engineer of Turnool
we were enabled to trace the line of the
Main Canal pretty accurately across the
water shed which separates the two valleys -
Here there will be a very heavy cutting for a
length of about 4 miles, but from the section
of the ground as indicated in the numerous
wells found in the villages along the line, the
Rock is by no means of a hard description,
and the excavation though heavy, will not be
so troublesome or costly as at the head of
the Bellary Canal; after examining this
locality...

21
locality we proceeded to Yellagooda to
inspect the feeder of the Hoondavar into
which the water from the Tumbaddra
will first be thrown, and we found
the River to be of such a section as will
prove quite fit for the purpose of irri-
gation.

The land in the villages of the
Hoondavar included between the Tum-
baddra and Perumam cannot be less
than 1 million acres. It is however proposed
only to provide 300,000 of these at present
with water, both on account of the additional
outlay of capital it would involve at
first, and also from the probability that
that is as much as the population of the
valley could at present take up.

25 The total quantity of land for which
water will be provided by the works above
enumerated amounts to 1,200,000 acres. $\frac{3}{4}$ of
this will be supplied for the first crop by
water direct from the Tumbaddra, the
remaining $\frac{1}{4}$ as stated above will be irrigated
from

its water is led, and that thus more than
2000 million Cubic yards of water are
annually lost.

30 The whole basin of the Nidri
lies within the District of Hunsrück. Its
water will therefore be appropriately turned
to account when distributed over that
District. The storage of 2000 million Cubic
yards will ensure a daily supply of
300000 Cubic yards per hour for 180 days,
much more than sufficient to maintain
a first rate navigable Canal, and judging
from information I have lately received,
renders also the Bennau quite acceptable Primer
to boats drawing 3 feet of water. The
District Engineer of Cuddapah in answer to
my enquiries informed me that on the
10 December last the Bennau was flowing
2½ feet deep at Chennar just below Chennar
its Confluence with the Hunsrück, and
that the water was just what it should
be for boat navigation, neither too much
nor

below!

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Project must be abandoned, but which
shall it be? If the storage of the water of
the Nidri be sacrificed, then the
portion of the Canal above its Confluence
with the Sumbodra must be given up,
all Connection with Bellari be an end,
and this unfortunate tract of Country
still be left to the mercy of the Season.

35 The Canal from Wallabapoon
through the town of Bellari to the Nidri,
will then be comparatively of little benefit.
Irrigation, it is true, will still be supplied
to a large area, but the benefit will be
considerably diminished by its exclusion
from the advantage of Cheap Carriage.
That Irrigation will essentially be given
up, it cannot be doubted, but if not pro-
vided for at once, and the Canal be
designed for Irrigation simply, the expense
will be greatly enhanced as in order to
provide for Irrigation alone, Canals
of small section and greater slope are
the most economical. But the derision
in which these would be carried would
never

new answer for the divergible Canals
An entirely fresh line would have to be
excavated involving additional masonry
works for the drainage, and thus make
the Cost nearly as great as would be
incurred by planning the Canals to serve
both purposes at the same time.

36 No one who has travelled
through the Northern Salooks of Bellari Taluk
and Harnool, could fail to be struck
with the dreary aspect of the Country.
but to one like myself coming from an
abundantly irrigated District the Contrast
between the luxuriant garden of
Rayachikudri and the treeless and waterless
plains of Bellari, was most marked
and painful. To an eye accustomed to
the sight of an active and busy popu-
lation the almost total absence
of life in the villages one passed through,
caused it to resemble more the Country
of the dead.

The

27
not too little." While the quantity was passing
down the River at Chennur and Nellur
at that time I have requested the District
Engineer of Coimbatore and Nellore to reform
me.

31 By means of these two Reservoirs
therefore uninterrupted navigation will be
maintained from Madras as far as
Parandevanchulli on the Nagry. For the
Canal from there to Darjig the small
supply required for navigation may be
obtained partly from the Mavry Tank,
and partly from the Darjig Tank. It is
proposed not to extend the navigation further
for the present, but I must not omit to men-
tion that the District Engineer of Bellari
pointed out the existence of a very fa-
vorable site for an extensive Reservoir
on a feeder which enters the Jumbodra
just above Wallabapoor.

32 No mention has been made
of the small branch navigation Canal
necessary to connect the Jumbodra
with

with the History above the barrier of the
latter, as no examination of it was made.

No Communication also has as yet been
made to His Highness the Ngazun regarding
it, but it is one of the most important
links in the whole line, and is I believe
now being investigated by one of the
Company's Officers.

The investigation already made
both by the Government Officers in the
districts affected, and by the Company's Chief
Engineer being sufficient to allow of a
tolerably near estimate of the cost being
arrived at, The Chief Engineer and myself
entered together into the details as far as
we could, and found that the total cost
of the works inclusive of superintendence
in this Country would be nearly 150 Laos.

This is 30 Laos more than the
limit fixed by the Home Government for
the first Project, and therefore if that limit
is to be adhered to, some section of the
Project

37 The few Pyots sent on the Road
to Kurnool pointed to their unploughed
fields, and asked where the means of
depraying the Government demand was to
come from, and when I explained the
probability of their soon being called upon
to assist in the excavation of channels, from
the Sumbadora, they brightened up and
said "If such be the case we shall
not have to leave our houses to seek a livelihood
in another and a better Country." This
people poorly clad, poorly housed,
poorly fed, without water in summer, without
fuel in winter, and exposed to periodical
visitations from famine present as pitiable
a picture of the results of an unimproved
Country as can well be imagined.

38 With the opportunity and means
of rescue in our hands, can the res-
ponsibility be incurred of withholding
them? Having myself during the last 16
years seen the result of similar works
in

in raising an equally depressed population from poverty to plenty and from a listless apathy to an wholesome activity. I cannot conscientiously recommend that this portion of the project should be laid aside, but on the contrary feel it my duty earnestly to urge its execution.

39. This year the rain registered in Bellary was only 10 inches, four inches less than in the same year of 1854. That great distress will consequently be felt is apparent from present prices, though it will be somewhat mitigated by the season having been more favorable in the adjoining districts of the Rachore Doab, and in the Honsain valley, yet there is no guarantee for such a mitigation in the coming year, and every succeeding year of scarcity only adds to the depression of the people.

The expenditure of the Company's money, will not only, of itself afford temporary relief and create a stimulus for exertion, but every rupee expended will be productive of permanent benefit, while it is almost
Certain

31. Certain that if their expenditure is restricted the Government will as in 1854, have to incur a considerable outlay, on their own account.

40 The abandonment of this section of the project being thus impossible both on the score of economy and humanity, the remaining section of the Honsain valley remains to be considered. The inhabitants of this valley it cannot be denied, are far better off than their unfortunate neighbors in Bellary. The contrast in papering from one to the other is most striking. The people appear to be ready to take immediate advantage of the improvements. Wherever there is a patch of irrigated land the care, in the cultivation is most marked. These Islands bear a very high assessment and are consequently worked highly. The valley however is locked out from the rest of the peninsula. There is at present access to no Port and nothing save the unimproved surface by way of Communications. To curtail this section would be not only to shut out a
Bellary

Bellary from the Port, but to keep the produce
of the whole Basin of the Pestun locked up as at present. The mere Completion of
the water Communication from Kurnool
to Madras will immediately bring all the
Cotton of Bellary, Adoni and the adjacent Districts
into the Madras market at a greatly reduced
price. Instead of taking over from 4 to 500 miles
by Bandis as at present at a cost of at
least 40 Rs. it will be conveyed without risk
from the weather for about 6 or 7 Repees per Ton.

With respect to the Irrigation the
Collector informed me that there is a long
Belt of land covered with Savanna skirting the
foot of the Nullamallay Hills which would
certainly be cleared and taken up as soon as
water was led to it. The soil being of that par-
ticular description which is unremunerative
for the Cultivation of dry Crops, but only requires
water to make it produce abundantly. Ironwood
could be supplied in any quantity to Madras,
which would in return send up its greatly
needed Salt.

this

33.
42 This section is accordingly the Key Stone
of the whole, and could not possibly be given
up without spoiling the entire Project.

43 From these Considerations I do not see
what else can be done than to send up the
whole scheme as it stands. The several
Sections are so connected and the whole tract
of Country affected so urgently calls for action
that I cannot but hope that if the Arcium
stance be urgently represented to the Council
for India, the necessary sanction will not
be withheld. At all events it will be some
years before the whole of this sum can be
expended and therefore there will be ample
time to consider the question.

44 Meanwhile however the sections for
which Plans and Estimates are submitted need
not be delayed but should be commenced
upon immediately for the sooner each portion
can be finished, the sooner will ^{the} Government
be relieved of the guaranteed interest, and
ample evidence furnished of the importance
of carrying out the Project in its entirety.

45 Before leaving the District, the Chief
Engineer and myself had arranged to visit
the

the Nullaunulla Hills together for the purpose of exploring the large plains found there with a view to determining on an eligible site for the settlement of the Company's Headquarters. Our servants however having mistaken our orders we missed our trail for 2 or 3 days, and so our plan was frustrated. I however happily met with the collector on his way off and so was enabled to see a portion of the Hills.

Though prepared in some measure by Colonel Arthur Cotton's description, I was yet greatly surprised at the general character of the Hills. Unlike other mountain Ranges of the Peninsula which I have visited they are covered with dense forest to their highest Peaks.

471 The highest hill on which there is a considerable extent of table land, has by two or three distinct methods of observation been found to be 3500 feet above the sea. This hill I was unable to visit, but had an opportunity of scanning the plain about 150 feet below the collector's bungalow, which

35 which is built on an elevation of 2850 feet, and, crossing the water shed which separates the Honnai from the Common valley, ascended sufficiently well the practicability of getting from the foot of the hills to the plain which is reached by the Gellagoo Pass. These plains form a curious feature in these Hills they stretch right across for about 15 miles without any great undulation or variation in level, so that the ascent and descent are steep and immediately overlook the low country on both sides.

48 There are most beautiful, fresh trees from 30 to 50 feet in height without a branch. They principally consist of black and white Madia, Gigis and Spici. I saw a great deal of Leuk also, but most of it was young. There were however the stumps of what must have been considerable sized trees 2½ feet in diameter.

49 These forests are regularly worked by the natives, but for want of a proper road they are unable to carry away the largest trees.

50 The collector informed me that the forest now yields a Revenue of about 4000 Rupees

Supplies a year but this is only for the supply
of Fumool and the neighbourhood. When once
the road to Kanas is open, the trade and
consequently the Revenue will rapidly increase.

The Bamboo jungle is also very fine, Bam-
boos being found from 4 to 6 inches dia-
meter. The principal papery which the wood
is carried is that which leads to the Village
of Bandy Atkon and passes the foot of
the Gerrahelewa Hill where the Collector's
Bungalow is situated.

So little regarding these Forests appears
as yet to have been communicated to Govern-
ment that I cannot but think their impor-
tance is ^{not} known.

I am not certain that large Teak
is now to be found in them, but I am cer-
tain that extensive plantations might be
made from the seeds which already exist,
but the Forests have been comparatively so
little explored, that it is not known what
timber there really is, and as they cover an
area of nearly 2000 square miles. I would
strongly urge a thorough examination
of

of them, as I feel sure they will prove
to be a most valuable addition to the
Revenue of the State.

53 Though perhaps somewhat foreign
to my more legitimate duties, yet I think
I may be excused recommending that the
several Papes which now exist may all
be opened up sufficiently to admit
of loaded Carts travelling down them,
and then that Roads may be cleared
through the Forest, connecting these papes
with one another, by this means the Forest
may be completely opened and access
had to every part. The plains now
covered with dense Forest trees with their
offer fair sites for European settlers, the
temperature during my stay varying from
57° to 68°. Water I feel sure can be found
on them at a small depth below the
surface, as they are surrounded by Hills
from 2 to 300 feet above them, and the
Rock is sand stone a stratum in
which water is almost invariably found.
The soil is of the richest vegetable mould,
but the best Criterion of its fertility is
the

the Timber which grows on it. As a Commence-
ment I would beg that Rs 5000 be placed
at the District Engineer's disposal to clear a
Road from the Gallypore to the Bandi Attem
pass. So as to open at once this portion
of Forest hitherto untouched. The Company
will carry a Canal to the foot of the Hills,
and a valuable and extensive Trade in
Timber will at once be established.

54 Before closing my Report I would
beg to say a few words on the value of the
water to the Districts of Bellari and Kurnool.
From Enquiry I find that the average
rent on dry land varies from 16 1/4 rupees
per acre making an average of about 2 1/2.

55 That on Irrigated land from 8
for one crop, to 12 for 2, making an average
of 10 Rs. per acre, the difference 7 1/2 represents
the value given to the land by the water.

56 In some instances the average rent
on the land reaches very high, especially
in the Flounders valley. The soil is then excee-
dingly good, and the Crops must no doubt
be proportionately fine. Under the Minister Randial
Tank, the land pays Rs 20 per acre and at
Calwa actually Rs 40. but there are of Kalwa
Course

Course exceptional Cases, it only tends to
show the value of water, and that the generally
received opinion of the maximum water
rate that can be levied is considerably below
the mark. It shows also that there is ample room
for fixing a remunerative water rate on the
area proposed above to be irrigated viz
1,200,000 acres.

58 In Bellari under the present
Sumbadra Channels there is a Consider-
able extent of Sugar Cultivation. The value
of this Crop at present prices I ascertained
from the Ryots, the Tahsildar, and the Police
authorities to be about 270 Rupees per acre
and that as might be expected, the Cultivation
of the Cane is steadily increasing. Under the
Sarjee Tank which is said to irrigate
1500 acres, one half appeared to be Sugar
Cane, so that there was sufficient at this
one spot to maintain a large Sugar Fac-
tory. When the Canals are once opened I
cannot conceive a finer locality for the
Establishment of Factories for the manufac-
ture of Sugar direct from the Cane.

59 The days for Refining Factories
in India are I think at an end, as the
great differential value between the
Raw

Raw materials in this Country and in England
Can never again exist. The great objection
to the risk of Plantation by Europeans will
I suspect be overcome in this locality as
the people appear to be so eager to extend
the Cultivation they would doubtless be
induced by the European Capitalists to sell
the Juice instead of the Jaggery. The inter-
mediate expense of manufacture would
then be saved and a much larger per
centage be secured by saving that portion of
Crystallizable Sugar now destroyed in the
first process of Conversion into Jaggery.

60 Saltpetre is likewise an article
found in abundance in the Bellari District,
but not being able to stand the expense of a
long land Carriage, the manufacture of the
article is not carried on largely, the price
however in the villages is only 7 to 8 annas
per maund of 25 lbs. The saltpetre refiner
will understand from this what a harvest
exists for him there.

I have entered into these particulars
in the hope of their proving interesting to the
Inevitable Community.

61 In Conclusion I would like to
touch on two most important points. One

is the Compensation to be paid by the Company
for all the private property taken up by them.
I am of opinion that before any work
is commenced the price of every piece of
land should be paid to the owners.

In the adjustment of these Claims
and the Transfer of the Government Land
it appears to me that the services of an
intelligent European Revenue Officer in-
vested with magisterial power, should be
specially secured. At present the Collector
of Kurnool has no one to whom he
could entrust this duty and a great
deal of additional work will be imposed
upon him on the commencement of operations.

62 The second is an early commencement
of the Revenue Survey in the Districts of Kurnool
and Bellari. It appears to me essential that
the area likely to be affected by the Company's
operations should be properly ascertained before
water is led to it. as otherwise it will be
difficult to ascertain the precise extent to
which it has been deimpfitted.

It is quite possible that the works
may be sufficiently advanced to afford
water to some portions ere the next Cotton
King Season comes round. at all events the
distribution when once commenced will
rapidly extend. No time therefore should be
lost

lost by the Survey Department in organizing their arrangements.

I trust the Government will take these two points into their early consideration.

3) As one end of the Amma will rest on the territory of His Highness the Nizam and a small portion of the Kondam Canal will have to pass through his land, it will be necessary to obtain his permission for the same.

4) Agreeably to the Orders of Government, the several proposals of the Chief Engineer, shall be communicated to and discussed with Mr. Wilson the Executive Engineer of the Apegaud District. but it has occurred to me that it would probably still more facilitate matters were I afterwards to proceed to Hyderabad and consult with the Chief Engineer there, as also wait on the Resident, and explain personally the proposals of the Company and the views of Government concerning them.

5) Having thus personally ascertained the practicability of this grand Project, and the existence of no Engineering difficulties, that a little ordinary ability and perseverance may not overcome, I have only to urge its speedy commencement at all

all points as soon as the detailed Plans and Estimates have been approved by Government.

I have the honor to be
Sir

Yours Most obedt Servant.

J. W. Rendell Esq
Consulting Engineer, Engt Comp

Dowluderaim
1st February 1868

Copy in album Dug
4 April No 13 of 1860.

Pub. Works 1860. Dept
Proc of Govt 10 April
No 3122

From

Captain Rendall
Consulting Engineer
Irrigation Company

To The Secretary to Government

Fort Saint George

Dated 1st February
Received 7th Feb 1860.
1. map.
No 36.

Forwarding Report of late
Tour to inspect the line
of Canal proposed by the
Irrigation Company.

No 31.

c29 July c24 March 1828

No 690-4. 1860

Public Works Dept

No 690
Proceedings of the Madras Government
Under date 1st March 1860

Read the following
letter from Captain Rendall
Consulting Engineer Irrigation
Company.

Forwarding Report of late Tour
to inspect the line of Canal pro-
posed by the Irrigation Company. (Here enter 1st February 1860)

mf
L
H
J

The Government
have read this report with
much interest. They now
resolved to forward it for the
information of the Home
Government, as containing
a clear outline of the several
parts of the works which
the Irrigation Company are
about to undertake. The
Report being general, there
are

are not many points requiring any order here; but the Government will notice such as there are.

2 With the information now before them, the Government are not prepared to

give a decided opinion as to allowing the company to undertake the construction of ~~the system of including~~

~~the main tanks, as a part of the system, for the early completion of the works to be undertaken~~ ^{but they resolve} report of the Chief Engineer whether that tank properly ~~forms a part of the system~~

~~of the Company; but~~ ^{to us} should ultimately appear, that that work properly forms a portion

of their general plan, the Government will then

strongly recommend that it should be made over to them, and also that they should be permitted

to increase the amount of their guaranteed Capital, to the extent sufficient to enable them to undertake it. All

the other parts of the scheme of works sketched out in this Report seem strictly

connected

Paras 5 to 10.

forms a part of the system of works about to be undertaken by the Company

connected as members of a general whole, so that no part could be properly omitted. In Para 44 the

Consulting Engineer speaks of Plans and Estimates having been submitted for one section of the works, and recommends that those works should be commenced immediately. No Plans or Estimates for any part have yet come before Government;

but the works here referred to are believed to be those at and near Karnool for turning water from the Tumbaddra into the Tundia and the Tennar. The instructions of the Directors of the Company require, however, that the detailed Plans and Estimates shall be submitted to them for approval before work is commenced; the Government is



Karnool

is therefore precluded from ordering the commencement of work, as the Consulting Engineer has already been informed.

4. Orders 47 to 53 will be communicated to the Conservator of Forests, and his attention drawn to what is there said of the forests of the Nallamalai hills.

5. The Government will be prepared, at the proper time, to give the Collector of Karnul such aid as may be necessary for giving over to the Company the land required for their works. They quite agree with Captain Sturtevant that all such land, when in occupation, should be paid for before being so made over.

6. The Government do not expect to be able to

31st March 1860-
N. 664

Para 61.

Para 62

to make arrangements for commencing the Revenue Survey of Karnul immediately.

7. The Consulting Engineer will forward a copy of the Sketch map which accompanied his letter, with the localities of the proposed works distinctly marked on it, for transmission to the Home Government; and he will understand that all projects requiring to be referred to the Home Government are to be furnished with similar Sketch maps.

4. Copy to the Consulting Engr
Irrigation and Land Co. Prop: 6
10. Chief Engr
11. Secy of Revy
4. Conservator of Forests

45 15
5

Copy made by
4 April No 13 of 1860.

(9)
Public Works Dept.
Pro: of Govt 10 April

No 690.

Pro: of the Madras Govt.
Dy 4 April 1860.

From Capt. J. H. Simdall Consulting
Engineer for Irrigation & Canal Co.
Dy 17 April 1860 No 938 ml

Irrigation

Para 3 & 10 of the letter
" of the 10th.

Reviewing the report
of the Consulting Engineer
Irrigation Company

Para 4 of the report is in

reference to the

No 31 & 32.