

Second Report of the Committee appointed by the Right Honourable the Governour of Bengal for the Establishment of a Fever Hospital, and for inquiring into local management and taxation in Calcutta.

Contributors

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SECOND REPORT

OF

THE COMMITTEE

APPOINTED BY

The Right Honourable the Governour of Bengal

FOR THE

ESTABLISHMENT OF A FEVER HOSPITAL,

AND FOR INQUIRING INTO

LOCAL MANAGEMENT AND TAXATION

IN CALCUTTA.

Calcutta:

BISHOP'S COLLEGE PRESS.

1846.

SECOND REPORT

THE COMMITTEE

FOR THE IMPROVEMENT OF THE ADMINISTRATION OF THE

ESTABLISHMENT OF A FEVER HOSPITAL

LOCAL MANAGEMENT AND TAXATION

IN CALCUTTA

PRINTED BY THE GOVERNMENT PRESS

1881

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SECOND REPORT.

IN their first Report, your Committee submitted to his Honour the then Governour of Bengal the results of very extensive inquiries which they had instituted into the Drainage, Cleansing, Ventilation, and Communications of the City of Calcutta and the Supplying it with Water—the establishment of an Hospital or Hospitals and of additional Dispensaries for the treatment of diseases among the Native poor—the causes of disease and obstacles to convenience and improvement which abound in it—the state of the Suburbs—the system of collecting and appropriating the taxes of the Town—the state of the Police as well in the Town as on the River which forms its harbour—if on some of those matters not so thoroughly as they could have wished, yet on all of them in such manner as in their opinion to justify their reporting upon them—subject in some particulars to further inquiry. At the close of that Report your Committee stated that to the consideration of the papers his Honour had directed to be transmitted to them regarding the Drainage of the Salt Water Lake, and the questions connected with that important and difficult measure, as well as to the reporting on the new Clinical Hospital, your Committee would forthwith address themselves; making them the subject of a Supplemental Report.

Your Committee, however, in reference to the Drainage of the Salt Water Lake, were then glad to express their conviction that the salubrity of the City and Suburbs was not wholly dependent upon the removal of this Marsh, but was immediately dependent upon that, which it was in the immediate power of the Government to effect without incurring the dangers of a partial and progressive drainage of a large extent of water, and moist ground, viz. the thorough drainage of all the ground within the City and Suburbs, so as to leave no water there so near the surface as to have the power of generating Miasma, and the screening the City and Suburbs from the passage of those poisonous particles from the Marsh by belts of bamboos, and forest trees, planted along the margin of the moist land where they are generated.

Upon the Drainage of the Salt Water Lake, and the questions connected with that measure, a vast mass of information has been collected, from time to time for many years back, and deposited in the Government Offices of this City.

Your Committee thought they could not better fulfil the intention with which they were appointed, so far as this great and important subject was concerned, than by ferretting out of the recondite obscurity in which they were so buried the several results of these laborious and scientific inquiries—This of course has taken a considerable time—But they think the bringing of this information to your Honour's notice, and that of the Publick, well worthy of the delay, and a greatly more valuable offering, with reference to the subject to which it relates, than any observations which could be submitted by your Committee; and your Committee being satisfied, as above stated, that the frightful insalubrity of the Town was not immediately

attributable, in any material degree, to the existence of the Salt Water Lake, and would not be so at all, if the suggestion of your Committee to plant a screen of wood were adopted, but rather to other causes obvious and indisputable in their nature, the existence of which, and the mode of removing them, your Committee had reported upon to the Government by its command so far back as the 7th January 1840, with no other result than a letter of thanks, which they had the honour to receive for their report from the Government who had appointed them, it did not appear to your Committee that any inconvenience was likely to result from a little delay in the completion of their Supplemental Report, which would not be counterbalanced by the greater fullness of detail in the information they collected.

App. (G) Paper marked No. XI. page 56.

Ibid—Papers marked No. I. to No. X. inclusive, pages 1 to 55.

Ibid—Paper marked No. I. page 1.

Ibid—Papers marked No. II. and No. III. pages 27-8.

Your Committee had the honour to receive a letter, under date 18th September 1838, from F. J. Halliday, Esq. Secretary to the Government of Bengal, transmitting to your Committee, by direction of the Honourable the Deputy Governour of Bengal, certain papers relative to the Drainage of the Salt Water Lake, and stating that his Honour would be happy to be favoured with the Committee's opinion upon the subject.

Of these papers the first was a Minute of Lord William Bentinck, then Governour General, on the subject of draining the Salt Water Lake, and improving the Canal.

This Minute, which bears date the 2d February 1830, was transmitted to the Court of Directors on the 16th February 1830, to which Despatch the Court returned an answer dated 10th November 1830.

In his Despatch the Governour General had desired to have the opinion of English Civil Engineers well acquainted with works of that nature. This the Court declined to procure, stating that there was sufficient knowledge upon the subject already existing in the Engineer Officers in their service in India. In his Minute the Governour General proposed, that the line of Canal, then executing according to the Plan of the late Major Schalch, should pass to the westward of the Salt Water Lake, instead of through the Lake as originally designed, which Canal was to connect the Salt Water Lake with the Hooghly, and "that with this improvement should be connected the execution of another object of equal utility and advantage with the Canal itself, viz. the Draining and Warping up the Salt Water Lake, the area of which comprises $18\frac{1}{2}$ square miles, or about 12,000 acres."

Of this Plan the Court of Directors were pleased to approve, as promising, so far as they could judge of it, much publick benefit; and they left it to the discretion of the Government of India to undertake it wholly themselves, or to permit individuals, including the Company's servants, to embark their money in the work.

If the Government undertook it on account of the Company, the Directors suggested that they would do well to open a negotiation before hand for purchasing the Salt Water Lake, which had been disposed of in perpetuity paying a rent of about 4000 Rs. to Government. Your Committee have obtained information relative to the price at which this purchase may be made.

Ibid, pages 5 and 26.

The profit to the Zemindars from the fisheries—from reeds—and from lands from which the waters had receded—the Governour General states that he had learnt from the Commissioner to amount to about 16,000 Rs. per annum.

The Court of Directors in their letter state the Plan to be a gratifying proof of their Governour General's desire to improve the commerce of India, and increase the salubrity of Calcutta and its vicinity. Your Com-

mittee can only express their hope that the appreciation entertained by the Honourable Court of the great importance of both these objects continues the same.

It appeared to your Committee that Lord William Bentinck's Minute, of the 2nd February 1830, above mentioned, must be taken as forming the outline of the first subjects they had to consider, and the foundation of their inquiry and report.

The first subject contemplated in that Minute is the improvement of the line of Canal originating in Major Schalch's Memoir, and then executing by Captain Prinsep.

The 2nd, is the Draining and Warping up the Salt Water Lake.

The 3rd, the Improvement of Tolley's Nullah.

The 4th, the Drainage of the City.

The 5th and last, the Financial part of the question.

But upon the first subject it appeared to your Committee, from information they received from the Government Offices, that further matters, not mentioned by Lord W. Bentinck, arising out of the proposal offered for consideration by Major (then Lieutenant) Schalch, had attracted the attention of the Government and Court of Directors, by whom that proposal had been ordered to be carried into execution by an Order dated 11th July 1827, still subsisting without any subsequent countermand, into which it appeared to your Committee material that they should fully inquire, with a view to report thereon, as intimately connected with the subjects referred to their consideration.

Major Schalch's proposal was communicated in a Memoir taken into consideration by the Government on the 28th July 1821. It was entitled "A Memoir by Lieut. J. A. Schalch, on a Plan for the formation of an easy, permanent communication between the Upper and Eastern Provinces of India and Calcutta by water, during the dry season." This is the Paper referred to by Lord William Bentinck.

Major Schalch's Memoir began by adverting to the want of a free Navigation between the Eastern and Upper Provinces and Calcutta during the months of January, February, March, April, and May, when most of the rivers which branch off from the Ganges become too shallow for large Boats; and he says that considerable expense had been incurred to remedy the evil, but to that time without effect—that in the plains of Bengal there is no difficulty in forming a Canal, the country being an uniform flat, and the soil easy of excavation, but that the difficulty of keeping a Canal open in the higher parts of Bengal is so great as to oppose an insurmountable obstacle to success—that both Major Rennell and Colonel Colebrooke, who had of all others paid the most attention to the subject, were decidedly of this opinion, and he cites memoirs of these gentlemen to this effect.

He therefore, offers for consideration a plan for opening a free communication between the Upper and Eastern Provinces of India and the Hooghly river at Calcutta, entirely independent of the caprices of the Bhaugaruttee, and other *branches* in the Delta in the upper part of their course; and which shall promise not only to be permanent, and free from the objections which have accompanied former plans, but shall repay, in a short period of time, the expense of excavation, and ultimately become a source of considerable revenue to Government, or profit to any body of individuals who may embark in the speculation.

He says, that the causes which render the country towards the head

App. to App. (G)
Paper marked A.
page i.

Appendix (H)
No. 94 a. p. 9f.

App. to App. (G)
Paper marked B.
page xiv.

App. to App. (G)
Paper marked A.
page i.

Ibid.

Ibid.

Ibid.—pages x.
and xi.

Ibid—page iii.

of the Delta unfit for Canal Navigation, do not apply to that portion of Bengal which is within the influence of tide, and which, on the contrary, appears peculiarly adapted for such an undertaking; and he mentions the circumstances which obviously render it so: and he instances Goodlad's Creek, which was excavated in 1796, but had not, at the time he was writing in January 1821, become at all obstructed, or experienced any change, and a cut made by Lieut. Morrison of the Engineers, which having retained its original form might be mentioned as another instance of the durability of such works in this part of the country. Having traced the course resorted to by the Up-Country trade Boats, when all the other passages to Calcutta branching off from the higher parts of the Ganges were unavailable, by the river Chundna branching off at Koostee, and the Gurroy branching off at Mooddapoor down to Mosundurpoor in the Jessore district, where they unite, flowing into the Soondurbun passage at the village of Alleepore, near Koolna, whence the route lies through the Soondurbuns and Tolley's Nullah to Calcutta, he states the difficulties and dangers of the Navigation.

As far as the Soondurbuns it is perfectly safe.

It then becomes dangerous to Boats heavily laden, from the great breadth and depth of some of the rivers, which form a part of the passage, independent of which the Natives, he says, are strongly averse to this route from the dread of Tigers, the danger of cooking ashore, the want of fresh water, and the delay attending the passage through Tolley's Nullah: and he states that Tolley's Nullah was, at the time he wrote, quite inadequate to the Navigation.

What he proposed, therefore, was to make one grand line of water communication between the Upper Provinces and Eastern side of Bengal with Calcutta, open and secure for every description of Boat, by forming a junction between the Gurroy and Hooghly rivers by means of Canals at the head of the Soondurbuns, taking advantage of such Nullahs as flow in a suitable direction, thus avoiding the large rivers, and the inconvenience of the present route.

The Gurroy being perfectly safe until reaching the village of Koolna, the Soondurbun passage may be considered as commencing there.

From this point he therefore starts, considering it as the Eastern extremity of his proposed line, and, proceeding along it to Calcutta, he enters into a minute and most satisfactory detail of every circumstance, which might in any way affect the execution of the Scheme.

Upon Map No. I, will be easily traced the route which he proposes.

In an Appendix to the above mentioned Memoir, Major Schalch adverts to the want of Drainage and Cleansing in the Town of Calcutta, and suggests a Plan for their improvement in conjunction with the Canals proposed.

The Memoir of Lieutenant Schalch having been carefully considered by the Governour General in Council, Resolutions were passed in Council under date the 28th July 1821, declaring that his Lordship in Council was disposed to think very favourably of the Plan proposed by Lieutenant Schalch, the several parts of which appeared to be very ably and judiciously conceived. His Lordship in Council deemed it necessary, before coming to any final decision, to receive the deliberate opinion of such persons as might appear most competent to judge of the nature and extent of the advantages to be expected from it, and of the probable charge to be incurred in its execution and maintenance. For the full investigation of those

App. to App. (G)
Paper marked A.
page iii.

Inserted opposite
page vi. of App. to
App. (G)
App. to App. (G)
Paper marked A. 1.
page xiii.

Ibid—Paper mark-
ed B. page xiv.

Ibid—Paper mark-
ed B. page xv.

questions it appeared to his Lordship in Council desirable to seek the aid of a Committee; and he therefore selected certain gentlemen, whose names are therein mentioned, to form such Committee.

The Resolution states, that it appeared unnecessary to state in detail the different matters which the inquiries of the Committee were to embrace—that they would naturally suggest themselves on consideration of Lieut. Schalch's Report and Plan, or would arise out of the results of future investigation. But in paragraph 6, the Resolution expressly declares, that "the Committee would of course understand, that, though the Drainage of the City was not necessarily connected with the proposed Canal, yet the matter was one to which it was not the less desirable that their investigation and Report should extend—that the probable influence of the proposed work on the health and cleanliness of the City was indeed as obvious a point of inquiry, as the degree in which it might be calculated to facilitate Commercial intercourse."

It appears, therefore, that the attention of the Government of India was directed to the Drainage and Cleansing of the Town of Calcutta, with a laudable degree of concern for the health of the Inhabitants, and a just appreciation of the policy of improving the healthiness, and convenience of the Capital of a great country, so far back as July, 1821, twenty-four years ago; and that it then considered these things matters to be kept steadily in view, in conjunction with every scheme for improving its Commercial intercourse. Your Committee cannot refrain from expressing their surprise, mingled with the deepest regret, that, at the end of these 24 years, not a single step has been taken to remove from those parts of the City inhabited by the natives of the country any of the frightful evils attendant upon a total want of Drainage, of Cleansing, and of free Ventilation.

On the 28th July 1821, a Second Appendix to his Memoir was submitted by Lieut. Schalch to the Committee appointed to Report upon his plan.

In this he offered to the notice of the Committee some further information, more particularly upon that part of the scheme which comprehended the proposed junction of the Salt Lakes and River Hooghly, in which, with the view to meet the objection which had been started against the practicability of forming the proposed communication, on the ground of the difference of level, and the velocity of the communicating streams, he explained in a scientific and satisfactory manner, the rules upon which the velocity of any River depend, applying them to the case of the Ganges.

In addition to the Appendices above-mentioned, Lieut. Schalch furnished the Committee with a Paper shewing the method employed to ascertain the difference of level between the Hooghly and Salt Lakes, and the actual difference of level so ascertained, and a Paper containing an estimate of the expense likely to be incurred in the execution of the scheme, and the profit to be expected from the re-sale of the Land along side of the Canal Road, and the yearly receipt from Tolls on Boats passing through the Canal, and lying in the Harbour, after deducting repairs and establishment.

On the 28th October 1822, the Committee appointed to examine Lt. Schalch's plan made their Report, in which they state, that in the course of their inquiries no ground had arisen to impugn the correctness of the opinion of Lt. Schalch—that in order to simplify their labours they had divided the subjects of investigation into several heads, under which they had arranged lists of Queries for distribution—and that they had distributed them very extensively, along with copies of Lt. Schalch's Memoir, to the several persons from whom information appeared obtainable. A list of these persons is given in the Report, and, as far as can be judged at this distance of time,

App. to App. (G)
Paper marked D.
page xvii.

Ibid, Papers marked D. I. and A.
pages xxv. and xxvi.

Ibid, Paper marked E. page xxviii.

Ibid, Papers marked E. 4. d. to E. 4. i. &c. inclusive p. l.

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the list appears to have embraced every person of this description. The Queries and Answers obtained are inserted in the Appendix to their Report.

App. to App. (G)
Papers marked E.
to E. 66, &c. pages
xxviii. to cclviii.

Appendices (H)
and (I) &c.

Ibid—page xxxii.

The Report was exceedingly favourable to Major Schalch's proposal, and the whole of this valuable Report, and its equally valuable Appendix, which lay in MS. in the Office of the Secretary to Government, as did many other valuable Papers in that and other offices, wholly concealed from the knowledge of the publick, and probably from that of all the Members and Secretaries of Government, your Committee, with the approbation of the Government, have printed in the Appendices to this Report.

In their Report the above Committee, under the Second head of their inquiry, reported their opinion of the influence of the proposed Canal on the accommodation and draining of the City of Calcutta, with the probable cost of land, &c., and they stated, that they were satisfied that the Drainage of the City would be materially improved, and facilitated, by the construction of the Canal, provided due means were taken to prevent the river from flowing into it during the Rainy Season—that the mode, with slight modifications, in which Lieut. Schalch proposed to effect this object had been generally approved—and that, as far as they had means of judging, it would perfectly secure the object in view—but that his Plan for conveying the filth and ordure of the Town through Tunnels to the New Canal, would not in their opinion answer—that the construction, however, at proper intervals, of Tunnels, described by Mr. Blechynden, from the Chitpore Road to the New Canal was considered highly desirable.

App. to App. (G)
Paper marked E.
14, page lxxvii.

Mr. Richard Blechynden in his Letter to the Committee on the 6th January 1822, in reply to the queries contained in the List No. 2, described the Tunnels he proposed.

The insufficiency of the Channel of Tolley's Nullah for the trade in its then state, the Committee Report to be accurately described by Lieutenant Schalch, and very generally noticed in the Communications they had received.

Ibid, page xxxiii.
Ibid. Paper marked E. 7, page lxi.

It appears from the Report, that, during their progress, the Committee had turned their attention to the state of the existing Navigation through Tolley's Nullah, and it appears that, on the 2nd February 1822, the Secretary to the Committee addressed a Letter to the Secretary to Government, in which he stated that the Committee found the obstruction to free Navigation by the route of Tolley's Nullah a source of very general complaint, and that with the Boat Insurance Company and the Boat Agents this consideration had weighed as one motive for an approval of the new line of Canals, and that the employment of Lieutenant Schalch on the duty of clearing Tolley's Nullah appeared to the Committee fraught with considerable advantage to the future prosecution of the line of Canals.

Ibid. Paper marked E. 9, page lxiv.

App. (H) Paper marked No. 5, page 2.

On the 8th February 1822, Lieut. Schalch was instructed to examine Tolley's Nullah, and to report upon its present state, submitting at the same time an estimate of the expense likely to be incurred in clearing its bed, and repairing its banks. Lt. Schalch addressed the Canal Committee under date 15th May 1823, stating that he had completed a minute survey of Tolley's Nullah, when he received the Resolution of Government of the 23rd April preceding, which required that Tolley's Nullah should be considered solely with reference to the *Diamond Harbour and Saugor Canal*; to the proceedings regarding which proposed Canal your Committee will presently call your Honour's attention.

Note.—The Survey of Tolley's Nullah by Lieut. Schalch is deposited in the Office of the Military Board,

under page 67
of this Report
para 3.

Your Committee has found the survey of Tolley's Nullah here mentioned, but has not found any Report thereon made by Lt. Schalch; nor can they state whether any thing was done in reference to Tolley's Nullah.

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On the 12th June 1823, the Secretary to Government addressed a Letter to the Secretary to the Canal Committee, stating that the Governour General in Council remarked, that whatever was done for the improvement of the Navigation of Tolley's Nullah, must now be done with reference to the Canal to Channel Creek—that no separate Report was therefore required.

Appendix (H)
page 7, No. 10.

It is probable, that the improvement of the Navigation of Tolley's Nullah having been connected with the formation of the Canal to Channel Creek, it was no further proceeded with, this latter measure never having been carried into execution, though, as will presently appear, it was not declared to be abandoned, however it may have been suspended or forgotten.

On the 20th March, 1823, the Governour General in Council recorded a resolution, that, having deliberately considered the above Report of the Committee on the Plan proposed by Lieutenant Schalch, and the Papers which accompanied it, for an easy and permanent communication between the Eastern Provinces and Calcutta, he was fully satisfied of the expediency of undertaking the proposed work without delay—that the practicability of making the Canal in question at a charge not exceeding the amount estimated by the Committee, and the facility with which when made it might be kept open, appeared to be fully established—that it seemed to be very doubtful whether any more direct line of communication between the River Hooghly and the Ganges could be rendered navigable throughout the dry season, and there was thence reason to conclude that the work would afford a very important facility to the trade to the Western Provinces,—that, *independent however of this branch of commerce*, the great utility of the projected Canal appeared to be fully established.

App. to App. (G)
Paper marked F.
l. page ccxx.

The Resolution having adverted to the extent of the commerce in question—the enhancement in the price of firewood and other necessaries, and the importance of facilitating the means of conveyance,—the tolls to be collected in the Canal in question—and the insufficiency of Tolley's Nullah, proceeds to state, that it was impossible to contemplate the present condition of that Nullah, crowded as it is with Boats, and affording a long, and inconvenient passage to the Soondurbuns, without a strong conviction *that the community have reason to complain of the appropriation of the Toll levied*, for that such imposts ought to be regarded less as a source of direct profit, than as a fund to meet the charge of maintaining, and extending the Channels of Commercial intercourse—that, viewing the matter in this light, *the Governour General in Council would doubt the propriety of maintaining the existing Tolls, were it his intention not to adopt any arrangement for facilitating the approach to Calcutta.*

App. to App. (G)
Paper marked F. l.
page ccxx.

The Governour General states, that he recognises at once an assured ground of confidence that the work proposed by Lieut. Schalch will be extensively beneficial, and that the expense of it may be met without any pressure upon the general resources of Government. On the above ground the Governour General in Council does not hesitate to resolve that the undertaking shall be immediately commenced. The Resolution then proceeds to consider the estimate of expense, and the anticipated receipt expected to meet it,—the principles which ought to regulate the compulsory sale by the parties, and purchase by the Government, of ground adjoining the line of Canal—the erecting of Bridges across the Canal, &c.,—and appoints Lt. Schalch Superintendent of Canals in Bengal, and Agent for the preparation of Suspension Bridges, and names a Committee under whose control Lieut. Schalch will act, as suggested in the Report of the Committee, and adverts to some minor details, particularly to the 18th para. of the Committee's Report relative to the construction of a Tunnel

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as proposed by the late Mr. Blechynden, as an experiment calculated to show how far the advantage of such a system of Drainage would counterbalance its expense, and the Governour General in Council says that the suggestion will be referred for Report to the Magistrates of the Conservancy Department, who will obtain and submit to Government a detailed estimate of the probable expense of the work, with their opinion as to its utility.

Your Committee obtained from Mr. McFarlan, late Chief Magistrate of Calcutta, a Report by A. H. Blechynden, Esquire, dated 7th February 1835, preserved in the Office of the Chief Magistrate, containing details of a Plan for the construction of a Tunnel from the river Hooghly to the Circular Canal for the better Drainage of the Town of Calcutta, through which the proposed Tunnel is to pass.

This Report is printed in Appendix D. to your Committee's first Report.

It appears from the Resolution of the Governour General in Council, above-mentioned, that the Mr. Blechynden, who had made the suggestion to the Committee upon Lieutenant Schalch's Plan, was dead on the date of that Resolution in 1823. He was Superintendent of the Roads in Calcutta. His name was Richard. He was succeeded in that Department by his son Mr. A. H. Blechynden, compiler of the Report, dated twelve years afterwards, which your Committee received from Mr. McFarlan. But except the obtaining this Report, no step has been traced as taken by the Magistrates of the Conservancy Department with reference to the Drainage of the City.

The recommendation of Mr. A. H. Blechynden, was confined to the construction of one Tunnel from the westward, in the centre of the Road through Neemtollah, the proposed line of which he describes in the detail of his Plan above-mentioned.

The proposal of Mr. R. Blechynden, the father, was, that a large Tunnel be made across the City at every 2,000 feet, or as near to that more or less as the situation of the streets would permit, and it was the construction of one of these Tunnels as an experiment that the Committee on Lieut. Schalch's Plan recommended to Government. Your Committee have not ascertained that the Plan suggested by Mr. A. H. Blechynden, ever emerged from its obscurity in the Chief Magistrate's Office, till obtained by your Committee, and certain it is that no step was ever taken, so far as they can learn, towards the carrying either Plan into execution.

On the 31st March 1823, the Committee upon Lieut. Schalch's Plan, addressed a letter to the Secretary to Government, transmitting their Supplementary Proceedings on the Soondurbun Canals, containing information collected since closing their Report, dated 28th October preceding.

Adverting to the details recorded in the Proceedings, and to their investigations on a line of Canals proposed to be established between Calcutta and Saugor Island, and to the recent fluctuation of the Indian funds, they submitted to the consideration of the Governour General in Council, observations in continuation of their Report on the Soondurbun Canals.

They advert to the paragraphs of their first Report, in which particular advertence was made to the state of the Navigation through Tolley's Nullah, of which they state that, however appropriated, the Channel must be improved to render the Navigation free, and supposing this accomplished the passage would continue ill adapted for the Import and Export trade of the City of Calcutta, particularly so in respect to all articles destined for the consumption of the inhabitants of the City, such as grain, salt, firewood, and other gruff goods.

First Report, Appendix (D) page 230, No. 24

Appendix (D) page 230.

App. to App. (G) page lxxvii.

Ibid, Paper marked G. page ccxxv.

Ibid, page xxxiii.

Impressed with a conviction of the inadequacy and unfitness of Tolley's Nullah for the transit of the trade, they had strongly recommended the formation of a Canal across the Salt Water Lake and around the Circular Road to the river Hooghly at Chitpore.

They then go into details regarding the Tolls which may be expected on the proposed line of Canals, between Koolna and the river Hooghly at Chitpore, and the augmentation to which they might fairly be subjected.

On the 23rd April 1823, both Reports, one of the 17th February regarding the Canal between Calcutta and Saugor, and the Supplementary Report of the 31st March regarding the Canal between Calcutta and Koolna, were taken into consideration by the Governour General in Council, who came to a resolution, in which he observes, that the facts and observations contained in the supplementary Proceedings and the Report of the Committee in regard to the Canals to be constructed between Calcutta and Koolna, all tend to confirm the already assured persuasion of the expediency of the work, and that they do not suggest to the Governour General in Council any modification of the Orders already passed in regard to the work above mentioned. In regard to the Report of the Committee on the Canal proposed to be cut from Tolley's Nullah to Channel Creek, with a branch leading to Diamond Harbour, the Governour General in Council remarks that it is full, clear, and satisfactory, and appears to him to afford conclusive proof that the work will be one of great public utility, and that it will yield to Government a large return for the Capital expended.

With this conviction, the Governour General in Council does not hesitate to resolve that the work shall be undertaken; but he remarks that, until the new Canal through the Salt Water Lake should be opened, Tolley's Nullah must apparently continue to be crowded with Boats passing to and from the Eastern parts of Bengal—that it seemed certain that the Nullah, even when cleared of the obstruction which now hinders the Navigation, would not suffice for both branches of trade; hence a doubt occurred to him whether the Saugor Canal should be immediately commenced or postponed for a time.

The Governour General declares it to be the intention of Government, to confide the Superintendence of the Work to Lieutenant Schalch, under the controul of the Committee appointed on the 20th ultimo, and that the Governour General in Council will be guided by the opinion of the Committee, in determining the period at which the work in question shall be commenced.

On the 20th March 1823, W. Paton, Esq., 2nd member of the Board of Revenue L. P.; H. Shakespear, Esq., Superintendent of Police; C. Barwell, Esq., Magistrate, Suburbs of Calcutta; and Captain W. Swinton, Superintendent of Public Buildings L. P. were appointed a Committee to controul and direct the execution of Lieutenant Schalch's Plan of a line of Canal from the river Hooghly to Koolna.

From the Circular Road at Entally down to the Salt Water Lake, near where Lieut. Schalch's Canal through the Lake was intended to commence, there existed an old Canal called the Ballighat Canal, executed in 1809.

Complaints of the obstruction of this Canal by a quantity of mud and filth poured into it by the Town Drains, were made to the Government by the Collector of the 24-Pergunnahs, Mr. Brown. This complaint and relative Papers were transmitted by order of Government to Lieut. Schalch, who reported thereon on the 5th April 1823. His Report was transmitted

App. to App. (G)
page ccxxvi.

Ibid, Paper marked H. 1. page ccxlvii.

App. to App. (G)
page ccxlviii.

Index to App. (H)
No. 1.

App. to App. (G)
E. 14. page lxxvii-iii.

Appendix (G)
page 31.

Index to App. (H)
No. 63 a. and No. 72.

Index to Appendix to Appendix (H) No. 121.

Index to App. (H) No. 12 to 14 inclusive.

Ibid—No. 2, No. 2 a. and No. 2. b.

by Order of Government to the Canal Committee on the 10th April 1823, and on 23rd April the measures proposed by Lieut. Schalch were authorised to be carried into execution.

From the centre of this Balliaghatta Canal, the Canal called the Circular Canal, part of Lieut. Schalch's Plan, was executed to the River Hooghly at Chitpore, and its continuation through the Balliaghatta Canal to the Salt Water Lake cleared from obstruction. The Canal proposed by Lieutenant Schalch was formed, and a Cut made according to his Original Plan from thence to a place called Bahminghatta, about 6 miles from the end of the Salt Water Lake. From thence his original Plan was partially departed from, by adopting a shorter route than that projected, to a place called Chultabariah, from whence his line was continued with some small variations, and the Canal excavated to Hoseinabad, upon the Juboona River, where it stopped.

The Canal Committee on 10th June 1823, in a Letter to the Secretary to Government, had recommended that both Canals, that to Koolna and that to Saugor, should be commenced upon immediately after the ensuing rainy season. Of this the Government approved by Letter to the Committee of 12th June 1823, and they appointed Captain Taylor and Captain Prinsep, Assistants to Major Schalch, the former on the Saugor, the latter on the Koolna Canal.

On the 30th July 1824, however, the Secretary to Government addressed a Letter to the Committee for reporting upon Lieut. Schalch's Plans, in which he states that he is directed to inform them, that the Governour General in Council has resolved that all Publick Works likely to occasion any considerable disbursement, and which are not of indispensable necessity, or such that the discontinuance of them would be seriously detrimental, shall for the present be suspended; and with reference to that Resolution to communicate to them, that the Channel Creek and Diamond Harbour Canal not having, it was understood, yet been commenced on, His Lordship in Council had determined that all measures towards the completion of it should be postponed until further orders,—and that it further appeared to the Governour General in Council, that the further prosecution of the Canal from Calcutta to Koolna ought for the present to be suspended, though His Lordship in Council was fully sensible of the general inconvenience incident to any delay in the completion of so useful a work.

It appears from the Extract of the Proceedings of the Governour General in Council under date 23rd July 1824, that the cause of this suspension of Publick Works, was the probable extent of the charges consequent on the War with the Burmese.

In his Letter to the Committee, the Secretary to Government says, that, before passing any final orders on the subject of the further prosecution of the Canal from Calcutta to Koolna, the Governour General in Council desired to receive from them a succinct account of what had been done, and a report of what reduction of establishment could be made on the supposition,—1st, That the further prosecution of the Canals was entirely suspended; and, 2nd, That the Works were only partially discontinued, if the latter course should appear to them most proper.

On the 19th October 1824, the Committee accordingly obtained from Major Schalch a statement of the then present condition of the Publick Works under his Superintendence, under the heads, 1st, of the Iron Bridges; 2nd, of the Canals.

In reference to the Diamond Harbour Canal, Major Schalch states, that a Minute Survey of the Country, with accurate levels from the Hooghly at

Index to App. (H)
Nos. 15, 16, 18.
Appendix (H)
page 110.
Addenda to App.
to App. (H) No.
VIII. page xi.

Index to App. (H)
No. 8, and (I).

Appendix (H) No.
27. a. page 10.

ibid. page 11.

Appendix (H)
No. 28, page 12.

Appendix (H)
page 15.

Kidderpore to Rangafulla, had been made, with observations and comparisons of the rise and fall of the tide at Diamond Harbour and Calcutta—that the levelling of so great a distance as that between Chandpaul Ghat and Diamond Harbour was necessarily a tedious and laborious, although an indispensable, operation—that Captain Taylor had however conducted it with much skill and assiduity through a country generally unfavourable, and had collected information which, combined with what he, Major Schalch, already possessed, was sufficient for commencing immediately upon the Canal whenever Government might order it to be undertaken.

Upon the great Eastern Canal, Major Schalch reports the operations in which he had been engaged, in detail. And in conformity with the instructions conveyed in the Letter of the Committee to him, and after a most mature consideration of the subject, he begged leave humbly to submit his opinion, that the success of the Canals in question would be endangered by a present cessation of their progress; and he states, as the grounds of his opinion, considerations which must have appeared incontrovertible, amongst which his own accumulated information, acquired during ten years from his own personal Surveys and Observations in the minutest detail, and the precariousness of his life, he thinks the Committee will probably not regard as the least: and he proceeds to show that the work was then more urgent, and more indispensibly necessary, than when it originally received the sanction of Government.

He then proceeds to lay down in detail a Plan for the future execution of the Work. Along with his Letter he transmits a copy of a Letter from Captain Taylor to himself, dated 28th August 1824, transmitting Maps and Surveys executed by him, with reference to the construction of the proposed Canal to communicate with the New Anchorage, Diamond Harbour Creek, and Tolley's Nullah, and Observations made by him in conducting the Survey, relating to the nature of the Soil, and other matters likely to come under discussion before the Canal Committee, and the levels taken at high and low water tides from Chandpaul Ghat downwards, and his Plan for conducting every part of the Excavation.

On the 18th November 1824, the Canal Committee addressed a Letter to the Secretary to the Government, transmitting a copy of Major Schalch's Report to them, with their observations thereon, upon the subject of the Canal operation. They express their extreme regret in regard to the Canal to Diamond Harbour, that, after all the trouble and expense incurred, Government should come to the determination of postponing the prosecution of that important Work.

On the 24th December 1824, the Secretary to Government addressed a Letter to the Canal Committee stating, that he was directed by the Governor General in Council to acknowledge the receipt of their Letter of the 18th ultimo, together with the Report and Plans, and to communicate to them that the Survey of the proposed line of the Diamond Harbour Canal appeared to have been executed by Captain Taylor in a very satisfactory manner, and that His Lordship in Council saw no reason to think that the benefits of that Work, or the facilities for executing it had been overrated—but that, since at present neither the services of Captain Schalch nor those of Captain Baker were available for the Work, it appeared, independently of financial considerations, expedient to postpone it. It appears that the services of Captain Schalch and Captain Taylor had been placed at the disposal of the Commander-in-Chief, and Quarter Master General. Upon what service Captain Baker was employed does not appear.

Appendix (H)
page 18, para. 48.

Appendix (H)
No. 28. a. page 20.

Appendix (H)
No. 29, page 26.

Appendix (H)
No. 30, page 36.

12 SECOND REPORT OF THE COMMITTEE ON THE

The Letter proceeds to say, that the early completion of that part of the Eastern Canal which runs through the Salt Water Lake, appeared to be an object of very considerable importance, even though the rest of the Work should be suspended—that His Lordship in Council concurred, however, with the Committee in thinking it advisable, if practicable, to carry on the General Plan on a modified system of operation—but he regretted, that it was impossible at the present moment to spare the services of Lieutenant Prinsep for the purpose, and that Captain Schalch's attention must be, for a time at least, exclusively directed to the duties he had to discharge under the Orders of the Commander-in-Chief. Unless, therefore, the Committee should be able to find a substitute for Lieutenant Prinsep among persons not in the service, His Lordship apprehended that the scale of operations in the ensuing year must be restricted within still narrower limits than they contemplated.

After Major Schalch's death, Captain Taylor was requested by the Canal Committee, on the 25th March 1825, to obtain from the Executors of Major Schalch, all Papers, Documents, Plans, &c. relating to, and connected with, the Iron Bridge Department, which might be found among his Papers; and on the 11th April 1825, Captain Taylor forwarded to the Canal Committee various Maps, Plans, &c. which he had received from the Executors, and also the Private Journals of Major Schalch, which were entrusted to him for examination, in order to ascertain if they afforded any information likely to be useful to Government.

On the 21st March 1825, the Canal Committee inform the Secretary to Government that they have not been able to meet with an Uncovenanted person qualified to undertake the Eastern Canal Works.

On the 3rd November 1825, the Canal Committee wrote to Lieutenant Prinsep, putting certain questions to him relating to the Canals carried on under his immediate Superintendence in the neighbourhood of Hoseinabad. Their Letter is signed by Captain Taylor, who it appears had become Officiating Secretary to the Canal Committee. On the 8th December 1825, Lieutenant Prinsep returned an answer to the above queries.

In a previous Letter to the Committee, of the 13th November 1825, Lieutenant Prinsep had suggested the advantage that would accrue from his personally visiting the seat of his former operations at Hoseinabad, to ascertain the present state of the Work left unfinished after the season 1824; and in his Letter of the 8th December 1825, he says that, if his avocations in the District of Chittagong, where he then was, allowed him the leisure, he should in no way grudge either the trouble or expense of a visit to the spot; stating that the Committee might rely upon his communicating any thing in his power in elucidation of the several points mentioned, and upon his anxiety to gain the information for his own satisfaction.

These Papers being communicated to the Government, the Committee were informed on the 29th December 1825, that Lieutenant Prinsep would be directed to Survey the unfinished Cuts of the Koolna Canal; and on the 14th September 1826, they were informed by the Secretary to the Government, that Lieutenant Prinsep had been directed to place himself under their orders; but on the 9th October 1826, the Secretary to Government, after stating that the Governour General in Council had been pleased to authorise Lieutenant Prinsep to draw a salary of 1,000 Rupees per mensem exclusive of his Military pay, as recommended by the Committee, and to entertain a certain establishment, and requesting the Committee to issue such instructions as might seem necessary to Lieutenant Prinsep, proceeds to in-

Appendix (H) No.
33. c. page 38.
Ibid, No. 33. c. (1.)
Ibid, No. 33. c. (2.)
Ibid No. 33. c. (3.)

Index to Appendix
(H) No. 32.

Appendix (H) No.
35, page 45.

Ibid, No. 43, page
52.

Ibid, No. 37, page
47.

Ibid No. 44, p. 55.
No. 45, p. 57, No.
48, p. 59.

Ibid. No. 50.

from the Committee that the Eastern Canal being a work of the greatest importance, both from its admitted utility, and the return which it was expected to yield for the sums expended on it, would of course claim the earliest attention of the Committee: adverting, however, to the orders which have been received from the Honourable Court of Directors on the subject of this work, His Lordship in Council considers it proper to direct that the further progress to be made in it shall for the present only extend to purchasing the Land, which may be requisite to ensure its ultimate completion, when the numerous advantages of the Work, which have been submitted to the Honourable Court, shall, as is confidently anticipated, have induced them to give their full sanction to the undertaking.

Appendix (H)
No. 50, page 61.

On the 23d November 1826, however, the limitation imposed upon the Committee to limit their progress in regard to the Eastern Canal, to the purchasing the Land that might be requisite to ensure its ultimate completion was relaxed, and the Secretary to Government under that date writes to the Canal Committee, that if any Land be purchased that season, an arrangement may be made for continuing the Canal progressively to the Westward.

The Committee acted upon this suggestion, but the part of the Canal approaching to Hosynabad was not finally completed according to Major Schalch's design.

The part called the Bhowanipoor Canal was to fall into the Gobra Khal, and from thence was to be continued by what was, and is now, called the Bayley Gunj Canal to the Chandpoor Khal, where it joins the Kulwar Khal—The Gobra Khal and Kulwar Gunj communicate with the Sea, forming a junction at the Colsha Khal—The Hosynabad Canal was to bring the water of the Ishamuttee, or Juboona, River, into which the tide rises, into the Bayley Gunj Canal, where it joined the Kulwar Gunj, which as above said, is the continuation of the Chandpoor Khal, and its communication with the Sea.

It appears from Captain Prinsep's Letter, dated Chittagong, 8th December 1825, to the Secretary of the Canal Committee, that he was aware that "the closing the head of the Western branch of the Hoistullah "Avanya, [or Kyontullah Doanya, otherwise called the Kulwar Gunj,] below the origin of the Bayley Gunj cut, formed a part of Major Schalch's "scheme."

Ibid.—No. 43.
Section 4, page 52.

It appears from Major Schalch's Minutes, dated 12th December 1823, that it was his intention to close the Kulwar Gunj, on the Southern side of the Canal, by doing which the tide from the Juboona would enter the Canal, and would meet the tide from the Gobra Khal, left open to supply the Canal with water.

Ibid.—No. 24. a.
page 135.

The object of thus shutting out the tide coming up the Kulwar Gunj was to meet an objection arising from fears, which Major Schalch thought not without foundation, on the part of the Inhabitants of the banks of the Juboona River, that a body of Salt Water would, on opening the Canal, enter that River, greatly to the detriment of the adjacent country. Major Schalch thought, that, by leaving open the Gobra Khal alone, the water would flow from the Canal into the Juboona, impregnated perhaps in a slight degree with Salt, but not in a degree to affect so large a stream; should this however be found to be the case, it would become necessary to bund the Gobra Khal, in the same manner as the Kulwar Gunj, and allow the Canal to be supplied from the Cheetpore Khal, still further to the Westward.

Ibid.

It does not seem to have been apprehended at that time, that any such accumulation of sand by silting would occur in the Bhowanipoor Canal, as to render a rush of water advisable for the purpose of clearing it.

In the Letter of Captain Prinsep above-mentioned, he appears favourable to the carrying out Major Schalch's determination to close the head of the Kulwar Gunj. He feared that without this Bund the tide would meet in the centre of the Bayley Gunj Canal under the most unfavourable circumstances, as the Cholkounee sand-bank must become the point of collision. This case, he says, or a modification of it, must be of most frequent occurrence in the series of cuts. The Bund referred to, if made, would of course annul the objection, and might contribute still further to the advantage of the Canals by insuring a set of tide which it was highly desirable should be uniform, even as far as the Bairmarree Khal, or Choumoooh. It might also furnish the opportunity of diminishing the enormous expense required to empty and complete the excavation of the second Cut (the Bayley Gunj Cut) by affording the possibility of introducing a current of water during the Freshes from the Ishamuttee.

On the 26th October 1826, Captain Prinsep states, that he had already visited the Hosynabad and Bayley Gunj Canals—that the former had suffered from the sliding of its Banks, by which 4 to 5 feet of its depth had been filled up—that this filling up was not of material consequence, inasmuch as there would be more than sufficient current, when the water was admitted from the Ishamuttee River, to clear it out—he states that the Bayley Gunj Cut was in nearly the same state as when he left in 1824—that he expected the Dam mentioned in his former communication of 8th December 1825, would still be found necessary.

It appears that Captain Prinsep delivered in an Estimate for executing the Bayley Gunj Canal, and Dam across the Kulwar Khal, and, in his Report of the 28th August 1827, he states, that, from the difference of time in the arrival of the flood tide at the East end of the Hosynabad Canal, and in the Ishamuttee or Juboona River, and the difference of their elevation at their extreme flood, and his having frequently found that, while the fresh water tide (i. e. in the Juboona River) had fallen only 3 feet, the Salt Water tide had fallen $7\frac{1}{2}$, and that the extreme low water of the Salt tide was one foot more than the Fresh, or more, which circumstances accorded with his former anticipation, he now considered the Dam necessary, both to secure the neighbourhood from the great influx of Salt Water, that might otherwise put them to considerable inconvenience, and as a means to excavate the Bayley Gunj Canal, and procure an uniformity of current through its bed. He had therefore included this work in the scheme and estimate of the ensuing season, and should proceed to make instant preparation, so as to commence in October.

On the 22d May 1828, the Secretary to the Canal Committee transmitted to the Secretary to the Government, a copy of a Letter from Capt. Prinsep, dated 3d of that month, reporting his having been reduced to the necessity of abandoning, for that season, the operations, which he had commenced with every prospect of ultimate success, for closing up the Kulwar Salt River, near the point where it is intersected by the line of Canal constructing under his superintendence. The Committee state, that they had delayed bringing the subject to the notice of Government, till they had ascertained, from Captain Prinsep, how far it would be practicable and expedient, to make another attempt that season towards com-

Appendix (H)
page 52, to 54.

Ibid.—No. 51.
page 63.

Ibid.—No. 57. a.
page

Ibid.—No. 99,
96, 97. page

pleting the Dam, with assistance which he anticipated from certain interested Zemindars. From Captain Prinsep's last communication, the Committee were decidedly of opinion, that it would not at present be justifiable to attempt to prosecute the work. Before the approach of the ensuing working season, the Committee would be prepared to offer, for the consideration of Government, the result of their deliberation relative to the expediency, or otherwise, of reconstructing the Kulwar Dam. In submitting Captain Prinsep's Report, the Committee were anxious to express their opinion, that the failure had arisen entirely from circumstances over which Captain Prinsep could not possibly exercise any controul.

On the 29th May 1828, the Secretary to the Government acquainted the Canal Committee, that the Governour General in Council exonerated Captain Prinsep from blame—that all thoughts however of renewing the attempt at the expense of Government must be relinquished,—and that unless the parties referred to have, or immediately do, come forward with some distinct proposal satisfactory to the Committee and to Captain Prinsep, that Officer should be authorised to excavate the mouth of the Hosynabad Canal without delay. The Secretary to Government intimates a great doubt that the parties interested would agree to bear the charge, since, besides the uncertainty of success, the object in view (a supply of fresh water) could probably be better and more cheaply attained by constructing Tanks.

The Government seem to have considered the preventing the great influx of Salt Water into the Juboona, as the sole object of Captain Prinsep in the construction of this Dam; whereas, upon reference to his Report to the Committee, they would have seen that this was but one, and not the most material, of the considerations which had weight with him—the main consideration being its necessity, from the circumstances he states, to the effecting the excavation of the Bayley Gunj Canal, and the procuring an uniformity of current through its bed—publick objects with which it would not appear that the Zemindars had any thing to do.

It does not appear that any satisfactory proposition was ever made by the Zemindars referred to.

On the 22d August 1828, Captain Prinsep made his annual Report on the Canal operations during 1827-28, in which Report he adverts again, somewhat more fully, to the cause of the unfortunate failure of the Bund across the Kulwar Gunj.

On the 19th September 1829, Captain Prinsep made a Report of the progress made in the different works under his superintendence. Upon the Bhaminghatta Canal, the first Division below the Salt Water Lake, he reports, that the excavations of the year had been entirely successful—that it was then open with Tides which flowed through it into and out of the Lake with some force—and that the manner in which this Canal was laid out by closing all outlets to the South, and thus making the Canal the feeder and outlet for the Lake, would secure the success of this Canal in preserving its depth.

With regard to the next division, called the Bhowanipoor Canal, he observes, that there is a difference of nearly an hour between the first ebb in the two Khals at the two ends, which is likely to induce a set from the Gobra to the Hinshee Khal during ebb tide, which, with the help of the back water in the Bhowanipoor Jheel when opened, and the old Nullah at (*F*), will effectually prevent any considerable stagnation, and consequent sediment.

It would therefore appear, that up to this point, the danger of any considerable silt to lessen the depth of the Canal, had been avoided.

Appendix (H)
No. 101. page

Ibid.—No. 100.
No. 100, a. No.
pages
Ibid.—No. 102.
No. 102, a. 102. c.
page

Ibid.—No. 118.
page

Upon the next section, the Bayley Gunj Canal, his Report is not so favourable in this respect. "The defects of this Canal," he says, "are I believe already fully known by the Committee. The sandy ridge in the centre, where unfortunately the tides meet, has filled by silting to 3 and 3½ feet below high-water mark, although excavated to 6 and 7." He says, "he had brought the uneven parts, where the excavation had been left incomplete and irregular, to an even bottom, 5 feet below high-water mark, and hoped that much would be gained, *when the Kulwar Bund should create an uniformity in the set of tide.*"

He goes on to say, "that he had already stated that the observed tide in the Gobra and Kulwar Khals had an extreme rise and fall of 11 feet, and, as there was no possibility of shutting out one tide, there remained no method of making this Canal an useful tide passage but by again shutting up the two ends, and excavating it to low-water or near that level—that the defect of silting would still remain to this Canal, as he could not devise any means, within reasonable limits of expense, to provide a head of water in the centre."

It appears from this, that Captain Prinsep continued of opinion that the erection of the Dam across the Kulwar Khal, was necessary to create an uniformity in the set of tide in that part of the Canal, and he refers to the impossibility of shutting out one tide as causing a necessity for again excavating the Bhowanipore Canal to the requisite depth.

Major Schalch had long before stated his opinion, that the Gobra Khal might without danger or inconvenience be also bunded; and it should also seem, that, the two Khals being bunded, the tide from the Soondurbuns would be completely shut out, and the only tide left to flow into the Canal would be that coming up the Juboona River.

Whether this state of things would cause a sufficient flush of water into the Bhowanipoor Canal to clear it from silt, and would prevent the tides encountering each other in its centre, is a question for Engineers to decide; but it appears to your Committee, that, at all events, the completion of the Bund across the Kulwar Gunj was, in the opinion both of Major Schalch and Captain Prinsep, a work of absolute necessity.

On the 15th September 1830, Mr. James Prinsep, who had been appointed Superintendent of Canals on the 23d February 1830, in succession to his brother, Captain Thomas Prinsep, who your Committee have learned had been killed by a fall from his horse, in a Letter to the Secretary of the Committee, submitting a Report on Canal operations during 1829-30, refers to the Reports submitted to the Canal Committee in September 1829, for an account of the several works projected for the then ensuing season, and states that the operations of the season were prosecuted in accordance with this Plan, and the greater portion of the work laid out had been accomplished.

He annexes an Abstract of the year's expenditure, and recapitulates the several items; after which he proceeds to explain the circumstances of each.

Of the Bhamungatta Canal, he Reports that the small portion which had remained unfinished was completed at the time of his first visit to the Mofussil Canals in March, when he ordered the Bunds to be cut away—he states that the Cut called the Bhojdiggee Canal, had been very successful, as it carried the strong tide of the Kantatullah Khal through it, so that there was little danger of its becoming filled up. He states, that the tides of the Kantatullah or Tardah Khals, were nearly simultaneous, so that they met in the new Canal; but as the numerous outlets of the Eastern half of the Lake, which were bunded during the excavation, could easily be re-

opened should the aspect of the Canal render the stronger Current advisable, he did not think it expedient to propose to throw a Bund across the Kantatullah, as had at one time been suggested by the late Superintendent.

He states of the Chytal Canal, a short Cut recommended by the late Superintendent as a substitute for a longer route through very unfavourable country, proposed by Captain Schalch—that the Cut was sanctioned by the Committee, and nearly two-thirds completed before he received charge—that were the direction taken passed through a Jheel it was intended to excavate to the depth of fourteen feet, but that the water rose so rapidly that this, with other circumstances, induced him to direct the Bunds to be partially cut away in April, leaving the average depth below the bed of the Jheel six feet—that in May he found the Cut very serviceable with a depth of seven and a half feet at high-water, and a strong flood current setting through it from the Choumoooh to the Akratullah Khal and vice versâ with the ebb—that notwithstanding the sandy spit, the rapidity of tide would keep it open, and even tend to cut it deeper—that it passed through cultivated country, and that the largest Boats would find ample water to enter it at the only time when the tide would carry the Craft up or down the Canal; and that at any rate, the choice of passing by the other route remained—that he saw no reason therefore to recommend that the Chytal works should be then resumed, except in so far as was necessary to clear the passage from Bunds, and throw it more completely open to the Currents to and fro of the tide of the Bayley Gunj Canal—he reports that it seemed to him very essential, that the whole line should be completed in one season, as otherwise the higher level of a part of the bed might be expected to spread its contents over that newly excavated, for the Soondurbun alluvion was of so soft a nature, that when moistened with water, it acquired a level like treacle or pitch—that the season unfortunately was unpropitious, hardly once allowing the surface of the ground to be thoroughly dry before the cutting commenced—that from the sliding in of the Banks in these places, and the oozing of sand from below where the section traversed a stratum of sand, it was found impracticable to maintain an excavation of more than $2\frac{1}{2}$ feet in the muddy section, and 4 feet in the sandy—that the rest of the Bayley Gunj Canal maintained the full depth required of 10 feet below the surface, or high-water level, of the country—that there were then 875 feet run of this Canal still unexecuted to the requisite depth by from 3 to 4 feet—that he was by no means confident of the practicability of deepening such a soil in a permanent manner—that this Canal had already been once filled in since it was executed by Major Schalch in 1824-5,—and that he was inclined to attribute this as much to the oozing upwards of the sandy matter of the soil, as to the operation of silting or deposition of matter held in solution by water which passed through with less velocity on account of the simultaneous tides of the Kulwar Gunj and Bundbeebee Khal.

Your Committee do not find upon Captain Prinsep's Map of the Soondurbuns any run of water denominated the Bundbeebee Khal, they therefore apprehend by this must be meant the Gobra Khal above-mentioned, to which this description applies.

Mr. Prinsep adds, "I would here beg leave to remark, that the Plan of damming up the Kulwar Gunj appears to have been very judicious in theory; as from the large body of water in the Ishamuttee as well as from its connection with the Ganges, there is a powerful ebb current passing hence through the Hosynabad Canal, which would have served to keep both that and the Bayley Gunj Canal open had the Kulwar Dam been experimentally successful. It is the failure of this bold measure

Appendix (H)
page 110.

Ibid.—page 111.

“under the skilful and indefatigable exertions of my predecessors, which, together with the large outlay, prevents my recommending a renewal of the attempt.”

Appendix (H)
page 112.

Mr. Prinsep goes on to observe, that experience had long since proved that Captain Schalch's scheme of a permanent line of Canal crossing the upper ramifications of numerous tide-ways cannot be maintained in such a soil as that of the Soondurbuns with sufficient depth for the Navigation of large Boats; while ample evidence has been afforded that it must soon become a series of tide Channels, passable only at high-water; but he adds, that as long as the apex, if he might so term it, of each section was situated at such a distance from the last as to occupy the period of one tide nearly in the passage of a Boat from one to the other, there would be no great disadvantage in such a system, and to illustrate this proposition, he gives in figures a disposition of the Tide navigation of the line of Canals as far as the Juboona River, showing the number of hours for the passage through the different Channels and Cuts, and for waiting for the change of tide; the result of which is, that starting from the Eastern Canal through the Lake and passing the Bhaminghatta Cut before the tide has fallen too low, you arrive in 12 hours at Chytul, where there is cultivated land to pass the night, and in 12 hours more, being the 2nd day, at the mouth of the Coxalee or Goodlad's Creek, having passed Hosynabad and descended the Juboona River—In this scheme he takes no account of the wind, and moreover has supposed the craft heavy and of considerable draft; with a light Boat, he says, and a favourable wind, the same space may be traversed even in a single day—still it must be confessed, he continues, that nothing is gained in point of velocity by the new route, although one-third shorter than the old Soondurbun passage, for the same tides partially employed in the one case will transport a Boat over the longer distance with equal facility, and he gives a Division of the Navigation by the old route starting from the Eastern Canal and proceeding by the Attra Banka Khal to Rampoor, thence descending to the Roymungul Khal and ascending the Nowyee and Burra Kooleya to the mouth of the Coxalee or Goodlad's Creek, the common point of destination by both routes, which is accomplished by the old route, being a distance of 64 miles in 22 hours without stopping, and by the new route being a distance of 46 miles in 34 hours, whereof 24 are employed in the Navigation, and 10 are passed during the night in the cultivated Land of Chytal. Hence it appears, says Mr. Prinsep, that there is a loss of a whole day (i. e. of 12 hours) in pursuing the new route for all Boats of considerable draught, yet capable of using oars such as Bauleahs, &c. Heavy Boats of burden would probably employ 2 tides in reaching Attara Banka, and thus perform the lower passage in the same time as would be taken in the Canal route. On the other hand, the advantages of the Navigation are such as to ensure it a preference over the deep and dangerous streams of the Soondurbun Forests, even at a little loss of time for the frail Boats which ply from the Eastward, laden with wood, Lime, Fish, Rice, Mats, Thatch, Vegetables, and Passengers.

Thus from Mr. Prinsep's statement it appears, that to the heavy Boats of burden no time would be lost, and to the lighter craft the time lost would be more than compensated by the comparative security. Mr. Prinsep appends a statement (Appendix E.) by which it appears that in the first 21 days of September 1830, an average of nearly 200 Boats per diem passed through the Bhamungutta Canal, and consequently through the whole line, or at least from the Mundaree, varying in size from the Dingee to the 1,000 mds. Pulwar during the month of September, when it must be remembered

that the whole Navigation of the Ganges is diverted from the Soondurbun route, so that it may be expected that the traffick by the Canal will be at least doubled in the dry season. It will be observed that of those 200 Boats per diem, between 34 and 35 per diem were Boats of the large description, and about 24 of middle size, making of these two descriptions together, about 59 or 60 out of the 200, the remainder being Dingee Boats and Saltee Boats, so that at this early period the traffick of all descriptions of Boats by the Canal was very considerable, even during a month when the navigation from the Ganges by the Hoogly for the whole of its course was open.

It is almost certain therefore that this traffick was chiefly supplied from the Eastward, and that the Canal was much used by the larger description of Boat. Your Committee will hereafter lay before your Honour evidence of the amount of the traffick at the present time.

It appears by a Letter from Mr. J. Prinsep of date the 3d December 1830, that, at that early period the greater part of the navigation had been attracted into the New Channel, that he encountered Boats of the largest size on his route, that the Wood Boats from the Roymungul told him that they saved 3 days from their trip, besides the diminution of danger.

In that letter Mr. Prinsep says, that he had deferred writing until he should have revisited the Kulwar Gung, and thus be better prepared to give an opinion upon the subject of the proposed Dam, i. e. the Dam proposed to be erected in lieu of the one attempted by Captain Prinsep which had failed.

He states, that he had already expressed his sentiments to the Committee, that the design was judicious, but that the difficulty of execution and expense appeared to counter-balance the advantages to be hoped for from its accomplishment.

He says, that the question of the Kulwar Dam, resolves itself into the more general one, whether the new Navigation shall be that of a real Canal or of a system of tide passages, as at present.

To render it the former, he says, would involve an expense of full 50,000 Rs. upon the 3 large Bunds, besides their constant protection from accidents.

To retain the present system would cost no further trouble, excepting in the unavoidable repairs which would be necessary in either case, and in the completion of a sufficient tracking path to aid the Boats in stemming the stronger currents.

He was inclined, therefore, still to recommend the Committee to leave the works as at present, at least for a year or two. A further Letter from Mr. Prinsep of the same date, stating some small outlays which he recommended, appears to close his correspondence with the Canal Committee, who, on the 20th December 1830, made over their Records to the Military Board, agreeably to the orders of the Governour General.

Upon the Papers respecting the Circular and Soondurbun Canals being transferred to the Military Board, Lieutenant Col. Galloway in a long Minute expressed himself dissatisfied with the whole project, as defective in design, as holding out no advantages commensurate with the cost, as attended with considerable injury to the Navigation of the Hoogly below Calcutta, and by no means altogether free from danger to a portion of that City.

He goes into a full detail of his reasons for these opinions, and he concludes by stating, that he conceives that the Board has but one duty to perform, and that is to express their decided opinion that the work should be immediately suspended, not merely as Mr. Prinsep designs on the

Appendix (H)
page 129.

Ibid.—pages 129-30.

Ibid.—page 130.

App. to App. (H)
pages i. to x.

Eastern branch thereof, but throughout the whole line of operations from the Hoogly Eastward, that is including the Circular Canal.

App. to App. (H)
pages x. & xi.

Sir Thomas Anburey, the Chief Engineer, merely states that he feels considerable difficulty whether the work ought or ought not to be prosecuted.

Ibid.—page xvii.

But in a separate Minute of date 12th February, he expresses his decided opinion that the Circular Canal ought to be prosecuted to completion, and that the Eastern Canal might be allowed to remain as it was.

Ibid.—page xi.

Lieut. Col. Craigie goes into the question at some length, and, as appears to your Committee, with great judgment. He states truly that the chief advantages, that seem to have been gained by the construction of the works in the Soondurbuns, appear to consist in the diminution of danger from the avoidance of some of the largest Rivers—he might have added from avoiding the passing through savage wildernesses inhabited only by tigers, and destitute of fresh water—and in facilitating communications with particular points in the Soondurbuns.

These appear to your Committee no small advantages.

He refers to the greater part of the Navigation having been attracted into the new Channel, and he concludes, that, from the great difficulty of constructing real Canals in the Soondurbuns, and consequently the little benefit in respect to time derived in pursuing the new route, he thinks it judicious to defer the further prosecution of Major Schalech's Plan for the present; but these considerations did not appear to him to justify a discontinuance of the prosecution of the Circular Canal; on the contrary he would urge the prosecution of it with the utmost energy.

Ibid.—pages xv. & xvi.

Mr. McFarlan agrees in these opinions, and by Letter, of date the 22d February 1831, addressed to the Honourable Sir T. C. Metcalfe, Vice President in Council, the majority of the Board expressed their concurrence with Mr. Prinsep in the expediency of discontinuing the prosecution of the Eastern Canals beyond the point they had then reached, and of leaving them in their then state *for a year or two, when a criterion might be formed of their success*, during which period, however, some expense might be advantageously incurred in the clearing and smoothing of Towing paths.

Ibid.—No. 15,
page xix.

A majority of the Board also concurred with Mr. Prinsep in the expediency of carrying on the remaining part of the Circular Canal to completion, with the utmost vigour.

Ibid.—No. 28,
page xxii.

In a Letter of the 15th April 1831, Mr. Prinsep informs the Military Board, that having, whilst in attendance upon Lieutenant Col. Tickell, Superintendent of Publick Works, in his visit of inspection to the Mofussil Canals, having had the opportunity of making personal inquiries upon the points referred to them by the Military Board, the information gathered on the spot agreed with the deductions already made, the results of which information he states; and he concludes by saying, that upon the whole the Board would perceive that no time was gained under ordinary circumstances by the Canal route, and that the advantages offered to the Navigation were altogether of another nature, upon which he says he was not called upon then to express his opinion.

Ibid.—No. 26 and
No. 26 b., page
xxi.

It appears, from a statement returned to the Military Board by the Collector, that the number of Boats of all descriptions, which had passed through Tolley's Nullah during the same months of September to March inclusive, amounted to 102 per diem.

Ibid.—No. 28 a.,
page xxiv.

It appears, by an abstract framed according to a Register kept under Mr. Prinsep's direction at Kantatullah for the same months, the average of Boats of all sorts per day passing by the new route to Calcutta was 91, and

from Calcutta 177, making together 268 per diem; being greatly more than stated in Mr. Prinsep's Letter. Of these it appears from the Register that 32 per diem were large Boats above 300 mds.

So that, even at that time, a decided preference appears to have been given to the new route.

It appears that Lieut.-Colonel Tickell, Superintending Engineer L. P., in compliance with the instructions of the Military Board, inspected the New Line of Canals from Hosynabad to Calcutta, accompanied by Mr. J. Prinsep.

His Report of the time necessary to this navigation, and of the State of each part of that Canal at that time, is contained in his letter to the Military Board of the 19th April, 1831. The results he comes to coincide with Mr. Prinsep's. He says that the New Line of Canal is adapted only to the navigation of boats not exceeding 1000 maunds burthen, to which he conceives it affords a communication preferable to that by the old route by the Soondurbuns, in the first place, by avoiding the Roymungul and other dangerous points of the Channel,—secondly, by the small depth of water in which they would be emersed in the event of meeting with an accident, so that the boat and cargo are comparatively secure,—and, thirdly, by the frequent occurrences of cultivated country and villages on the line, instead of the continued jungle which is met with on the old route.

He says, that in point of time little or nothing is to be gained, except perhaps by Boats which can row against tide—the ebbs and floods being all much more gentle than in the great Soondurbuns. The line of Soondurbun Canals, he adds, is open both to Tolley's Nullah and the Lake exit, and so far may be considered apart from either of these. The preference he says must be given to the Lake route by Fish Boats, and all in fact bringing goods to the Calcutta market, as it will enable them to land their cargoes in the very Town—The remainder, including heavy laden Boats, resort to Tolley's Nullah, the Eastern Canal not affording at present a sufficient depth of water; but, when the Circular Canal is completed and opened to the river, it is but reasonable to expect that the new route will attract most of the Craft passing through Tolley's Nullah, which will then most probably be used only during the period of the rains, when the Chitpore Locks will be closed against the Navigation during 2 or 3 months—He considers the new line to be as fully and freely navigable then, in 1831, as it could well be made for the passage of Boats not exceeding 1000 mds. burthen, and that, by the Register kept by Mr. Prinsep, it seemed to be used and preferred by them—that it was consequently of considerable publick utility, and that the expense of maintaining it so did not promise to be incommensurate with such a beneficial result.

This Officer, therefore, did not agree with Lieut.-Col. Galloway in his opinion with regard to the defective nature of the original design, or of its total failure in regard to the advantages contemplated; and from the evidence to be presently submitted to your Honour, it will appear that the opinion of Col. Tickell has proved to be well founded.

It will be observed that the chief, and indeed the only defects, which prevented the advantages of the new route being much more extensive, consisted in the Canal not affording by its original construction a sufficient depth of water for the larger boats, and the deficiency of means to prevent it from silting up in some places.

It should seem to your Committee to be a matter deserving of immediate and accurate investigation, whether these defects cannot be altogether, or at least in a very important degree, removed.

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No. 37. a page xxx.

The then actual advantages of these Canals are well set forth in a Letter from Mr. J. Prinsep to Lieut.-Colonel Tickell of date the 5th May 1831, in which he says, that, judging from the Registry of Boats passing through the new Canals, their success might be pronounced complete; and he only states the cost of the new route as having amounted to two lacks of Rupees.

In this Letter he states their great defect to be, that they cannot be made into a single Canal line on account of the Mundaree Choumook, or into two lines without the expensive measure of Bunding the Kullwar, Gobra, and Kantatullah streams. The expense of making these Bunds he had before estimated at 50,000 Rupees.

The evidence of the large returns at present obtained from the Tolls on these Canals will demonstrate, that it would have appeared wholly unworthy of the patriotick wisdom of this great Government, if its attention had been called to the matter, and would have been considered by any private Company, who had embarked in such a work, wholly inconsistent with an enlarged view of their pecuniary interest, to have hesitated for an instant to incur so small an expense for so great an object.

There does not appear ever to have been suggested by any Engineer Officer, who had surveyed the Canals, any difficulty in this undertaking, or any risk of failure, but what is inseparable from every work of the like nature in the like circumstances; and then the question always is, whether, upon a careful and scientific investigation, the probability of success is such as to warrant the expenditure. Your Committee are compelled to say, that it appears to them very singular, that, in the present case, no measure has been taken to decide this question.

In the year 1836-37, it appears from the Military Board's Annual Report of date 2nd May 1837, that the then "Superintendent had suggested, as a permanent improvement to the Navigation of the Soondurbun line of Canals, the damming up a large Creek called the Gobra Khal (one of the Bunds contemplated by Major Schalch and Captain Prinsep) by which means a considerable body of water would be thrown into it." The Board content themselves with saying upon this in their Report, that, similar attempts on other tide-ways of like character having failed after heavy expense had been incurred, they had received the proposition with caution, and had called for fuller information before they could submit the project with confidence to Government. Whether any further information was obtained, or what was the nature of the information demanded, does not appear from any Report made by the Board to the Government.—But from the Records of their office it appears, that Captain Thomson did furnish them with the further information desired, in his Letter to the Superintending Engineer of the Lower Provinces, of the 12th of April 1837, which will be found in the Appendix. Subsequently Captain Goodwyne made a Report upon the same subject on the 22nd July 1843, which will also be found in the Appendix, but no further step appears to have been taken in the matter. The estimated expense of this Bund was between Rs. 5,000, and 6,000.

The other Bunds which had been contemplated by Major Schalch, Captain Prinsep, and Mr. J. Prinsep, as necessary to the converting these cuts from a series of tide-ways into a real Canal, do not appear to have been suggested to the Military Board, or to have attracted their attention after the Resolution was adopted in 1831, of suspending the further prosecution of the work *for a year or two*.

In a Despatch dated the 19th September 1837 the Governour General submitted to the Court of Directors a correspondence relating to the Eastern Boitacannah and Circular Canals, and to subsidiary arrangements made under

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to App. (H) page
vi.

App. to App. (H)
No. 418½ a. page

Ibid.—No. page

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No. XXXVII and
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the provision of the Act of the Legislative Council No. XXII. of 1836, for the regulation and management of these lines of Navigation, and the measures he had adopted, with the advice and assistance of a Committee of gentlemen, whose names are entered in the margin of this Despatch.

In this Despatch he mentions the sum of one Company's Rupee upon every 100 Mds. burthen as the Toll which had been imposed upon all Boats of whatever description passing through the Canals, and he mentions eight different works which were recommended by the Special Committee he had appointed, whose Report, of date the 26th October 1836, will be found in the Appendix, the first three as indispensably necessary, the remaining five being characterised as great improvements.

First. The construction of an Iron Dredging Boat.

Second. The general repair of Tow-paths and the Bridging of cuts made for irrigation in various places.

Third. The Bunding of the Gobra Khal, to afford the means of scouring the Bayley Gunj and Bhowanipoor Canals.

Fourth. The rivetting the Main Drains from the Circular Road to the Canal, to prevent the influx of silt.

Fifth. The widening of the Balliaghatta Canal from the junction of the Circular Canal to the extent of 20 feet.

Sixth. The excavation of a Basin at the Salt Water Lake, capable of holding 500 Boats.

Seventh. The closing up of the Kamckera, otherwise, as your Committee understand, called Kamapookerya Khal, with a view of preventing the formation of a bed of sand at the entrance of Tolley's Nullah (meaning at the entrance of this Khal into Tolley's Nullah) and

Eighth. The Dredging out one mile in length of Tolley's Nullah.

The Governour General goes on to say that the gradual adoption of all these works was approved of—that the Military Board was directed to submit Estimates of them—and that the immediate execution of two of them, the Dredging Boat and Basin, was authorised—but the Basin was limited to contain 100 or 200 Boats at an expense of Rs. 10,000 instead of the projected expense of Rs. 21,474.

These works, the Dredging Boat and the Basin, were accordingly executed; but your Committee see from the Military Board's Report that the Dredging Boat was a failure, and has since been sold.

Your Committee have not found any evidence of an estimate of the expense of the other works having been submitted by the Military Board to the Government. The trifling sums layed out on the Tow-paths, whether including the Bridging of any cuts made for irrigation or not does not appear, will be presently stated.

No attention appears to have been paid to the order of the Government for an Estimate of the expense of Bunding the Gobra Khal; nor to the like order for an Estimate of the expense of widening the Balliaghatta Canal. These works approved by the Government as either essentially necessary, or as important improvements, were specially connected with the Soondurbun Canal; but have been left from that time to this, nearly 9 years, without further attention being paid to them.

The following is the amount of Tolls collected on the Calcutta Canals, exclusive of Tolley's Nullah, during the years undermentioned, showing the

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105.

amount of imposts, which, according to the enlightened opinion of the Governour General in Council, recorded on the 20th of March 1823, the Government were bound to "*regard less as a source of direct profit than as a fund to meet the charge of maintaining and extending the Channels of Commercial intercourse,*"—and, therefore strictly applicable to the improvement and completion of this Canal: viz.—

From the 1st of Nov. 1836, to the 30th of April 1837, Rs. 44,778 : 4 : 6.

For the year ending 30th April 1838, Rs. 90,633 : 0 : 0.

During the above two periods the rate of Toll was 1 Rupee per 100 maunds burthen.

From this period the rate of Toll was reduced to one-half or eight annas per 100 maunds burthen, which it was thought the rapidly increasing number of Boats authorised, and indeed demanded.

In the year ending the 30th April 1839, the amount of Tolls received was Rs. 37,406 : 3 : 4. But such was the increased traffick, that the Toll at the reduced rate soon came to exceed what it had been at the higher.

In the year ending the 30th April 1840, the Tolls amounted to Rs. 71,467.

In the year ending the 30th April 1841, the Tolls amounted to Rs. 1,03,364.—

From which time they have gone on rapidly increasing, till, in the year ending the 30th April 1845, they amounted to Rs. 1,38,745—showing an amount of nearly Twenty-eight millions of maunds, or One million of tons, brought by 86,060 boats.

Previously to the improvement of the Lake Channels by Major Schalch, and the construction of the Circular Canal, the Traffick which came up Tardah Nullah and the Lake Channel to Balliaghat averaged about Two millions of maunds, or 72,000 tons per annum, and yielded, at a considerably higher rate of Toll than the present, Rs. 17,797.

It appears that the average annual Estimated repairs to the Circular Canal, during the last eight years ending the 30th April 1845, has amounted to Rs. 6,065 : 4 : 7, and the average during the same period of the General Current Expenditure, including establishment, Dredging expenses, petty Repairs, and Miscellaneous charges, has amounted to Rs. 23,513 : 10 : 10. This includes the aggregate expenses of Tolley's Nullah, and the Circular Canal which are under the same management, having one office establishment and other items of expenditure common to both.—But the above sum includes the expense of Tow-paths on the Soondurbun Canals, an item separate from the expenditure on Tolley's Nullah, and which must be deducted, being upon the above average Rs. 704 : 13 : 3 per annum, leaving a balance for the aggregate expenses of Tolley's Nullah and the Circular Canal of Rs. 22,700 : 6 : 2. Of this, one-half may be stated against the Circular Canal, being Rs. 11,350 : 3 : 1—This sum added to the Estimated repairs above mentioned, and to the said sum of Rs. 704 : 13 : 3 as the average annual expense of Tow-paths, shews a total expenditure of Rs. 18,120 : 5 : 2 incurred on the Circular Canal.

In the sum, of which the above is stated to be the annual average, are included heavy outlays upon the erection of the Ooltadangha Bridge over the Circular Canal, and the construction of the Balliaghatta Docks, and half of the cost of the Iron Hull of the Steam Dredging machine, amounting in all to Rs. 40,609 : 8 : 6.

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b., page cclxviii.

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The clear annual surplus of the year ending the 30th of April 1845, during which the expenditure somewhat exceeded the above average, was Rs. 1,25,985 : 15 : 0, derived from the traffick to Balliaghat exclusive of Tolley's Nullah. To this is to be added the amount received from Ferries, Fisheries, and Ground Rent, &c., on the Calcutta and Soondurbun Canals, exclusive of Tolley's Nullah, Rs. 2,340 : 14 : 8, and from Rents from Lands along the Circular and Balliaghatta Canals, Rs. 10,837 : 5 : 9, being for that year Rs. 13,198 : 4 : 5, which, added to the above sum of Rs. 1,25,985 : 15 : 0, shows a total clear profit for the year 1845 of Rs. 1,39,184 : 3 : 5, from these Canals.

With this large and increasing traffick, and this amount of surplus Revenue, it appears to your Committee indisputable, that the utmost attention should be paid, not only to the keeping in a proper state, but to the improving by all necessary works, the whole of this important line of Canal; and they think it their duty to bring to your Honour's attention the smallness of the sums, which of late years have been expended upon the *Soondurbun Canals*, and the total want of attention paid, they regret to say, to the necessary repairs, and the keeping them in a navigable condition.

From the Military Board's Annual Report of the 13th March 1835 it appears, that, during 1833-34, the sum expended upon these Canals was Rs. 442 : 11 : 7.

By the Report of 3rd May 1836 it appears, that the only expenses incurred on the Soondurbun Canals was, on the keeping the Tow paths clear of jungle.

By the Report of 2nd May 1837 it appears, that no outlay was incurred on the Soondurbun line of Canal, beyond a charge not exceeding Rs. 867 : 11 : 4 for the same purpose.

In the Report 31st August 1838 the Board state, that regarding the Soondurbun Canals they have only to report, that they believe them to be much in the same state as last year—that they have passed but one bill for making Tow-paths to the extent of Rs. 773 : 5 : 3—and have no estimate of any further expense before them.

In the Report of 1st May 1839 they state, that the Tow-paths through the Soondurbuns had been ordered to be repaired, and cleared, and maintained in proper order, at an expense of 773 : 5 : 3, which your Committee presume means the sum above-mentioned, and which they state to be less than for former years.

If so, nothing at all was laid out this year.

In the Report of 8th September 1840 your Committee observe, that the Soondurbun Tow-paths are stated to be repaired and cleared at a cost of Rs. 497 : 0 : 3.

In 1841, and 1842, and 1843, the Annual Reports make no mention of the Soondurbun Canals at all.

In the Report of 1844 an Estimate, amounting to Rs. 4,368 : 4 : 6, for cutting down jungle, repairing and making Tow-paths, &c. is stated to have been recommended by the Military Board to the Government. This recommendation proceeded upon a Survey and Estimate by Captain Goodwyn, under the order of the Military Board, of the repairs and improvements immediately necessary on the banks of the Canals, in repairing old and making new Towing-paths, cutting Jungle, and Bunding small Nullahs and Watercuts which obstructed them, and driving piles in some places where necessary to secure the banks; this being the first Survey and Estimate of the sort required or made, so far as your Committee has discovered, since these Canals were placed under the Superintendence of the Military

Appendix (J) No. XVI. a. page 105.

Ibid.—No. XXIII. a. page 112 & No. XXIV. a. page 114.

Addenda to App. to App. (H) No. III. a. page iii. Ibid.—No. IV. page iii.

Ibid.—No. V. p. v.

Ibid.—No. VI. page vii.

Ibid.—No. VII. page x.

Ibid.—No. VIII. page xi.

Ibid.—Nos. IX. X. and No. XI. pages xiii. to xv. Ibid.—No. XII. page xvi.

Board. They were at once sanctioned by Government, and the repairs and new works were executed, under the Superintendence of Capt. Goodwyn, at a cost rather less than the Estimate, which cost forms a part of the General Expenditure of 1845. This is the first outlay amounting in any one year to £100 sterling upon these extensive and important Canals. The average annual outlay for 9 years ending 30th April 1845, including the above sum of Rs. 4,368:4:6, appears to have been Rs. 722:14:10,—no expense but what is included* in this average having been incurred on these Canals during the six year's preceding the commencement of the above period, when the Canals first came into use, i. e. in 1830-31;—but, if these six years be considered as added to the nine years already noticed, the average for 15 years will amount to Rs. 433:12:4.

In the Report of 1845 no mention is made of any outlay, or projected outlay, upon these Soondurbun Canals.

Capt. Boileau, in his Letter to the Superintending Engineer Lower Provinces of the 30th April 1842, states the length of these Canals from the city of Calcutta to the Juboona River, under his Superintendence, to be 50 miles. Although this most intelligent and active officer is, as he says, supposed to have the Superintendence of the whole of these Canals, he says, that, since he received charge of this office from the late Capt. John Thomson in February 1839, he has not found leisure to visit any of the Mofussil Canals, and he rather thinks that his predecessor was in a similar predicament for the two years preceding the time of his being relieved by him. "In fact" he says "the duties of my different offices in Calcutta are onerous, and require such incessant attention, that, during the last two years I have not, to the best of my recollection, slept out of the Canal Office for one single night."

It is evident, that an Officer so overwhelmed with other duties could not bestow an efficient Superintendence upon these Canals; which amounts to saying, that a Canal, upon which little less than £ 14,000 sterling per annum was levied from the publick in Tolls, no superintendence whatever was bestowed upon, in order to keep it in a state of efficiency for the purposes of commercial intercourse.

Capt. Boileau, after stating some material information regarding these Canals, which he had obtained from his predecessor Capt. Thomson, and also a proposition of Mr. Heatley's, an extensive Soondurbun proprietor, all which will be found in his Letter, states, that he had proposed paying a visit to the Soondurbuns for the purpose of examining the Mofussil Canals, but had never yet found an opportunity of doing so, nor did he see a prospect of his being able to do so; and he thinks that it would be advisable to attach another Overseer to this department to look after these Canals, or rather to supply an Assistant of a superior grade, who should understand Surveying, the taking of Levels, &c.

It will be observed that this representation was made more than four years ago, but your Committee have not found any mention of the appointment of such an Overseer or Assistant.

In a subsequent Letter to Major Fitzgerald of the 11th May 1842, in answer to a question put to him on the 13th May 1842 by that Officer, whether if the proposition made in Capt. Boileau's Letter of the 30th April were sanctioned, it would enable him to visit his distant Canals, and superintend any work that might be required to improve the navigation of them, Capt. Boileau says, that he greatly fears that even the appointment of an additional Overseer to look after these Mofussil Canals would not enable him to leave Calcutta for a sufficient time to Superintend, in an efficient manner, the execution of any works that might be required in those parts.

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page 141.

* An Estimate amounting to Rs. 813:7:8 passed in 1834-35 was charged in 1837—See Addenda to App. to App. (H) page vi. para. 21 and App. I. page 57 & App. J. page 107.

Addenda to App. to App. (H) page xvi No. XIII.

App. to App. (H) No.

Ibid. No.

On the 16th May 1842, Major Fitzgerald, the Superintending Engineer, forwards to the Military Board the correspondence between Capt. Boileau and himself upon the subject of the Eastern Canals, "from which the Board would perceive, that the Superintendent had not been able to visit them since he received charge of his office." "Presuming" he adds, "that this is a state of things which the Board is desirous to see rectified, I shall, in my promised Report, make some proposition for the Board's consideration, with the view of enabling Capt. Boileau to afford an efficient superintendence to the duties of his substantive appointment." He had previously stated that he had proposed to submit the observations he had made in a late passage through the Eastern Canals, for the consideration of the Military Board, after concluding the other Reports which he had then in hand.

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On the 27th May 1842, Major Fitzgerald submits to the Board his promised observations regarding the Eastern Mofussil Canals, and Capt. Boileau's management of the same. Major Fitzgerald had himself come by these Canals from Hosynabad to Calcutta, starting on the 28th of March then last. He states the particulars of his progress, and the state of each particular Canal which he passed through. He reports favourably of the Hosynabad Canal; but of the Bayleygunge Canal he states, that he looks upon it as a failure, and that it can never be rendered efficient, unless the original intention of the projector is carried out and the Gobra Khal bunded up. He gives his reason for this, and for thinking that if this were done, that Canal would probably become a navigable tide Nullah. He says, that he is aware that a considerable sum of money was some years ago expended in an unsuccessful attempt to close up the Gobra Khal, but that perhaps the large Revenue derived from the Tolls might admit of another attempt being now made to effect so desirable an object to the improvement of the navigation through the Soondurbun Canals; but that, if this is not attempted, he cannot recommend any expenditure being incurred to make the Bayleygunge Canal navigable by excavation,—that it would need such expenditure yearly, and would have to be closed up just at the time that it would be required—that, on account of the alternation of tides, it would never be a satisfactory Channel,—that the line of this Canal is the best that could be taken for this navigation, but that its efficiency is entirely dependent upon the closing the Gobra Nullah, and, if that cannot be done, Boats must go round by some other course, as they now do, to the Bhowanipore Canal.

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pendix (H) No.

He reports favourably of the other parts of the Canals, except the Bhamingattah Canal, which he says is not navigable for boats of burden at low water. He complains much of the jungle which obstructs the Tow-paths, and of one place where there appears to be no Tow-path at all, where he was enabled to proceed slowly by pulling against tide, but where a heavy boat would have had to stop; whereas, by being enabled to proceed against the stream for a short distance by trackings, he would sometimes save the delay of a whole tide. He says he is quite aware that what he has said of the Canals is very imperfect, and that a much more detailed account of them is required,—that it is true that he passed through them in not a very light boat, and reached Calcutta in 30 hours from Hosynabad, but this was done under the favourable circumstance of a strong spring tide—that during the neap tides this rapid progress could scarcely have been effected,—and that it is desirable that the state of the Canals at all times of tide should be known, before their general efficiency can be pronounced upon. He concludes by referring, with respect to Capt. Boileau's management of that portion of his duties, to his own statements in his Letters. Major Fitzgerald says that there is not perhaps much that would constantly re-

quire the Superintendent's attention in the Mofussil; but that the Canals should not be altogether neglected: and he certainly thinks, if they are to remain under Capt. Boileau's charge, he should be placed in a position to afford them an effectual superintendence.

Your Committee will close the observations they have to make upon the Soondurbun Cuts or Canals made to Hosynabad, by calling your Honour's attention to some valuable evidence, which they have received upon their great usefulness, and their present state.

Appendix (J)
No. XXVIII,
page 118.

Mr. McPherson, a Soondurbun grantee, states, in a Letter to your Committee dated 8th January 1846, after the outlay of Rs. 4,368:4:6, above-mentioned, that the Eastern Canal from Balliaghatta to Hosynabad is much frequented by Boats not drawing more than 4 or 5 feet; but Boats of a larger description are obliged to take a southern Route, though a great number of the larger Boats pass through the Canal when returning empty. He says, that the distance by the Canal is much shorter and safer; but, as it has not been deepened since it was made, except for a short distance about 14 years ago, it has become very shallow at certain places, which he names, and at which Boats drawing 4 feet can only pass through at high-water—that the Canal there becomes dry even long before low-water—and that, to make the Canal really useful, it would be necessary to deepen all the Cuts from Bhamingatta to Hosynabad. He complains much of the towing paths requiring to be kept clear of jungle, and of the slovenly manner in which this work is now done by hired coolies under the charge of a sirdar; and says, that, to keep the Canal in good order, and the towing paths in repair and free from jungle, European Superintendence is absolutely necessary—that in many places no Boats can track along the line—that he made an offer to Capt. Thomson, then Superintendent of Canals, to keep the Banks of the Kooltee Khal clear of jungle as far as his own land extended, and to allow the use of his own Bunds for people towing Boats, provided the actual expense of clearing the jungle only should be paid; but that the amount placed at Captain Thomson's disposal was so small, that he could not allow more than one-fourth of the sum that the labour would cost. "The whole sum allowed for clearing the towing paths, &c., from Bhamingatta to Hosynabad was only 700 Rs. yearly."

Your Committee understand that this is a distance of 40 miles; and it is certain, from the Reports of the Military Board, that 700 rupees, small as the sum is, was very far indeed from being allowed for this purpose yearly, although, if the outlay of Rs. 4,368:4:6 in one year, 1845, is included, the average outlay of the last nine years will amount to Rs. 722:14:10.

Mr. McPherson says, that one or two Tanks along the line of the *Eastern Canal*, would be of great use—that fresh water is scarce in the Soondurbuns, and travellers depend entirely on the good-will of a few of the Grantees, who have made tanks at their own expence.

He is not aware of any improvement that can be made on the *Southern route* through the Soondurbuns, further than making one or two tanks in convenient places—that the want of fresh water is seriously felt—that many Boats are annually wrecked, and men taken away by tigers, by this route: but that he had only heard of one instance of a man having been taken away by a tiger in the Hosynabad Canal.

Mr. McPherson remarks, that the natural Creeks and Rivers on the line are deep enough for any sized Boats; but, should the proposed Canal from Hosynabad to Koolna be carried into effect (to which your Committee will presently call your Honour's attention) the present Canals

should be made deep enough to allow Boats of the largest draught to pass through; otherwise, on arrival at Hosynabad, they would have to run down the Juboona River, &c., and so on by the present Southerly Route to Calcutta.

Mr. Carey, Superintendent of Narainpore Salt Works, confines his observations, which your Committee regret that he had been compelled to delay transmitting from severe ill health, to the Balliaghat Canal. He states it is now about nine years since he was appointed to Narainpore, and he is happy to state, that the passage from Balliaghat to Narainpore has been very much improved during that period.

"There are still," he says, "near Balliaghat sunken Boats, and Fishermen's stakes, in parts of the Canal which ought to be removed, but nothing equal to what there used to be in former times; and in his opinion if the Canal could be kept free from these, made wide enough at Balliaghat to receive the number of Boats that come in at certain times of the year, when it is so full that the passage is nearly choked, and embankments or bunds made on both sides with the Jungle cut away for tracking boats, the passage up to, and through the Balliaghat Canal might be made as safe and desirable as possible.

However this may be, it appears quite clear that it is not safe and desirable at present.

Mr. Alfred Harris, a Pilot and also a Soondurbun grantee, in his letter dated 13th January 1846, speaks highly of the advantages of the Chitpore Canal, and the Canal through the Salt Water Lake; but he complains much of a want of attention to keeping the Channels (of the Canals generally) clear of wrecks and other obstacles—of the want of clearing away Churs—of the obstructions from the careless manner in which Boats are laid—of the want of European Overlookers to facilitate the Navigation—of the want of Towing-paths and Bridges over Nullahs—of part of the Canals in the dry season being impassable for Boats above 500 maunds, except on spring tides—of parts being in so bad a state that small fishing Boats cannot pass till half-tide. He says, that the passage by these Canals cannot be used by Boats above 800 maunds, except on very high tides, and even then not more than 3 in 10 pass that way, but more generally by the Attara Banka Route. He says, that the exactions that Boats are liable to at the different Chowkies and Thannas, which are added to the Toll Government imposes, deters native Boats from taking the Canal Route—that the Canals in many places from Balliaghatta to Kamer-gatchy are often obstructed for days together by sunken Boats—that all the Tow-paths are in want of repair—that the want of Bridges over Nullahs and quantity of Jungle on the Banks all obstruct the Navigation, which, with very little cost and better superintendence, would be done away with.

This gentleman states, that the traffick by the Soondurbuns via the Attara Banka passage from Koolna, Chittagong, Burmah, Sylhet, Dacca, and all the Eastern Provinces, is immense in the dry season—that it is one continual transit of Boats of sizes varying from 100 to 6,000 maunds, carrying all descriptions of produce—that the greatest difficulty felt on this passage is the want of fresh water, there being none procurable between Shereghatta and Attara Banka, of which place he is the owner.—In answer to the question respecting the dangers of the passage, he says, he should think that the same dangers exist as in 1822, except that there is a resting place in the Jungle passage which was not in existence in that year, where Boats are free from tigers and can remain in safety in bad weather. It should seem, therefore, to be certain, that, with the exception of this one resting place, this passage is at the present moment exposed to all the dangers which are above described; and, although your Committee have not ob-

Appendix (J) No. XXIX. page 121.

Ibid.—No. XXX. page 122.

tained any evidence of the exact nature and amount of the dangers and inconveniences, which exist in the passage from the Juboona River to Koolna, they see no reason to believe that they are in any degree diminished since 1822, any more than those in the Attara Banka Route.

Appendix (J) No.
XXXIII. page 126.

The Secretary to the Chamber of Commerce expresses generally, as the belief of the Chamber, that the works already executed by Government, to maintain a line of communication between the Hooghly and the Ganges through the Upper Soondurbuns, have been of great service to the trade of the country, and that every improvement of that line must be productive of additional benefit.

It appears to your Committee, that this is now the opinion of every person who is acquainted with the trade of the country; but the Secretary adds, that the Chamber does not possess the means of computing the extent of commerce which seeks that Channel.

Ibid.—No.
XXXIII. page
127.

Mr. Rainey, of Koolna, to whom Queries were transmitted, having been much engaged and continually absent from home, was unable to reply to them; but Mr. J. F. Hedger, also of Koolna, transmitted such replies. He states, that great advantages have resulted from the Canals already made to Hosynabad, as being a shorter and safer route to Calcutta—that, if a good Towing-path were made, a Canal from Hosynabad to Koolna would be highly desirable—He says, that it is impossible to state the probable number of Boats, or their tonnage, that now come down the Ganges, and so to Koolna on their way to Calcutta during January, February, March, April, and May, but that they are immense in number and tonnage.—He believes that Boats now always take the route from Koolna to Hosynabad, thence to take advantage of the Canals to Calcutta.

This answer, however, must be taken with some allowance; for it appears from Mr. Harris's evidence, that a great many Boats from the Eastern Provinces take the Attara Banka passage. But it is certain that Mr. Hedger is so far correct, that out of sight the greater number of these Boats proceed by Hosynabad. Supposing the highest number stated by Mr. Harris in the time of the year when the number is greatest, 40 Boats per diem, to be the daily number throughout the year, that would make about 14,400 Boats per annum, which take the Attara Banka passage. The total number, upon the average of the last 5 years, ending 30th April 1845, which arrive from the Salt Water Lake, and from the Soondurbuns by Tolley's Nullah, is 88,072; so that at the largest calculation of the number which take the Attara Banka passage, more than 4-5ths of the Boats proceed from Koolna to Hosynabad.

This gentleman is of opinion, that there is very little danger from Koolna to Calcutta through the Soondurbuns, an opinion in which he does not seem to be supported by the other evidence. He says, there is of course danger to the large unwieldy native Boats in the larger Rivers during storms—but that the greatest danger is from Dacoits and other bad characters,—that he himself has seen a Boat cleared out at 3 o'clock in the day,—that robberies take place every year to a great extent, if native reports are to be believed—that there appears to be no Police in the Soondurbuns—that Boats with valuable cargoes seldom go singly, but in fleets on account of Dacoits.

In answer to a question referring to the proposed Rajmahl Canal, this gentleman expresses a doubt whether that Canal would not soon be filled up by Ganges sand; but he adds, there is no sand in the Soondurbuns. He states, in regard to the present Soondurbun passages generally, that all the narrow Rivers are full of wrecks, stumps of trees, &c.—that there is very little

Towing-path, and what there is, is much obstructed by Jungle—that the Chitpore Canal is famous for wrecks which lie there for weeks, and the piles driven in at the sides of the Banks are very dangerous—that a Boat at high-water, when they are not visible, anchoring over them is liable at low-water to have her bottom stoved in—he says all who have been to and from Calcutta via the Soondurbuns are unanimous in their opinion of the negligent manner in which the Darogah and others of the Chitpore Canal perform their duties.

In answer to the first Query put by your Committee, *viz.*—“What advantages have resulted from the formation of the Canals projected by Major Schalch from the Chitpore Bridge, and thence through the Salt Water Lake to Bahminghatta and Hosynabad on the Juboona River?”—Mr. A. Warde, Superintendent of Salt Chowkees, Soonderbuns—says “Increased facility of bringing the produce of the country through which the Canals pass; greater safety to the passage of Boats; and he has not the least hesitation in stating it as his opinion, founded upon observation and experience in his constant passages through the various Soondurbun Creeks and Rivers, that no Boats, that could effect a passage through the Upper Soondurbun or Canal Route, would ever follow that of the lower or Attara Banka Route; for which he gives the following reasons—“Boats,” he says “by the Lower Route are much subject to being wrecked in blowing weather, especially on passing the mouths of the numerous large and deep rivers, which open into the Attara Banka passage, or Lower Route, where there is generally a dangerous swell, and gusts of wind which acting on the round-bottomed country Boats, laden to the very waters edge, sets them rocking and rolling, by which they take in water and become water-logged, and ultimately sink, and the crew are plunged into a deep and rapid river, where alligators of the largest size abound, and, if the crew succeed in getting safe to the shore, they are still exposed to be devoured by tigers, as the greater part of the Lower Route is through a very dreary waste or Jungle, with not a habitation near, or even fresh water procurable.” “The case,” he says, “is widely different in the Upper Soondurbuns or Canal passage, where Boats, not being within the influence of the openings or wide mouths of numerous large rivers, are not subject to sudden gusts or heavy swells; and, in case of their being wrecked by any accident, their cargoes are not all lost, as the Boats are not in deep water. Again there is not such fear of wild beasts, as the greater part of the route is *now* through *cultivated* land, where fresh water and supplies from Bazars are procurable, as well as assistance.” He states the time taken up by heavy Boats in both passages to be about the same, but that Boats of light draft effect the passage in less time by the Upper than by the Lower Route.

It appears by this gentleman's evidence, that Indigo planters and others, who have very large pinnaces well found in tackle and stores, prefer the Lower Route, as not being exposed to obstructions, and the inconvenience of stopping at low-water between the high wet banks of the Canals; but it is unnecessary to observe, that it is not for this description of vessels, which are very few in number, and are in truth a sort of yachts for the pleasure and accommodation of the wealthy, that these Canals are constructed, but for the safe and easy passage of the Commercial Boats of the country; and the well found pleasure pinnacle has the route which it prefers left at its command.

To the second Question, regarding the local advantages which would be obtained by continuing the Canals from Hosynabad to Koolna, this gentleman states, that these advantages would be increased cultivation—

great advantage to the inhabitants residing in the neighbourhood of the proposed Canal, in respect to the convenience of conveying their produce to distant markets—the draining and irrigating large tracts of land—greater safety—the avoiding of large rivers, especially at those points where several rivers meet—and he thinks a shortening of time would occur by the avoiding of some very considerable bends of rivers.

In answer to the question, whether Boats now frequently or ever take the route from Koolna to Hosynabad, thence to take advantage of the Canal through the Salt Water Lake to Calcutta, he says that much the greater number of Boats do so.

He says, that the dangers and inconvenience of the Attara Banka passage, remain the same as in 1823, except that there are now one or two patches of Land cultivated—he does not think that any material saving in freight would result from completing the Canal from Hosynabad to Koolna, but that a higher rate of Toll would not be objected to.

He does not know the amount of the Trade, but he should say, that nearly *all* the Trade which arrives at Balliaghatta and Panspottah on Tolley's Nullah, comes from Assam, Sylhet, Dacca, and Chittagong, and places adjacent to the Canal—that the portion of the commerce of the country, that may now be conveyed in large Boats, would be likely to adapt itself to the navigation of the New Canal in respect to using Boats of light draft, but that except some Boats from the Upper Provinces, and the larger description of wood, lime, and rice Boats, he does not think there are many Boats that use the Soondurbun Navigation, which exceed 350 to 600 maunds burthen.

This gentleman speaks of the putting the Soondurbun Navigation on a *respectable* footing, as a *National* work of great importance to the increasing Trade from the Eastward.

He doubts, if this were done, whether any great saving in time, by Boats passing through the Rajmahl Canal, from circumstances which he states in answer to Query 10, would result; but he states, as is obvious, that the Rajmahl Canal would be of no use to the Trade from the Eastward; whilst the Soondurbun Navigation is useful, not only to the Eastern Trade, but also to that of the Upper Provinces; and he says no Railway to the Eastward is likely ever to be formed, owing to the country being intersected by numerous rivers, and being periodically inundated.

This gentleman states, in his answer to the 15th Query, that his knowledge does not extend beyond the Canal Navigation from the Eshamuttee River to Calcutta. Within this District, his duty of Superintendent of Salt Chowkees in the Soondurbuns must render him perfectly acquainted with all the matters he speaks of; and beyond this he must possess a very competent knowledge of the disadvantages of the present line of water communication—of the advantages which would result from the carrying on the Canal to Koolna—and of the extent of the traffick with the Eastern Provinces—being in constant communication with the persons navigating the Boats which come up either the Eshamuttee River or the Attara Banka passage—it being, as your Committee understand, his duty to board all the Boats which he has reason to suspect of being engaged in a contraband traffick in Salt, whencesoever they may come.

In his answer to Query 11, he describes the bad state of the Towing-paths—the necessity of deepening the Canal throughout—the dangers which exist in some parts of it, of which the greatest appears to be at its junction with the Circular Canal, where “Boats, which have come hundreds of miles, and escaped all the dangers of the Road, rejoicing in the termination as they

hope of their labours, find themselves suddenly deprived of all their hard earnings by the *disgracefully* crowded and shallow state of the Nullah." He says, that he has often counted 9 Boats sunk in the course of a day and night.

On the 23rd of March last, at night, three large lime Boats were wrecked, and many more were landing their cargo in the road for want of water; and upon inquiry of the various merchants he learnt, that, from the 1st of December to the end of March, not less than 150 Boats of various kinds had been sunk within that short distance, conveying property estimated at Rs. 50,000.

Your Committee feel assured that your Honour will feel, as they do, that this is a state of things which ought not to be permitted to exist upon a Canal, the publick work of a great Government, the Superintendence of which is confided to publick officers, and from which the Government draws a clear Revenue of upwards of one lack of Rupees per annum, arising from the Tolls exacted from Boats left exposed to these dangers, arising partly from a want of careful management, and partly from an ill judged economy in the expenditure.

Mr. Warde suggests, that the Canal ought to exist as a passage only from the Soondurbuns to the Hooghly, and not as an Import Depot, for which (Depot) separate Cuts or Docks should be made, the situation of which he describes in his evidence, and a plan of which, drawn on Capt. Prinsep's Map of the Calcutta Suburbs, he has sent to your Committee.

In a subsequent part of his evidence, (Answer to Query 15,) he suggests matters worthy of great attention, in order to put and keep this Canal in the most efficient state.

The whole of his evidence is deserving of great attention.

From Mr. Heatley, a Soondurbun Grantee, your Committee have received a valuable paper, in answer to the Queries which they transmitted to him. They will not attempt more than a notice of some of the principal points in it, and beg to refer your Honour to the paper itself, which is printed in the Appendix.

In regard to the system of the Eastern Canal, which he states to be composed of Tolley's Nullah, the Circular Canal, the Balliaghatta Canal, the Lake Canal, the Bahminghatta Canal, and the others ending with the Hosynabad Canal, he states, that the shallowness of Tolley's Nullah renders it little frequented in comparison with the Balliaghatta route, even by Boats coming up the Attara Banka line of Navigation, and taking their choice of passages at Tardah.

He states the complaint of stoppage by the congregation of Boats to be justified by the state of Tolley's Nullah, and still more as regards the Balliaghata and Circular Canals.

He notices the obstructions caused by the Fishermen—by the extortion practised by the Toll gatherers, and in many cases by the Salt Chowkees—by Fishermen's stakes—by Sunken Boats—by Stumps of trees—by the tracking paths, some impeded by Jungle, and others impeded by intervening Khals—and a general want of depth in the system of Canals, especially at places which he mentions.

In regard to Tracking paths, he says the Jungle which extends to the waters edge, prevents the use of the tracking rope in case of adverse tides, and that this grows upon land especially reserved by Government for the construction of Tracking paths—all the Pottabs of the Grantees excepting from the grant a strip of land 60 feet wide bordering upon the Canal. He says, that it is a little too much to expect the Grantees to do for the Government what it contemplated doing for itself; besides which he states, as a

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Ibid.—No.
XXXV. page 132.

reason why the Grantee should be inclined to leave the Jungle on this strip of land, that, left as it is, it serves as a good hedge to cultivated portions of the lot beyond, against the incursions of the predatory Boatmen, a race well known in the Soondurbuns. But he confirms the evidence which has been already noticed of Grantees, in spite of these considerations, having offered, if Government would clear the Jungle in question, to prevent its becoming an obstruction again, and to give their own bunds as Tracking paths—but that the offer was declined, on the ground that the fund set apart for the repair and improvement of all the Canals, being 700 Rs. a year, was inadequate to the disbursement required.

He mentions, as another obstruction to uniform tracking, which your Committee cannot but think might have been most easily removed, the interruption offered by little Khals or streamlets just too deep to be forded, especially where alligators are not wanting, and too narrow to make it worth while to take the trackers on board to the other shore. The greatest drawback, however, to the usefulness of the Canals is their general want of sufficient depth; and he states the parts of the Canals where this defect is the greatest, and the most serious impediment to their usefulness, causing a prodigious loss of time and the greatest inconvenience. The consequence is, that the larger boats, those above 700 maunds, from the Eastward in fair weather prefer the Attara Banka Route, as the less harassing and scarcely more tedious. This gentleman states that “he does not, from what he has seen of it, think the Attara Banka passage dangerous at present—that cultivation is beginning to fringe it on the Northern bank of the line—and that the intervals between the haunts of population are daily diminishing.”

But, however this may be, your Committee think it established by the other evidence, that, unless to well found Boats of considerable size, differing very much from those most in use in this Navigation, the dangers of the Attara Banka passage are very great, and, supposing them to be somewhat exaggerated, they are quite sufficient to make it highly desirable to afford the means of avoiding them. But Mr. Heatley proceeds to say that the improvement of the Canal line is now, he apprehends, desirable upon other grounds than the pure dangers of the Lower Route—that the larger Boats, those above 1000 maunds, and there are some as high as 5000, will naturally prefer the wide Channel and sailing room of broad Rivers, and these will consequently convey the trade of Arracan, Chittagong, and Sylhet; while the more compact and smaller Boats from Dacca, Mymensing, Rungpore, Furreedpore, and Jessore, coming from a higher latitude, will be glad to avail themselves of the route so much higher up, (viz. the Canal Route) and in a nearly straight direction, economising time and ensuring safety—results which will be still further identified if the remainder of Major Schalch's Canal is carried out by the completion of the line to Koolna.

The remainder of this gentleman's communication contains suggestions relative to the Soondurbun Canals highly deserving of attention.

From a Report made to the Special Committee appointed to examine Lieut. Schalch's plan by the Board of Customs, on the 8th of August 1822, it appears, that of the traffick in goods imported to, and exported from Calcutta via the Soondurbuns, 19 parts in 20 consisted in the traffick with the Eastern Districts below Bogwangolah. Your Committee see no reason to believe, that the proportional traffick with the Eastern Districts has decreased since that time, but the contrary; and, if this be so, only a part of the importance of the Soondurbun Canals which were projected by Major Schalch is derived from the traffick with the upper part of the Ganges above Bogwangolah. This may eventually perhaps be better provided for by a Canal

from Rajmahl, or by a Railway. But at least Nineteen Twentieths of the importance of the Soondurbun Canals, if this estimate be nearly correct, must be derived from the facilities they are calculated to afford to the intercourse between Calcutta and the Eastern Provinces.

The circuitous passage, therefore, from Hosynabad to the end of Tolley's Nullah at Tardah has been saved, and considerable danger and inconvenience, for about one-half of the distance to be navigated from Koolna, have been avoided, although not in so complete and perfect a manner as was originally designed, or might with due attention be accomplished. But the inconvenience of the circuitous and dangerous passage described by Lieut. Schalch from Koolna to the Juboona River, amounting at least to one-half of the length, and to an equal degree of difficulty and danger, to which it will be seen that many witnesses have spoken, has been left in the state in which it was at the time when Lieutenant Schalch drew up his Memoir in June, 1821.

Thus the completion of the object which the Government in 1823, after the most careful examination of all the facts connected with it, declared its determination to carry into effect without delay, as one of great importance to the commerce of the country, by opening an easy and permanent communication between the Eastern Provinces of India and Calcutta during all seasons, and a direct line of communication between the River Hooghly and the Ganges navigable throughout the dry season, besides accomplishing objects of great utility independent of this branch of commerce, has been, if not abandoned, allowed to fall asleep for upwards of 22 years, at what cost of life and property to those concerned in the trade it were difficult to calculate.

But from the answer of Mr. Phillips, Assistant Salt Agent at Koolna, to the Secretary to the Committee on Lieutenant Schalch's projected Canals, dated January 15th, 1822, it appears, that "the losses which had occurred in "the Soondurbun Navigation on the Koolna side of Mooktarpore," the precise Navigation left unimproved by abandoning the continuation of Lieutenant Schalch's proposed Canal, "might be averaged at 5 or 6 Boats "annually, during the then preceding 5 years, some from the effect of bad "weather, some others by running on the hidden stumps of trees." Your Committee upon a review of the whole evidence cannot but think this Estimate greatly below the fact. He adds, "that the Salt Boats suffer "particularly from the necessity they are under of moving in all weathers. "Lieutenant Schalch's project would assuredly obviate the dangers of the "present Navigation, inasmuch as the hazardous parts of the Soondurbuns "will be altogether avoided thereby."

App. to App. (G)
E. 21 a. page xciv.

It is obvious that this gentleman, in referring to the dangers of the present Navigation, has especially in view the dangers of the Koolna side of Mooktarpore, the dangers which to this time have been left unprovided against.

In Mr. Plowden's answer he says, that "the crossing the Seepsa is "attended with much danger, this part being more infested with tigers than "any other in the Soondurbuns; nor can a Boat with any regard to safety "anchor near the shore; nor is it uncommon to see a bamboo erected with "an inverted pot on the head of it, to mark the place, as a warning to others, "whence some person had been carried off by a tiger. The New Route," he adds, "would certainly remove the aversion of the native Boatmen to the "Soondurbun passage. It would become an object of preference for the "reason assigned above."

Ibid—E. 22. a.
page xcvi.

It will be observed that the river Seepsa is crossed between Mooktar-pore and Koolna.

The danger from tigers is mentioned, in all the answers obtained by that Committee, as more formidable than that of the loss of the Boat, though this is far from inconsiderable, and they all agree that, if the New Communication were opened, a preference would invariably be given to it.

Mr. Phillips says, "In the Old Route, should a storm occur, the Boats are under the necessity of sustaining its violence at a distance from the River Banks, on the frail security of a native anchor and cable. From the absence of any Tracking ground after leaving the cultivated parts, Boats must of necessity wait at certain points for a favourable change of tide, which, during the stormy season, subjects them to endure a greater portion of bad weather than might otherwise be requisite, and this in the most unfavourable parts of the Navigation. The Dandees (Boatmen) at the same time suffer from their apprehension of tigers—the danger of cooking their provisions on shore, for they will do so in spite of every thing—and the want of fresh water. Not any of these inconveniences are likely to exist in Lieutenant Schalch's New Communication, and it appears to me, therefore, that a preference will invariably be given, unless perhaps in the cold weather, when a few Boats may prefer the present Route."

Appendix to Appendix (G) Paper marked E. 21. a. page xcv.

Ibid.

This gentleman states, that "Hindoo Dandees, starting from Koolna to proceed by the Soondurbun Route to Calcutta, require higher wages than the Mussulmans. If the latter receive Rs. 3 per mensem, the Hindoo demands Rs. 3, As. 8, and Rs. 3, As. 12, or Rs. 4."

He does not state the reason of this difference of wages; but it appears certain, that it is owing to the necessity which the Hindoos suppose themselves under of cooking on shore, and the danger to which this exposes them, which danger the Mussulmans avoid, as they cook on board.

Ibid.—E. 19. page lxxxvii.

Mr. Wooden, in his Letter to that Committee says, that "Lieutenant Schalch's line of Canals would afford a beautiful safe Navigation throughout the year, free from every danger—that such a route is much required, particularly by the Western Boats—that to them the present Soondurbun passage is full of danger and inconvenience—that the Dandees of these generally cook on shore, but the present route does not afford them the means of so doing—that Lieutenant Schalch's Route would remove all objections to the Soondurbun Navigation—the distance would be much curtailed, and the comforts of the Boat people amply provided for, if the banks were kept clear of Jungle—they would have the option of working all day, and laying to all night, which would be a great inducement to the large pattelabs, &c., and he thinks "the execution of the proposed line of Canals will tend very materially to bring such jungly tracts as are near, or intersect their line of route, into the highest state of cultivation." He states, that "the Mangees (Steersmen) and Dandees of Eastern Boats, both Mussulman and Hindoo generally cook on board, and have no fear which can operate in raising the price of freight, but on the contrary the Western Boat's crew not cooking on board," he states as a circumstance "operating to raise the price of freight."

Ibid.—No. E. 19. a. page lxxxix.

Ibid.—E. 30. page cxxx.

Messrs. Stewart and Robertson state to the same Committee that the natives of Benares, who are in the habit of insuring goods to Calcutta, will not take a risk by the Soondurbuns. Now although such risks are taken by Insurance Offices at Calcutta, nothing can shew more strongly than this the Native feeling of the insecurity of this Navigation.

Mr. Dale, Commissioner of the Soondurbuns, says to the same Committee, that the adoption of Lieut. Schalch's Route would tend in a great degree to remove the aversion of Boatmen to the Soondurbun Navigation; for, independent of the saving in distance, it would relieve them from the apprehension of robbers and wild beasts, as well as from the danger of being wrecked upon sand-banks, sunken trees, boats, &c. It would also allow them more frequent opportunities of supplying themselves with fresh water and provisions, and enable them in most cases to dress and eat their victuals on shore, which is of great importance to a Hindoo. This gentleman adds, that, when he had occasion to engage Boats for his own accommodation in the Soondurbuns, several persons, who were before willing to give them on hire, and accompany him, declined doing so on knowing his destination.

App. to App. (G)
Paper marked E.
41. a. page clxv.

Much more evidence will be found to the same effect in the Appendix to the Report of that Committee. It is summed up by that Committee in the following words,—

Ibid.—page
xxxiii.

“The correspondence on this part of the investigation (the Navigation through the Soondurbuns—obstacles—advantages, &c.) has been extensive, and the communications received have tended to establish the opinion generally entertained of the difficulties and dangers of the present route. The preference given to Lieutenant Schalch's Scheme is so decided, that the Committee might confine this part of the Report to a general recognition of the statements in the Memoir. The danger and delay of the passage across the great Rivers in the Soondurbuns, such as the Roymungul, &c., are generally admitted. The aversion of native Boatmen to the Soondurbun passage is stated to be strong. The dread of tigers, the privation experienced in the want of fresh water, and of places on shore for cooking, are the ostensible and natural causes of this aversion.”

Your Committee cannot but think, that the feelings of common humanity towards this most laborious and useful class of men, join with considerations of publick policy, in recommending an immediate attention to the removal of these difficulties and dangers.

In regard to the detention and danger caused in bad weather by the necessity of crossing large and dangerous rivers, these are stated chiefly to occur at the junction of the Koolea and Roymungul Rivers—at Bussenpoor [Busuntpoore] on the Juboona—at Taika, on the Kobudduck [Kobaduk]—at the junction of the Minus with the Seepsa—of the Seepsa with the Budder—and at Bullusspore on the Pussa [Pussur]. The junction of the Koolea with the Roymungul may be avoided by the Canal Route now existing to Hosynabad, and usually is so. But the detention and danger at the other points remain.

App. to App. (G)
Paper marked E.
19 a. page lxxxviii
E. 21 a. page xciv
E. 40, page cxlv
E. 41 a. page
cxlviii E. 41 a.
page clxiv.

Your Committee are of opinion, that, in considering the advantages of avoiding the passage by the Attara Banka, too exclusive an attention has been directed from the first to the facilitating the Navigation between Rajmahl and Calcutta during the dry season, with the view of facilitating the Commercial intercourse between the Sea and the Upper Provinces. But, important as this object is, the Government of 1823 does not appear to have lost sight of the importance of *an easy and permanent communication between the Eastern Provinces and Calcutta, and other objects of great utility, which would be accomplished by the opening of the proposed line of Navigation to Koolna.*

Of the amount of the traffick between Calcutta and the Provinces Eastward of the River Hooghly, below Bogwangolah, your Committee have not been able to obtain any accurate account. But it is only neces-

sary to cast the eye upon the Map, and to consider the vast extent and fertility of these Provinces, including Assam, to be satisfied that its amount must be very large.

It is believed, that the whole, or nearly the whole of the commodities, which find their way by water carriage from this vast tract of country to Calcutta for consumption or exportation, must come by Koolna, and from thence through the Soondurbuns by the present dangerous and precarious Navigation, either through Tardah Nullah and Tolley's Nullah, or, proceeding up the Juboona to Hosynabad, and thence taking advantage of the Canals, pass through the Lake Channel.

Your Committee have already stated the number of Boats and amount of Tonnage which pass annually through the Lake Channel.

The total number of Boats which entered the Circular Canal from the Salt Water Lake, from the 30th April 1840, to the 30th April 1845, amounted to 3,37,610, showing an annual average of 67,522.

The number of Boats entering Tolley's Nullah from the Soondurbuns during the same period, was 1,02,750, showing an annual average of 20,550, making an average of 88,072 Boats, which arrived at Calcutta through the Soondurbuns.

The number of Boats entering the Circular Canal from the River Hooghly for the above period, has been 76,360, showing an average of 15,272 per annum. The entire number of Boats frequenting this Navigation during the last five years has been 4,13,970, showing an average of 82,794 Boats per annum.

What proportion of these consisted of Boats coming down from Rajmahl in the dry season, and what proportion of Boats laden with the produce of the Eastern Provinces, your Committee have no means of determining. But they have already observed, from the Report of the Committee in 1822 upon Major Schalch's Plan, that about Nineteen Twentieths of the total number of Boats passing Koolna at that time was estimated to have come from the Eastern Provinces. They think it may be safely concluded that a larger proportion of the whole number must come at present from these provinces, when it is considered that they have greatly increased in extent, and must have improved in cultivation.

It cannot, therefore, they think be doubted, that the advantage to the traffick with the Eastern Provinces alone would be quite sufficient to warrant the necessary outlay for the improvement of these Canals, laying entirely aside the consideration of any increased facility of intercourse with the Provinces above Rajmahl; and it will be observed, that the execution of Major Schalch's Canal all the way to Koolna, as he proposed, remains at this instant sanctioned by the Court of Directors, by the order dated 11th of July 1827 above mentioned. (Supra page 3.)

To what extent this latter intercourse by the Soondurbuns might be superseded by the line of Canal proposed by Col. Forbes, or by the Railway now projected, your Committee do not think it necessary to consider in investigating the advantages of the Canal to Koolna, for the reason they have stated;—but they may observe that, if Col. Forbes' Canal were adopted, it is stated by the Projectors of that Canal that the preparing the surveys and sections would require two seasons, and that from the time of first breaking ground to the completion of the work would occupy eight years; so that, if resolved on to-morrow, it would be ten years hence before the Canal would be open—whereas the Canal to Koolna might be completed in a very short time, and the advantage of the communication in the dry season with the Upper Provinces for the intermediate space of time would be far from inconsiderable.*

Appendix (J.)
No. XVI a. page
105.

Ibid.

App. to App. (G)
Paper marked E.
65 b, page ccxviii.

[Vide printed
Letter of Rajmahl
Canal Committee
dated 29th Novem-
ber 1831, to the De-
puty Secretary to
the Government.]

* See App. (I)
No. 48, page 73.
para. 4.

If the Railway is looked to for completing this facility of intercourse, it seems far from certain when this object will be fully attained; and there are some Valuable Articles of Export from those countries which it would seem difficult to transport by a Railroad—such as Timbers of large dimensions; of which a large amount, both in quantity and value, is annually sent down to Calcutta by the Ganges and Hooghly. One gentleman, Mr. Barnes, reported to the Committee of 1822, that he had himself been a sufferer to the amount of lacs of Rupees from valuable fleets of Timbers being left to the almost certain destruction of the Ganges, from not being able to enter the Bhaugaruttee, Jellinghee, and Mattabanga for want of water; and in a recent instance he had a fleet of 46 Boats entirely swamped.

App. to App. (G)
Paper marked E.
25, page ciii.

The importance of the traffick between Calcutta and Dacca passing by Koolna is well stated by Capt. F. Jenkins in his Letters of the 16th of April 1832, and 29th of June 1833, to the Military Board, in answer to their request that he would favour the Board with such observations as he might have had an opportunity of making on the state of the new Canals in the Soondurbuns, and the Entally Canal. In one of these Letters, Captain Jenkins calls the notice of the Board particularly to some obstructions and dangers to Navigation between Koolna and Dacca, which appear of great importance.

App. to App. (H)
No. 87. and No.
127. page.

Although beyond the limits of the line of Canal strictly referred to your Committee, they cannot help calling your Honour's attention to this part of the Navigation, as intimately connected with that Canal, and they would humbly suggest, that a survey and investigation should be set on foot, as recommended by Captain Jenkins. That Officer calls the attention of the Board particularly to the great value of the traffick which comes through the Soondurbuns—to the total inadequacy of Tolley's Nullah and the Entally Canal, to allow the immense tonnage employed in its transport to pass backward and forward, and to reach convenient wharfage at Calcutta or in the Suburbs—and to the probability of this trade being shortly greatly increased by the extension of cultivation throughout the wastes of the tract in question—as most urgently demanding the completion of the improvements then in hand under the direction of the Board, and the entire and vigilant attention of a Superintendent to conduct and maintain those works, and promote measures for further facilitating a Commerce of vast and growing importance.

A copy of this Letter was submitted by the Military Board for the information of Government on the 1st of May 1832, as containing information which might hereafter prove useful, and they state that they had furnished the Superintendent of Canals with a copy of that document.

Index to App. to
App. (H) No. 129.

There the matter appears to have rested from the 1st May 1832 to the present hour.

The expense of completing the Canal from Hosynabad on the Juboona River to Koolna, was estimated by Major Schalch at about Rs. 21,000, by a route which he thought sufficient for all necessary purposes. It appears that the Committee subsequently suggested to Major Schalch an improvement upon the line of this Canal by straightening it between Deacol and Banka [Bankra]—But he was called away before he had time to report upon this, which would appear to have been a very desirable alteration. This was intended as a continuation of a straight Cut from Hosynabad to Deacol proposed by Major Schalch himself, as an improvement upon his first design of following the old passage to Busuntpoor. Major Schalch's improvement by a Cut from Hosynabad to Deacol he estimated at Rs. 60,000. The further continuation suggested by the Committee appears about two-thirds

App. to App.
(G) pages vi, and
xxvi.
Appendix (H)
Nos. 13, 15, 16, and
18, pages 131, to
134.

of its length, and might therefore probably perhaps be taken at Rs. 40,000, additional, making the total cost of the Canal upon the most improved plan, Rs. 1,21,000, (equal to £12,100) or upon the most economical plan, but one thought sufficient for all necessary purposes £2,100.

Your Committee will now shortly state what was done in relation to the Canal from Calcutta to Channel Creek.

On the 25th of July 1822, the Secretary to Government transmitted to the Committee for reporting on Lieutenant Schalch's Plans, a copy of a Letter from Mr. Henry Wood, proposing a Cut from Calcutta to Channel Creek, together with the Plans and Estimate which accompanied it. The Letter of the Secretary states, that His Lordship in Council was quite disposed to agree in opinion with Mr. Wood, as to the utility of a Canal such as was proposed. But he was desirous of receiving from the Committee a detailed Report in regard to the general advantages of the work, with the suggestion of any improvements of which the Plan might appear susceptible.

It was added, that it was understood that Lieut. Schalch had carefully examined the tract, through which it was proposed the Canal should run. This Letter, with the other Papers relating to this Canal, your Committee have printed in Appendix to Appendix I.

The Committee forwarded the above Letters and Papers to Lieut. Schalch.

Lieut. Schalch in his answer, dated 21st September 1822, stated, that he was some months past partially engaged in forming a Plan similar to that of Mr. Wood—that he had only then completed his inquiries upon the various subjects connected with the practicability of such a Plan—and that he had arranged these in a Memoir which accompanied his Letter.

In this Memoir Lieut. Schalch states, that he had made out a Plan for a Canal to Diamond Harbour, with an Estimate of the expense, which was privately circulated among the principal Merchants in Calcutta—that the utility of the Canal, and the prospects it held out of a profitable return were universally admitted—but that the general opinion was against its being undertaken by a body of private individuals, on the grounds of the inability of the Government to grant a Charter of Corporation—and that in a country, where the Government had an exclusive interest in the land, works of this nature ought clearly to be undertaken by them, as they would eventually be the chief gainers. He, therefore, begged leave to offer to the consideration of Government the observations which followed, the subjects of which he discussed in their order.

First,—The inconvenience and delay of the present communication between Calcutta and the lower parts of the Hooghly River. These he describes as very considerable, from numerous sands which stretch in many places entirely across the bed of the Hooghly between Calcutta and the Sea, rendering the Channel at those places so shallow that it becomes dangerous for vessels to attempt a passage over them, at even the highest state of the tide. *and the difficulties & dangers of the navigation during the S. W. monsoon.*

Secondly,—He proceeds to shew, by a reference to the Map, the line of his proposed Canal, commencing with Tolley's Nullah.

Thirdly,—He details his information as to the level of the country, and the relative state of the tides in Tolley's Nullah, in the Hooghly at Diamond Harbour and Rangafulla, the lowest of the sands which he had before mentioned, giving the necessary sections of the country, and showing the respective levels at different seasons of the year, and states of the tide.

Fourthly and Fifthly,—He describes in detail the several sluices, &c. which he proposes.

Appendix to Appendix (1) Paper marked No. 1. a. to No. 1. a. (14) inclusive, pages 1. to v.

Ibid.—No. 1. b. to No. 111. f. page vi, to xciii.

Ibid.—No. 1. b. page vi.

Ibid.—No. 1. c. page vi.

Ibid.—No. 1. c. (1)

Ibid.—No. 1. c. (1) page ix.

Lastly,—He states the expense of the Canal, Sluices, and Harbours, including the purchase of land, and allowing 10 per cent. for contingencies at Sicca Rs. 5,06,217, or rather, there seeming to be a mistake in the addition, 5,06,297.

Lieutenant Schalch's Letter and detailed Memoir, with a Plan showing the course of the River Hooghly, and the line of the proposed Canal, with sections and levels of the country through which it was proposed to carry it, explanations of the rise and fall of the Tides, Sketches of the Sluices, Gates, and other delineations calculated to explain the Memoir, were transmitted by the above-named Committee to the Secretary to Government, for the consideration of the Governour General in Council. These Papers have been printed, and the delineations lithographed by your Committee.

App. to App. (1)
Paper marked No.
I. d. page xvi.

From the Plan it appears, that Channel Creek communicates with the Sea at the end of Saugor Island, to the Eastward of the mouth of the Hooghly, and the different soundings of this Creek are marked upon the Plan; but it does not appear whether Lieutenant Schalch took into consideration, as a probable or possible advantage of this Canal, the proceeding of Ships up Channel Creek, and discharging their Cargoes in that Creek at its junction with the Canal.

The Committee state, that, having been apprised that it was the wish of Government to be furnished with these documents, and with the Committee's opinion on the practicability and expediency of the proposed Plan without delay, *and adverting also to the near approach of the season of the year, at which, if the work be approved, it should be commenced upon*, they had refrained from entering into the same minute course of inquiry, as that which they had prosecuted in regard to Lieutenant Schalch's former Plan, for improving the Inland Navigation of Bengal from Koolna in the Soondurbuns to the River Hooghly near Calcutta—that the execution of the proposed Cut to Channel Creek embraced few points requiring minute or scientific examination—that the details of local information furnished by Lieutenant Schalch were the result of repeated visits and careful inquiries, personally conducted by him—and that, with the information before them, they entertained no doubts of the easy accomplishment of the work in the manner proposed by Lieutenant Schalch.

Ibid, page xviii.

The Committee then notice the principal points of difference between the Plans proposed by Mr. Wood, and by Lieutenant Schalch, suggesting several advantages attending the latter. They state that the expense of the whole work as calculated by Mr. Wood is 9,41,567 Rs., and as calculated by Lieut. Schalch 5,06,217 Rs. The Committee state, that they see no reason to doubt the general accuracy of Lieut. Schalch's Estimates, allowing for the facilities which the work will derive from existing Nullahs,—and that they concur with Mr. Wood and Lieutenant Schalch in regard to the publick advantages anticipated by those gentlemen, from the completion of the work.

App. to App. (1)
page xviii.

Ibid.

On the 3rd October 1822, the Secretary to Government addressed a Letter to the Committee for reporting upon Lieutenant Schalch's Plan, acknowledging the receipt of their Letter, together with the Report and Plans which accompanied it,—stating that *the Committee had justly understood it to be the wish of Government to come to a decision upon the subject at an early period, in order that advantage might be taken of the dry season then commencing*—entirely agreeing with them in preferring the Plan proposed by Lieutenant Schalch to that suggested by Mr. Wood—approving of Lieutenant Schalch's Plan and Estimate as the result of much careful and judicious consideration—and concurring with them in opinion

Ibid.—No. 1 e.
page xix.

that the proposed work would not only be very beneficial to the community, but would ultimately yield to Government a return more than would replace the capital expended. There were, however, some points upon which, before finally determining upon the undertaking, His Lordship in Council was desirous of receiving further information.

These points are stated, and it is added most correctly that every thing saved or gained to the community may fairly be reckoned as a corresponding benefit to Government, whether Government think proper to share in the gain through a Tax or Toll or not.

Upon the receipt of this communication, the Committee drew up Letters addressed to sundry persons, with queries for distribution, and an abstract of the Plan for opening the Canal. All these Papers and the answers received from the persons applied to, form the Appendix to Appendix I, to this Report.

On the 17th February 1823, the Committee upon Lieutenant Schalch's Plans addressed the Secretary to the Government, submitting, for the consideration of the Honourable the Governour General in Council, the result of their further inquiries on the several points adverted to in his Letter of the 3rd October preceding.

Your Committee have already stated, that, on the 23rd of April 1823, the Governour General in Council resolved, that the proposed Canal from Tolley's Nullah to Channel Creek, would be a work of great publick utility. But, upon considerations then mentioned, among which was the previous opening of the New Canal through the Salt Water Lake, a doubt occurred whether the Saugor Canal should be immediately commenced, or postponed for a time.

The information desired by the Government on the 3rd of October 1822, was given them—the Canal through the Salt Water Lake was opened and carried to Hosynabad, about half the proposed distance between the Salt Water Lake and Koolna—but the Plan of the Canal proposed from Tolley's Nullah to Channel Creek has never been resumed.

Your Committee have already stated, that the proposal offered for consideration by Major Schalch was ordered by the Court of Directors to be carried into execution by order, dated 11th July 1827. This order embraced also the making of the navigable Cut from Calcutta to Channel Creek, upon which the Court of Directors say, that the circumstances in evidence seem sufficiently to establish that it afforded every prospect of a favourable result, and they trusted that, notwithstanding the interruption which publick works might have suffered from the war, this work might be resumed without intermediate damage.

An extract of this Despatch was transmitted by the Government to the Canal Committee, on the 13th of December 1827, for their information. Nothing further appears regarding this Canal, until the 9th March 1831.

In a Despatch bearing that date from the Court of Directors, they state, with reference to a Report from the Saugor Island Society, representing the importance of improving the communication with the Island, and with other parts, either by continuing the Road from Diamond Harbour to Channel Creek, or by a Canal to connect Calcutta with the Lower Soon-durbun passage, that the advantages, which it is stated would accrue from this latter work, were so important, and to the Court of Directors appeared so probable, that they thought that it demanded the serious and immediate attention of the Government.

In answer to this Despatch the Governour General in Council, on the 17th of July 1832, informed the Court of Directors, that, upon reference

App. to App. (I)
No. 1 f. to No.
11xx. pages xxi. to
lxxvi.

Ibid.—No. III. page
lxxvii. to xciii.

Supra. page 9.

App. to App. (I)
No. 1 e. page xix.

Supra. page 3.

Appendix (H)
page 92.

Ibid.—No. 94 a.
page 91.

App. to App. (H)
Supplemental Pa-
pers No. LXVIII.

Ibid.—No. XLIII.

to their Advocate General, that officer had stated that the Saugor Island Society had, in consequence of certain failures on its part, become unable to continue its existence by the deeds under which it was constituted, and the Governour General states, that, the repeated attempts of the Government to induce the Mercantile Community to undertake a project for improving the communication between Calcutta and the Lower Soondurbun passage having proved unavailing, it could not be anticipated that they, the Government, would embark in so extensive a work; and that the opening of the Eastern Circular Canal, and the more general employment of Steam Boats in the Navigation of the Hooghly, rendered the object of less importance than it formerly was.

It does not appear that this Despatch was noticed by the Court of Directors till the 25th September 1835, when the Court in a Despatch of that date express their regret that the anticipations in regard to the Saugor Island Society, and the prospects it appeared to hold out of ultimate success, had not been realised.

They add, that they must again express their regret that the efforts of the Government to induce the Mercantile Community to open a water communication between Calcutta and the Lower Soondurbuns had been unsuccessful, while they concurred in opinion, that the employment of Steam Boats in the Navigation of the Hooghly, and the opening of the Eastern Circular Canal, rendered the object of less importance than it formerly was. It will be observed, that although the Court of Directors had authorised the Government in India to resume the work of opening this Communication as a Government work, the Government had endeavoured to throw it upon the Mercantile Community.

Your Committee have not been able to ascertain whether any orders to this effect were received from the Court of Directors, or what the efforts of the Government were, and how employed, to induce the Mercantile Community to undertake this Canal; but nothing further has ever been done regarding it. The Court of Directors appear to have acquiesced in the abortive attempt to throw the undertaking on the Mercantile Community, notwithstanding that their order of 11th July 1827 continued unrevoked; and, although, in their Despatch of 25th September 1835, they considered it of *less* importance than formerly, they appear still to have regarded it as a matter of importance, and to regret that it had not been put in a course of execution. Your Committee think they will be able very satisfactorily to show that this opinion of the Court of Directors is correct.

It should seem that the Court of Directors believed that their original order regarding the completion of Major Schalch's Canal to Koolna had been carried into complete effect.

Your Committee have submitted to persons most likely to afford them information to be relied on, queries relative to a Canal to Channel Creek.

The answer of Mr. Beckwith, of the house of Cockerell and Co., is decided, that, in the present state of trade, and as regards the external commerce of the country, a Canal from Tolley's Nullah to Channel Creek would be of no use—that in 1822 a large portion of the external trade was carried on by the East India Company in very large vessels, that discharged stock in cargo at Diamond Harbour or Saugor, and a communication between Calcutta, Diamond Harbour and Channel Creek, would then have been a great benefit—but now, from the smaller size of the vessels employed, and the greater ease and safety of the Navigation from the employment of Steam Tugs, every vessel comes off town, and would continue to do so if there

App. to App. (H)
Supplemental Pa-
pers No. XLV.

Appendix (H)
No. 94 a. page 91.

Appendix (J)
No. XII. page 100.
No. XIV. a. page
102.
No. XXVI. page
107.
No. XXVII. page
107.
No. XXVIII. page
118.
No. XXIX. p. 121.
No. XXX. p. 122.
No. XXXI. p. 125.
No. XXXII. page
125.
No. XXXIII.
page 127.
No. XXXIV.
page 128.
No. XXXV. page
132.

was the most perfect Canal communication to an anchorage at Diamond Harbour or Channel Creek.

Appendix (J) No.
XIV. a. p. 102.

Ibid.—No.
XXXI. page 126.

The answer of Capt. Rutherford, Executive Officer of Canals, to the same query, is to the same effect.

The answer of the Chamber of Commerce is to the same effect.

Ibid.—No.
XXX. page 122.

Your Committee are, therefore, of opinion, that, in the present state of trade, and with the use of Steam Tugs, no advantage would be derived to the external trade of Calcutta from the formation of the Canal proposed. Mr. Harris the Pilot, who has been, as he says, in the habit of traversing up and down the River Hooghly all the year round for upwards of twenty years, does not think in the present state of the trade that any Ships would discharge their cargoes at Saugor, except in casual cases of injury and damage—that, even if ships were too deep to cross the James and Mary, only a few boat-loads would be discharged to lighten the ship a foot or two—that Boats from the western side of the Bay and River would never cross the River to enter the Canal at Channel Creek or Diamond Harbour, for reasons which he gives—that, if Government are disposed to facilitate the Navigation of the River Hooghly, he suggests a Canal being formed between Fulta and Diamond Harbour, sufficiently deep to take a ship of 18 feet through, in a flood tide—that ships would use it in preference to risking passing over the dangerous Shoals at the James and Mary and Fulta Sands—that the expense would be less—commerce would be expedited, and time saved—that the distance is but small, being only 5 to 6 miles—and that two good entrances can be procured for the entrance and discharge of ships, one being at Fulta Creek, and the other a little below Krockrahatta Trees—that this passage would be the means of avoiding a number of very dangerous shoals, and sometimes facilitating ships arriving in Calcutta from one to four days.

He thinks the only possible advantage of a Canal to Diamond Harbour or Channel Creek would be to benefit the line of country immediately in the vicinity of which it passed.

Your Committee would humbly press upon your Honour's attention, as a matter highly deserving of investigation, the suggestion of Mr. Harris relative to the formation of the short Canal he proposes between Fulta and Diamond Harbour.

Your Committee are unable to speak with any precision of the advantages which must be derived to the country through which the Canal in question would run, or the advantages to Calcutta from opening a direct water communication with it; but that country is of great extent, and, as your Committee understand, of great fertility.

Appendix (J) No.
XXVIII. page 118.

Mr. McPherson is of opinion, that a Canal from Tolley's Nullah to Channel Creek would be of great benefit, and easily executed—that the traffick from the country South of Calcutta is very large, particularly in the article of rice, immense quantities of which are brought to town for shipment to Europe—that besides this, a large quantity of salt from Tumlook, Hidgelee, and Diamond Harbour would pass through that line—that at present all the salt and other produce can only go, during the North-east Monsoon, by Channel Creek and the Doagra River through the Soondurbuns, a dangerous and circuitous route, which occupies 7 or 8 days in passing through an entire waste, where tigers abound, and not a drop of fresh water being obtainable—that the distance from which firewood is brought into Calcutta at present is upwards of 100 miles—that indeed a large portion of that necessary article is brought from Backurgunge, while, should a Canal be opened to Channel Creek, an immense quantity of fuel would be available within a short dis-

tance of the Capital—that the Canal from Tolley's Nullah to Channel Creek would have no cross current during the whole way, and with a Lock on Diamond Harbour Creek, and perhaps one at Culpee, for the entrance of Boats from the Hooghly, there would only be the tide from Tolley's Nullah, and the other from Channel Creek, which would prevent the frequent deposit that occurs in the Eastern Canal—that a few sluice gates to drain the country would be required—that such a Canal would, in his humble opinion, soon repay the outlay to Government.

With reference to a Canal from Tolley's Nullah to Channel Creek, Mr. Warde says—That very few Boats, except salt and large wood Boats, he hears ever use the route taken by the Steam Vessels passing to and from the Hooghly at Channel Creek through the Soondurbuns to the Ganges, and that he has heard from an old Branch Pilot, that he has seen nine Boats of the latter description lost in one day, immediately on their emerging from the Soondurbuns into the River Hooghly, and that the Canal would obviate such losses. He does not consider the proposed Canal to Channel Creek as materially desirable to the Shipping, except in affording them several contingent advantages during unfavourable periods of the year; but the Canal would be importantly useful in bringing to Calcutta the produce of the country to the south of Calcutta, and would afford, to all the Native Boats [now] proceeding up or down the River, a safe passage at *all* periods of the year. He thinks commodities from Chittagong and along that Coast and from Balasore, and places on the west side of the lower parts of the River Hooghly, would come by the proposed Canal, but not from Dacca, Sylhet, and Assam. Mr. Heatley agrees in opinion with other persons who have been interrogated by your Committee, that a Canal to Channel Creek will never be of use to the Shipping interest,—that, in the light of opening up a communication by which local produce may find its way into the market of the Metropolis, it is his decided opinion, that the benefits to the District, through which it would pass, will fully repay the expense of the excavation—and that the direct Tolls will be pecuniarily compensatory,—that the chief production of the 24-Pergunnahs is rice, and that almost wholly of the finest qualities—that the amount of the production may be estimated when he states that nearly all the Table Rice exported during the late heavy shipments to England and the Continent from Calcutta, known as the Patna, was the produce of this District.

This rice, he says, is derived from the whole surface of the District, the boundaries of which he describes.

From the description given by this gentleman of the number of water passages, most of them not more than broad ditches, which appear to have water in them only at a particular season, ending in January and February, and of the miserable canoes, made of hollowed trees called Saltees and Dongahs, which form the boatage of the District, it seems impossible to conceive any District more deficient in means of transport.

By such means as the District possesses the produce is carried, some to the Diamond Harbour road, and some to the neighbourhood of Calcutta, from which places it is transported on carts, and probably on bullocks, to the Town.

When it is considered that this District is forty square miles in extent, and is described as so productive of an article in the greatest demand both for home consumption and exportation, and has been found, according to this gentleman's account, upon extensive trials, to be well calculated for the production of Indigo, Silk, and Sugar, it should seem to be an object of undoubted importance to open an easy, safe, and cheap mode of transit from it to the Town and Port of Calcutta.

Appendix (J) No.
XXXIV. p. 131.

Appendix (J) No.
XXXV. p. 133.

It appears from the Commercial Annual of 1845, containing a Tabular Statement of the External Commerce of Bengal during the years 1843-44 and 1844-45, framed by Mr. Wilkinson, Export Supervisor of the Calcutta Custom House, that the amount of Rice exported in 1843-44 was

To Great Britain	...	...	...	...	...	...	Mds.4,85,636
And to France	...	...	...	...	...	...	17,800

Making a total ofMds.5,03,436
all of which is stated to have been Table Rice, nearly the produce solely of the District in question.

In 1844-45, the quantity exported to Great Britain wasMds.6,69,563
and to France 10,840

Making a total ofMds.6,80,403
If to this be added the probable consumption of this description of Rice in Calcutta, and what may be supposed to have been exported to the Upper Provinces, a high Estimate will be formed of the produce, in this article alone, of the tract in question.

Supra—page 2.

Your Committee have above referred to Papers transmitted to them by the Government on the 18th of September 1838, regarding the Drainage of the Salt Water Lake, and the questions connected with that important and difficult measure.

Appendix (G)
Nos. 1. to XI.

These Papers, although described in that Letter as relative to the Drainage of the Salt Water Lake, embraced the other subjects which your Committee have noticed.

The first object mentioned in the Minute of the Governour General, then Lord Wm. Cavendish Bentinck, is the improvement of the Canal, and reference is made to Lieutenant Schalch's Memoir above stated; but Lord Wm. Bentinck's Minute has more especial reference to the Canal connecting the Salt Water Lake with the Hooghly, that is, the upper part of Major Schalch's Canal.

His Lordship describes the upper part of this Canal under the name of the New Circular Canal then executing, of which one extremity opened into the Hooghly, and the other joined the Entally Canal; which latter communicated with the Salt Water Lake, through which there was a Navigable Channel which entered a Creek directly communicating with the Sea, and within the influence of the daily tides.

It will be observed, that this, although a description of the communication of Major Schalch's Canal with the Sea as it existed in the time of Lord William Bentinck, and still exists, is not a description of the termination of that Canal as designed by Major Schalch, which was to have been continued to Koolna, the point where it was his intention that it should communicate with the Ganges, and so with the Sea on the one hand, and the Eastern and Upper Provinces on the other. But his Lordship's attention appears to be confined to the upper part of the Canal opening into the Hooghly.

His Lordship recommends a change in the Plan of the upper part of the Canal—and that the New Circular Canal, instead of terminating at the Entally Canal, should be continued round the Lake, and as close to it as possible, and should enter the Creek at deep water below Bhamungutta—that the Lake should be Drained, and subsequently Warped up.

Your Committee, having shown the nature and extent of the whole Canal, which Major Schalch proposed in the Memoir referred to by Lord Wm. Bentinck, and where the execution of that Plan was permitted to break

off, and what are the advantages sacrificed by its imperfect execution, proceed to consider—First, the question of the improvement of the line of the upper part of the Canal suggested by Lord William—Secondly, the Draining and Warping up of the Salt Water Lake—and Thirdly, the state of Tolley's Nullah, which is remarked on in his Lordship's Minute, its crowded state, and the great imperfection of its Channel.

In the same Minute reference is generally made to the Drainage of Calcutta; but upon this subject your Committee have fully reported in their first Report. In preparing their present Report they have confined themselves, so far as regards the Drainage of the City, to the ascertaining how far the proposed works for improving the Canal, and for the Draining and Warping of the Lakes will affect that Drainage.

Upon the improvement of the New Line of Canal suggested by His Lordship, your Committee have taken the evidence of Captain Boileau, of the Engineers, Superintendent of Canals, Captain Fitzgerald, Major H. DeBude, and Colonel, then Major, Forbes of the same Corps.

Captain Boileau stated, that the Circular Canal has been executed without any of the evils anticipated by Mr. Blechynden. Mr. Blechynden's anticipations will be found in Appendix to Appendix G. Captain Boileau says he does not anticipate, from the carrying a Canal through dry ground in the direction suggested by Lord Wm. Bentinck, any benefit in any degree commensurate with its expense, though it would facilitate the bringing of all bulky articles of country produce into the populous suburbs of Bayley Gunj, &c.; but that a continuation of the Circular Canal into Tolley's Nullah would answer this purpose much better, and that there is a sufficiently deep cut in the Lake Channel already in existence.

Captain Boileau states the traffick of the two years of which he makes a return, viz. 1839 and 1840, to amount during the winter months, when the Nuddea Rivers are shut, to 38,271 Boats, shewing the traffick during the winter half of the year to be to that of the other half as 14 to 10 nearly; so that the accommodation for Boats which might be sufficient during the rainy season would require to be increased by nearly one-half in the dry weather. The Superintendents are not able to inform your Committee of the respective numbers of Boats entering the Canal which come from one place or another—no note being taken of the sort of produce they are freighted with, or the places they come from. How much, therefore, of the traffick is derived from the Provinces above Rajmahl and is in some degree dependent upon the shutting of the Nuddea Rivers, and how much from the Eastern Provinces there are no means of ascertaining. But from the evidence of Mr. Harris noticed above, it should seem that the transport of goods from these Provinces, is greatest in the dry season. The general agricultural produce is not gathered till the commencement of the dry season.

Captain Boileau states, that the present accommodation is not quite sufficient for the great number of these Boats which come to discharge their cargo within these Canals; but that it seems to be sufficient for those which are merely in transit.

It would appear, therefore, to be sufficient for the Boats arriving with goods intended for immediate exportation, and carried direct through the Canal to the River Hooghly, but not sufficient for such as are intended to be warehoused in Calcutta, whether for future shipment, or for consumption, which must form the much greater portion of them.

He states, that the Towing-paths of the Salt Lake Channel scarcely deserve the name, but might be very much improved—that the Towing-

Appendix (J) No. 1 to No. V. pages 1 to 20.

Appendix (J) No. 1, pages 1 to 12. App. to App. (G) Paper marked E. 14, page lxxvii.

Ibid.—E. 14, page lxxv.

Appendix (J) No. 1. page 2.

Appendix (J) No. XXX. page 123.

Appendix (J) No. 1. page 3.

paths of the upper part of the Canal are excellent—and that they have pucca roads (i. e. formed of broken bricks or stones) along their banks for about five miles, which might be advantageously extended throughout their whole length—and he recommends the improvement, or rather the perfecting of the present rude Towing-path along the Lake Channel, by converting it into a Carriage Road for five miles, at a cost of about 8,000 Rs. per mile. The construction of a pucca Road along the South Bank of the Bhamungutta Canal was estimated by Capt. Boileau and submitted to Government.

Appendix (J) No.
I. page 3.

He states, that the construction of this pucca Road along the South Bank of the Balliaghatta Canal, which he recommended, was calculated in his Estimate, on the 1st of August 1839, at Co's. Rs. 8,507 : 13 : 0, but that this expense had not been sanctioned by Government,—that a pucca Road was then in progress along the North Bank of the Balliaghatta Canal at an expense of Co's. Rs. 2,152 : 1 : 0 ; but that to render it as efficient as possible, it should be carried a mile further, so as to reach the Salt Water Lake, the cost of which might not exceed 3,500 Rs. more. Of the pucca Road on the North Bank, Capt. Boileau completed 3,500 feet. The remainder is still unexecuted.

He is not aware that Major Schalch's Channel in its present state, or after the execution of such improvements as he recommends, would impose any obstacle to the Drainage of the Marsh, or to the Warping it up, though it would add to the expense of them, because some provision must be made for keeping the Lake Channel navigable at all times during either of these processes ; and though the improvement of the Lake Channel by Bunded Roads would bring higher tides from the Soondurbuns to Calcutta, and would lessen the fall towards the Lake level, it would thereby affect the Drainage proposed by Major Forbes (that is of the Town) but in a trifling degree.

Appendix (J) No.
I. pages 1 to 12,
inclusive.

For other improvements as well in these Canals as in Tolley's Nullah, suggested by Captain Boileau, your Committee beg to refer to that very intelligent Officer's evidence.

In the answers given by Captain Boileau to the queries in No. 1, viz. upon the question of the improvement suggested by Lord Wm. Bentinck in the upper part of the Canal, and the other matters above referred to, Captain Fitzgerald states that he generally concurs, as does also Major DeBude.

Ibid.—No. IV.
page 17.
Ibid.—No. V.
page 19.
Ibid.—No. IX.
page 85.

Colonel, then Major, Forbes concurs also in the views taken by Captain Boileau.

Colonel Forbes states himself now to be the only survivor of the Committee consisting originally of Mr. J. Prinsep, Captain John Thomson, and himself, who in 1834, were directed to report on the Lake Drainage.

He states, that Mr. J. Prinsep was fully in possession of the views entertained by his brother the late Captain Thos. Prinsep, of the Engineers, the former Superintendent of the Canals—that Mr. J. Prinsep, who had for sometime officiated in this situation, was likely to be well acquainted with the localities—that Captain Thomson was at the time Superintendent of Canals, and as such, familiar with all the details and affections of the Lake—and that, therefore, at least as far as concerned the parties, the Committee was so constituted as to embrace the best practical information obtainable upon the matters brought under discussion ; neither were the principles of operation, which were unanimously assented to by them, submitted by the Committee, until all the Plans and Papers bearing upon the subject had been studied, and the Canals and Lake carefully examined. To the Re-

port of this well qualified Committee, your Committee will presently advert.

Infra page 51.

He states, that it was then known that the portion of the Canal passing through the Lake stood in need of Towing-paths, which could be most easily and cheaply formed by embankments.

He then goes on chiefly to notice matters connected with the Drainage and Warping of the Lake, with reference to the portion of the Lake he would first warp up as connected with his system of Drainage; but he observes with regard to the Canal, that, whatever else is done towards the ameliorating the condition of the Lake, its Central Channel should, as suggested by the Committee, and as now recommended by Captain Boileau, be embanked; and he adds, that no deepening or widening the Lake Channel, supposing it, as it ought to be, embanked along its southward side, could affect the system of Town Drainage suggested by him: but, in reference to Captain Boileau's answer to the 7th query, he states, that, if the Circular Canal were continued behind Entally and Ballygunj into Tolley's Nullah at Bhowanipoor, such a work would most materially interfere with the system of Town Drainage proposed by him, Colonel Forbes, inasmuch as the extension of the Circular Canal would, if that system were carried into effect, receive the contents of the Town Drains.

Appendix (J)
No. 1X. a. pages
92, 93.

Ibid.

Ibid.

If this were otherwise, their Silt added to the alluvion derived from the Hooghly water, would have the effect of warping the land under the Lake up to a level, adapting it for cultivation.

Upon all other matters Colonel Forbes agrees with Captain Boileau.

Your Committee beg to refer to Colonel Forbes' very able Paper above mentioned; but they think it right to say, that, in answer 9 page 94, he refers to a Report forwarded to Government by himself and Colonel, now General, McLeod, of the Engineers, on a line of Canal extending from Mirzapore upon the Hooghly to Rajmahl on the Ganges. To what extent the execution of this Canal would supersede that proposed by Major Schalch, is a question which has not fallen directly under the consideration of your Committee, nothing connected with that Report having been referred to them.

Appendix (J)
No. 9. a. page 85.

But they have heard that the formation of this Canal has been suspended pending the consideration of the projected Railroad, and they have already shown that neither the Rajmahl Canal, nor the Railroad would supersede the Koolna Canal as a communication with the Upper Provinces for several years; and that, after they did so, the Koolna Canal would remain a work of great commercial importance with reference to the Eastern trade.

Your Committee accordingly next proceeded to put questions to the above mentioned Engineer Officers upon the subject of Draining and Warping up of the Salt Water Lake; but, as in these questions the attention of these gentlemen was drawn to Lord William Bentinck's Minute above referred to, and to the Report of the Committee above mentioned appointed on the subject of Draining the Salt Water Lake, and various Minutes and Papers relative thereto, your Committee think it most in order to state, as shortly as possible, the substance of those several Papers, before stating the result of their subsequent inquiries into this important matter.

Appendix (J)
Nos. I. to V. pages
1 to 20.
No. 1X. a. pages
85, to 99.

The Drainage of the Salt Water Lake is considered by Lord William Bentinck so easy a measure, with a fall into the Canal at low-water, that nothing need be said of it.

The Government transmitted to the Court of Directors, along with Lord William's Minute, the following Papers:—

Appendix (G)
No. 11. page 27.

First,—Major Schalch's Memoir, which has already been adverted to.

Ibid.—Paper
marked A.

Appendix (G)
No. 1. (n) insert-
ed opposite page 6.

Second,—Survey of the Salt Water Lake, dated December 1828, by Captain T. Prinsep.

Ibid.—No. 1. (c)

Third,—Survey of the Soondurbuns by ditto.

Ibid.

These two Surveys so transmitted to the Court of Directors, do not appear to have been returned; but copies of them were preserved in the offices here, which have been lithographed and placed in the Appendix.

Ibid.—No. 1. (o)
page 6.

Fourth,—Queries put by Lord William Bentinck to Captain Prinsep, and his answers thereto, taken into consideration by the Government on the 16th of February 1830. These queries relate to the height of the Tides; the difference of high and low-water mark in the Salt Water Lake and the Hooghly at Chandpaul Ghat, and the relative difference in point of time of high-water; the depth of water in the Canal and Salt Water Lake at low-water; the depth, width, and average silting up of Tolley's Nullah and the silting up of the Canal and Lake; the extent of the Salt Lake, and the question whether the Lake is the property of Government or Individuals; the general level of the Plain, and the lowest level of the Town of Calcutta.

Ibid.—page 10.

There is much valuable information in this Paper. As to the size, and in whom the property is of the Lakes, Captain Prinsep states, that the Western Lake, the largest, contains about 18 square miles, equal to nearly 12,000 acres of land; that the Eastern Lake may be taken at about 5,000; that the right to the property is, he believes, without question in the Government, but that at present certain Zemindars claim and enjoy the rights of fishing on the Lake, and think themselves at liberty to make encroachment upon its extent. To this Paper is annexed a Note headed "Levels showing the relative height of the Tides in July, August, and September," as compared with the lowest part of Calcutta; and a Table of Land Levels of different parts of Calcutta; the rice Plains north of the Lake; the flows of the Drains along the Circular Road, and of the believed lowest bed of the Salt Lake, compared with the Tide Level at the different times of year there indicated.

Ibid.—No. 1. (o)
(1) page 11.

Fifth,—A Table exhibiting a daily Register in the River Hooghly from 1805 to 1828, by Jas. Kyd, Esq., which, with the observations it contains, forms likewise a very valuable Paper.

Ibid.—No. 1. (s)
page 13.

Ibid.—No. 1. (r)
page 17.

Sixth,—Capt. Prinsep's Memorandum and diagram on Tolley's Nullah.

Ibid.—No. 1. (a)
page 17.

Seventh,—Captain Prinsep's Memorandum on the Salt Water Lakes, with suggestions for filling them up by Warping, to which was attached a Scheme for raising the bed of the Lake to a level fit for cultivation, with a statement of expense, and a Table of Land and Tide levels.

Ibid.—No. 1. (n)
page 25.

Eighth,—Captain Prinsep's Memoranda, in reply to His Lordship's questions of the 29th and 30th of December 1829.

Ibid.—No. 1. (t)
page 26.

Ninth,—A Letter from W. Dampier, Esq. to the Secretary to Government, stating the rents paid to the Zemindars for land bordering upon the Lake, and the produce in the shape of rent which would accrue to the Landholders should the Lake be drained.

Ibid.—No. 1V.
pages 28, 29.

The Despatch of the Court of Directors of the 10th of November 1830, and relative Papers were sent to the Military Board on the 2nd of December 1833, with a Letter from the Private Secretary of the Governour General, requesting that the Board would take the subject of them into consideration.

Ibid.—No. VI.
(a) page 37.

The Military Board on the 27th September 1833, requested Captain Forbes, Captain Thomson and Mr. Prinsep, to whom they transmitted the Papers on the subject of Draining the Salt Water Lake, to form themselves into a Committee, and report their opinion upon the following points:—

First,—As to the expediency of undertaking the work with reference to its probable influence on the health of Calcutta, and to the return which might be expected for its outlay.

Second,—On the best mode of executing the work.

Third,—On the expense and length of time that would be required for its completion.

Lastly,—The effect it would have on the Drainage of Calcutta, proposing such means for obviating any difficulties in this respect as might occur to their Committee.

This Committee is that mentioned by Col. Forbes. On the 11th of January 1834, in a Letter to the Military Board, they submitted under several heads the conclusions, which the investigation of the subject they had it in their power to make appeared to authorise.

As to the expediency of undertaking the Work with reference to its probable influence on the health of Calcutta, they state that, fortified by the opinions of medical men, they had reason to believe that the entirely embanking out the salt and brackish water, and effectually draining off rain and alluvion-charged river water from a surface, which they state to be of the extent of 40 square miles, a great part of which is now daily overflowed and receded from by the Tide, lying to the south-eastward, and for nine months of the year to the windward of Calcutta, will most materially improve its salubrity, and that of the country adjacent.

Your Committee agree with this Committee in opinion, that this would be the ultimate effect of this operation. But they think it requires great consideration whether the immediate effect upon the salubrity of the City and country adjacent might not be extremely deleterious, and whether it would not be essential to provide some adequate means of preventing this result before commencing the work, if undertaken. To this matter your Committee will hereafter address itself.

The embankments adapted for effecting this object are represented in a Sketch, which accompanied this Report, forming a Plan of the Salt Water Lake near Calcutta, a Lithographed copy of which is inserted in the Appendix opposite the said Letter.

With regard to the return, which might be expected when the Lake was drained, the Committee annexed Statements of the Executive Officer, which inclined them to believe that the attainment of the important objects contemplated might be effected with a return of 10 per cent. upon the outlay. They report what they consider the best mode of executing the Work—that the probable expense, exclusive of a feeder separately estimated for, would be Sicca Rupees 2,00,000—that, in five years from the time that the entire Work should be sanctioned, the embankments, the construction of a new Feeder, of Drains, Dams, and Sluices might be completed, allowing the first three years for procuring the necessary information, the purchasing of Land, and the collecting of materials—and they conclude by reporting, that the Drainage of that part of Calcutta lying to the northward of the Dhurruntollah would not in any way be affected by the Works proposed, and the Drainage of the ground to the southward of that street might be much improved by them, as they would afford it an increased fall of from 2 to 3 feet. It will be recollected that the amount of ground which would be obtained is stated at 36,000 beegas.

The Military Board also obtained from Captain J. Thomson, Superintendent of Canals, a description of the ground lying south-east of Calcutta, dated 11th January 1834, which states the various Levels and Tides.

Appendix (G) No. VI. (b) page 38.

Infra page 57 and 65.

Ibid.—page 38.

Ibid.—No. VI. (a) (i) page 39.

Attached to this Paper is a Paper entitled, "Rough Estimate of the probable expense of Draining the Salt Water Lakes," agreeably to the Plan recommended in the foregoing Report. This rough Estimate contains, along with sections of the several Works, a description of the Embankments proposed, and of the ground, with Estimates of the expense.

Appendix (G)
No. VI. (g.) (2)
page 41.

Ibid.—No. VI. (c)
page 44.
Ibid.—No. VI. (d)
page 48.
Ibid.—No. VI. (e)
page 50.
Ibid.—No. VI. (f)
page 51.

Minutes were drawn up by the Members of the Military Board upon the Report of the above mentioned Committee; one by Lieutenant Colonel Galloway, one by Colonel Sir Thomas Anbury, the Chief Engineer, one by Lieutenant Colonel Craigie, and one by D. McFarlan, Esq., Chief Magistrate.

Lieutenant Colonel Galloway in his Minute states, that the Scheme presented by the Committee is chiefly confined, save the feeder, to the process of Draining the Lake, and not of Warping; but he apprehends that the Warping will be indispensable, both in regard to the advantage proposed as to increased salubrity of climate, and for the purpose of cultivation, for which he assigns his reasons at some length, affirming that, if the Warping succeeded, there would be no necessity whatever for Draining, for as the bottom became elevated, the water would naturally recede; and in order to do this he apprehended all that was necessary was to cut a feeder as projected from the Hooghly near Cossipore, for the purpose of admitting water, and simultaneously forming Warping Bunds, but he would by no means recommend that the Warping of the whole Lake be attempted at once. He then proceeds to the detail of the Plan he proposes.

He states, that he entirely concurs in the view taken by the Governour General (Lord William Bentinck) in regard to the Circular New Canal, which, passing towards the Soondurbuns, should never have entered the Lake. He refers to his having long ago stated his objections to this part of that Scheme. These objections are stated in his Minute of the 18th January 1831, which will be found in the Appendix; and he goes at some length, into the detail of the many advantages which he thinks would result from carrying the Circular Canal through firm ground along the Southern range of the Lake, and of his reasons for being of that opinion.

Ibid.—page 46.

Upon this question your Committee have already stated the opinions of other Engineer Officers differing from that of Colonel Galloway.

Ibid.—No. VI. (b)
page 48.

The Minute of Sir Thomas Anbury commences by expressing his regret that, considering the high authorities under which the Report had been framed, he derived no light therefrom—that upon the question of salubrity he did not feel himself competent to enter—but that the measure, independent of the healthiness of Calcutta, was one much to be encouraged—and after several other observations he concludes by saying, that on the whole he thought that the cost of the undertaking had been heedlessly estimated for, and that in fact the Plan, if it could be called one, was altogether undigested, and not at all explained.

Ibid.—No. VI. (a)
page 50.

Lieutenant Colonel Craigie contents himself in his Minute with stating, that the Report of the Committee was marked by simplicity of plan and brevity of exposition—that it was the joint Report of Engineers of high scientific attainments, and with intimate knowledge of the Lake, the result of long consideration, and personal observation—that Captain Thomson was likely to be employed in the execution of the work, should it be sanctioned, and therefore willing to be responsible for the success of the Plan—that a Report framed under such circumstances must be entitled to great weight—that of its intrinsic character he would not venture to speak—he would however suggest that it should be published, and the Plan thus thrown open to public discussion.

Mr. McFarlan, Chief Magistrate, gives no opinion upon the Report; but, considering the main object of the Drainage and Warping up the Salt Water Lake to be to improve the salubrity of the capital, he looks upon it as absolutely necessary that the scheme, and manner of its proposed execution, should be thoroughly unfolded to the inhabitants, and suggests the possibility that increased sources of Malaria may arise whilst the work is in progress, and that an extended rice marsh, into which the Lake would in time be converted, might not be less productive of noxious vapour than the surface of a Salt Lake. He suggests, that, if the estimate of profits be just, some Capitalists would soon undertake the job, with a far better chance of economical management, and he would propose that, failing private Capitalists, a joint-stock Scheme be propounded for general consideration.

Appendix (G) No. VI. (r) page 51.

An account of all these proceedings, together with the Papers mentioned, was transmitted to the Court of Directors on the 23rd of December 1835, in which Despatch the Government acquaint the Court that—

Ibid.—No. VII. page 52.

“The Despatch of their Honorable Court, dated the 10th November 1830, on the subject of Draining the Salt Water Lake in the vicinity of Calcutta, and improving the course of the Circular Canal, having reached the Presidency during the absence of the Right Honourable the late Governor General at Simla, the subject was referred for His Lordship’s consideration; and the consideration thereof was by him suspended until his return to Calcutta, when the whole papers connected with it were transferred through His Lordship’s Private Secretary to the Military Board.”

Ibid.—No. VIII. page 53.

“These Papers were all brought upon record on the 5th March last, but no orders were passed upon them by the Right Honourable the late Governor General in Council, and the subject has not since been resumed by us.”

No answer having been received by the Government of India to this Despatch up to May 1837, the Secretary to the Government of Bengal on the 9th of that month informed the Military Board, that, no reply having yet been received to that Despatch, His Lordship deemed it unnecessary to revive the subject at present.

Ibid.—No. IX. page 54.

On the 2nd of May 1838, however, the Court of Directors addressed a Despatch to the Government of India, in which they state the substance of the Papers transmitted to them on the 23rd December 1835, and say that the Government already are in possession of their sentiments on the general subjects of those paragraphs, and that the Court does not see occasion from the perusal of the documents now transmitted, which are unaccompanied with the expression of any opinion on the part of the Government, to add to their instructions contained in their Despatch of the 10th of November 1830—that the Government it would appear had not taken any proceeding in the matter—that they thought the greatest degree of publicity should be given to the information they had obtained—and were inclined to the opinion expressed by Mr. McFarlan that, if it could be made apparent that the undertaking would produce a return of 10 per cent. on the outlay, there would be no want of Capitalists to secure the completion of the work without the interference of the Government.

The matter was then referred to your Committee.

Ibid.—Nos. X and XI. pages 55 and 56.

Your Committee, as above stated put Queries to the Engineer Officers, who have been already mentioned, regarding the Draining and Bunding up of the Salt Water Lakes.

Appendix (J) No. I. to No. V. pages 1 to 20. No. IX. a. and No. X. pages 85 to 99.

Captain Boileau in his answers stated, that he did not see any reason to doubt the practicability of Draining the Salt Water Lakes, though he did not think the execution of it advisable; that an opening between these

Lakes and the River Hooghly would hardly answer the purpose of Draining them, from the respective Levels of the tides in the River and the Lakes; but that the Lake Drainage could be effected by the Soondurbun outlets; that, being altogether opposed to the Drainage of the Lakes, he would not recommend the attempt to be made either way, but, if undertaken at all, he thought it could best be done in the direction of Tardah Nullah, the general surface slope of the Lake; that the framing an Estimate would occupy more time than he could spare for it.

Capt. Boileau's attention was requested to para. 10 of Lord Wm. Bentinck's Minute above referred to—para. 6 of Col. Galloway's Minute—and to the Letter of the Military Board to the Right Honourable Lord Auckland of date the 29th of August 1837; and he was asked whether, if a Canal were cut in the direction proposed by Lord Wm. Bentinck and with the sides so raised, he was of opinion that the necessity of Lock Gates at the mouth of the Circular Canal, where it takes its departure from the Hooghly, would be superseded, and he answered that he did not think that the Lock Gates could be safely dispensed with, and he gives his reasons for that opinion.

His attention was then requested to paras. 8, 10, and 14, of Lord Wm. Bentinck's Minute—to Captain Prinsep's Memoranda and Schedule there-to annexed—to Sir Thos. Anbury's Minute—to the answers returned to the Military Board by that Committee—to Captain Thomson's description of the ground lying south-eastward of Calcutta, and the Plans there referred to—and to the Plan showing the means proposed by Lieutenant-Colonel Galloway and the Committee for Draining the Salt Water Lake; and he was asked, whether he was of opinion that the Warping up of the Salt Water Lake was practicable, so as to render the large surface of these Lakes dry for the purposes of cultivation, and free from the generation of Marsh Miasmata; and, if he was of this opinion, whether he thought the so doing would in any respect endanger the Drainage of Calcutta, or in any respect which might not be obviated; and he answered as follows—

“I am of opinion that the Warping of the Salt Lakes is practicable, so as to bring their entire surface under cultivation, which measure would I think be highly beneficial in many ways, and I would strongly advocate the adoption of this measure in preference to making any attempt at Draining them.

“Though temporary inconveniences might be sustained, during the progress of such a work, by the drying of the mud deposited in the present site of the Lake in the course of the season, yet I do not think that the neighbourhood would even at these times be at all more unhealthy than it is at present; the atmosphere in the immediate vicinity of the Lakes being now very pestilential, and several of my people have died from its effects.

“After the work of Warping shall be completed, and the surface of the Lakes raised two feet above their present level, and brought under cultivation, I do not suppose that their neighbourhood would then be nearly so unhealthy as it is at present.

“A large area, which is now nearly worthless as well as noxious, would be brought under cultivation, and become most valuable arable land at a cost far below the return that might be expected, should this great work be carried into execution.” He adds, that “it would not in his opinion in any way interfere with the Drainage of the City, beyond the trifling difference of level which he had before adverted to, viz. raising the waters about $1\frac{1}{2}$ feet in the further extremity of the Canal at Chitpore, which he says needs scarce to be taken into consideration.”

He agrees with Capt. Prinsep in his proposal to commence the process of Warping upon that portion of the Salt Lake nearest to Dum Dum, and of course concurs with Sir Thomas Anbury so far as his Plans coincide with Capt. Prinsep's; but he does not think the Lakes ought to be drained previous to their being silted up, as appeared to be recommended by the Chief Engineer.

He was of opinion, in opposition to Sir Thomas Anbury, that it would be scarcely practicable to use the Circular Canal in any way as a Feeder of muddy water to the Lake, without doing serious injury to the Canal Banks, and materially obstructing the Navigation, by which great inconvenience would be occasioned to the Publick, and material loss of revenue to the Government, besides the increased expense of keeping the Canal in repair. He then states where a separate Cut should in his opinion be made for a Feeder to convey the River water to the Lake, and its course, and dimensions, referring to Captain Prinsep's proposal with which he very much agrees; except that, although the dimensions of the new Feeder, showing a section of 200 feet, recommended by Capt. Prinsep, seems to be quite enough for the supply of muddy water, he says it might be increased with much advantage, should it be determined ultimately to convert it into a navigable Canal; and he says that Capt. Prinsep's Estimate will give a very good idea of the expense attending the execution of such a Feeder as he proposed, and the enlarged one recommended by himself would probably cost rather more than double his Estimate, or in round numbers three Lacs of Rupees.

He concurs with the Committee appointed by the Military Board in thinking, that the Drainage of the Northern part of the City would not be injuriously affected by the construction of the proposed works, and that the Drainage of the Southern Suburbs would be improved by them; but that the improvement of the Drainage of the latter would be effected in a far higher degree by the excavation of a Canal between Tolley's Nullah and Entally Canal as lately recommended by him; and he thinks that the Drainage might be perfected without following the Plan recommended by Major Forbes, which provides for giving double the present fall for the Drains, whereas he, Capt. Boileau, considered that there was quite fall enough at present if the slopes of the Drains were properly managed.

Your Committee are humbly of opinion, that it would be unwise to depart from Colonel Forbes' system of Drainage, unless or until a more perfect system shall be suggested, and they cannot think it advisable to sacrifice any fall that can be obtained; they would, therefore, humbly recommend, as at present advised, the carrying of Colonel Forbes' Plan into effect, and surrendering the advantages of the Canal between Tolley's Nullah and the Entally Canal, although quite alive to those advantages.

Captain Boileau's attention was particularly directed to the observations of the Court of Directors, under date the 18th January 1837, upon the inconvenience from the accumulation of Silt deposited in the Canal by the Calcutta Drains.

Upon this he gives a very distinct explanation, and concludes by stating, that your Committee may, he thinks, fearlessly adopt any system of Drainage which may appear best to them for removing the scourings of the City, without anxiety as to where the mud may ultimately be deposited, the Canal Department being quite competent to get rid of all the Silt, where it may be discharged from Drains and Sewers properly constructed.

In regard to health Captain Boileau states, that he never had any complaints made to him of the insalubrity of the Entally Canal, nor did he ob-

serve that the people who inhabit its Banks are less healthy than those in other parts of Calcutta; but that Mr. Blaquiere, who had had the experience of very many years, had given evidence of an opposite nature, which ought to have more weight than his.

With regard to the health of the Inhabitants of the borders, or of any inhabitable part of the interior of the Salt Water Lake, he says there have been great sickness and mortality, both in his Toll Collecting Establishment on the Western margin of the Lakes, and also among the people employed by him in driving piles along the south bank of the Balliaghatta Canal; that the mortality, among the former he attributed entirely to local causes, as his people appeared to have sunk under endemick disease arising from Marsh Miasma; but the deaths on the Balliaghatta Canal he believes to have been caused by Cholera Morbus, or some epidemick disease, and not from local insalubrity; he repeats that he does not think it would be advisable on any account to attempt the Drainage of the Salt Lakes previous to their being Warped up, and he greatly fears injurious results from undertaking any such operation, by which so large a surface of pestilential soil and miasmiferous matter would be exposed, to the great detriment of every person living in its neighbourhood, or to leeward of it.

Your Committee beg to refer your Honour to the evidence itself for the particulars of Captain Boileau's most intelligent and valuable statements; they will advert more shortly to the other witnesses examined, referring for particulars to the Appendix.

That the Lock Gates at the mouth of the Circular Canal could not be safely dispensed with Captain Fitzgerald agrees with Captain Boileau, as also upon the practicability of Warping up the Salt Water Lakes, so as to render their surface fit for the purposes of cultivation. He is of opinion, that the Draining and Warping of the Lake would improve the healthiness of the neighbourhood, and not interfere in any way with the Drainage of the City; upon the impracticability of using the Circular Canal by way of Feeder of muddy water to the Lake, and the propriety of the separate Cut recommended by Captain Boileau, Captain Fitzgerald agrees with that Officer. He also thinks that Sluices should be constructed in the embankment for the discharge of rain and other water admitted into the Lakes. Upon the other questions he agrees with Captain Boileau, except that he is not able to speak as to the unhealthiness of the neighbourhood of the Lakes from any knowledge of his own; and that he is of opinion, that it would be advisable to drain the Lakes even if they are not warped; and he thinks the so doing would improve the healthiness of that part of the country, and that, if the Warping system is practised, the portion of the Lake under operation ought, it appeared to him, to be drained. If any water were allowed to remain, so much the less would be let in, and a proportionate less quantity of alluvion deposited, and the time which the operation would otherwise take would consequently be prolonged.

Major DeBude believes it to be both practicable and desirable to drain the Salt Water Lake, not into the Hooghly but in the direction of Tardah Nullah.

He concurs about the Lock Gates, and the Warping, but thinks it desirable to drain the Lakes also, and looks upon the Drainage as more immediate and certain in its effect than Warping, but would recommend the trial of both, and does not anticipate any injurious effects to the Drainage of the City from either operation, except that he adheres strongly to the Drainage—he thinks the process of Warping would be very slow, but would

Appendix (J)
page 5.

Ibid.—No. IV.
page 17.

Ibid.—No. V.
page 19.

ultimately be effectual; but, if obliged to limit himself to one process, he would prefer the Drainage as more immediate and certain, and he does not suppose that the effect of laying the surface of the Lakes permanently dry would be at any time so bad, as that of the alternate exposure and inundation which now occur.

Colonel Forbes, in answer to the 2nd Series of questions relative to the Draining and Warping of the Lakes, states decidedly, that Draining the lowest levels of the Salt Water Lake, apart from Warping them up, would only be possible by steam-engine power—He says that, having spoken to Capt. Boileau respecting that part of his reply to the 1st Query, respecting the practicability of completely Draining these Marshes, in which he states that he does not see any reason to doubt the practicability of Draining them—he finds that Captain Boileau means that he does not think that it would be advisable to attempt Draining the Lakes, in contradistinction to Warping them up,—an opinion in which Major Forbes concurs.

Your Committee would direct your Honour's attention particularly to what appears to them the admirable proposition of Major Forbes, to bring in aid of the proposed Feeder from the Hooghly all the natural Channels between Chitpore and Ishapore, for the purpose of conveying to the Lakes masses of earth and alluvion for Warping them up, with the guards necessary to be attended to in the progress of the process, and its probable expense.

He concurs in opinion, that nothing proposed for this Warping up would be injurious to the system of Town Drainage recommended in his former evidence.

In regard to Lord William Bentinck's Minute referred to in Query 3rd, he says, that, having attended Meetings of a Committee at Government House on the subject of the Canal proposed by Lord W. Bentinck, he no more approved of it then than he did at present—that he conceived its construction utterly at variance with the proper Drainage of Calcutta, and that, previous to sanctioning the present Lake Channel, and works connected with existing Canals, Lord William himself must have arrived at a conclusion somewhat similar; and that no Engineer in this country approved of the Plan, though he could not imagine that there could have been any other than a predisposition to approve of it if possible. He believes that the Warping of these Lakes would not be difficult, and would in every way be advisable.

Your Committee beg to refer further to this very important Paper in the Appendix, particularly to Answer 13, describing the Lakes in their present state, the Embankments and Towing-paths required, and their fearful insalubrity.

There are two considerations of great importance in the Draining or Warping up these Lakes, to which your Committee think it necessary to direct your Honour's attention upon the question,—the one having reference to the insalubrity of these Marshes as more immediately affecting their near neighbourhood, and without doubt extending in a greater or less degree to the surrounding country—the other bearing upon the question of increased danger of Malaria during the process of Draining them.

Mr. A. Dyson, Overseer of the Entally Suburbs, which appointment he had held for 24 years, was examined, and he stated that he thought the Entally Suburbs more healthy than Calcutta—It is within 2 miles or 2½ miles of the Lake.—Mr. Dyson states, that his residence is two miles from the Lake—that he himself had never been sick but once, and that was on the occasion of his being attacked with the Jungle fever whilst superintending the

Appendix (J)
No. IX. b. page 95.

Ibid.

Ibid.—No. IX. b.
page 97.

Ibid.—No. III.
page 13.

repairs of a Road close to the Salt Water Lake. He states, that Cholera, Dysentery, and other Bowel Complaints are the most frequent diseases of Entally, and that he had the misfortune to lose in 1825-26 three children from spleen, one 13 years and 10 months, and one 10 years and 9 months, and another 8 years and 6 months—that this was at Entally.

This evidence is not calculated to convey a favourable impression of the healthiness of that Suburb; but it does not show that it is less healthy than the Native Town of Calcutta, where these diseases appear, from the former Report of your Committee, to be frequent and severe.

Mr. Dyson mentions causes of unhealthiness, which may have operated quite independently of the vicinity of the Salt Water Lakes.

He says, that there are many Drains in Entally, which are not cleaned out—that he has not the men to clean them—that he had formerly one Division under his charge, and had then 250 convicts, and could keep the Drains quite clean—that this was in Mr. Elliot's, and subsequently in Mr. Barwell's time—and that he had at the present time only 70 convicts, and had now two Divisions under his charge—that he had observed a great difference in the healthiness of the Inhabitants since the Drains had not been kept clean—that formerly in Mr. Elliot's time there was not so much sickness—that all the gardens are at the present time overgrown with Jungle, and the Roads overhung with trees which obstruct ventilation.

He concurs with the evidence appended to your Committee's First Report, as to the comparative healthiness, speaking of Entally, of the different seasons.

He states November, December, January, and February, as the most healthy—in March, April and May it becomes less healthy—in May and June he had had several cases—he finds the convicts become ill in July—he keeps them in the Guard two or three days, after which he sends them to the Hospital—he has in July eight or nine convicts ill—this continues much the same in August and September—in October not so ill.

He does not know any thing of the state of health of those who live near the Salt Water Lake—his duties do not frequently send him to that vicinity. He says, that Entally is supplied with drinking water chiefly from tanks—that they have only one publick tank, the water of which was then undrinkable from the quantity of putrid vegetable matter accumulated in it—that there are several private tanks the water of which is wholesome, and that all the people take water from the private tanks, except in the hot season, when the owners, from a fear of their tanks becoming dry, prohibit water being taken from them by the poor Native Inhabitants, which puts them to great inconvenience and distress; and he says generally that this Suburb is very scantily supplied with good water for drinking and culinary purposes—that he has witnessed material suffering from a want of good water for his own convicts—that he has been obliged to send them to private tanks with the owners' permission—that there is no supply of proper water for the publick—that his convicts have a tank of their own, but the water is not drinkable—that they have wells, but the wells are not good. And speaking of the Suburbs generally, he says, that the tanks, with few exceptions, are full of grubs and insects.

He says of the Drains in Entally, that the Drains run off pretty free when kept clean—that he could keep them clean if he had a sufficient Establishment—that formerly in Mr. Elliot's and Mr. Barwell's time they were kept quite clean—that he used to take the Levels himself, and, when in controul of a larger Establishment, the Drains were kept so clear, that the water ran pleasantly through them—that there is a sufficient fall towards

the Lake to keep the whole of the Suburb of Entally well drained, except sometimes when there is a heavy fall of rain for seven or eight days; then the Drains are all full, and sometimes the Salt Water Lake during spring tides chokes all the Drains.—He has seen all the Low Lands about the Lake covered with water, and all the villages about there surrounded with water.

A more miserable picture of the state of a Suburb of the Capital of a great Empire, held by a civilised Government, cannot well be imagined, though unhappily it is only the same with the state of the other Suburbs of Calcutta; but it does not appear that the amount of disease in this Suburb, whatever that may be, is more attributable to the neighbourhood of the Salt Water Lake, than to the want of Drainage, foul Tanks, Jungle, obstructions to Ventilation, and want of wholesome Water, which would alone account for the utmost state of insalubrity.

This Suburb, as has been already said, is about two miles from the Lake.

The Native Town of Calcutta is about three miles.

The answers returned by W. C. Blaquiere, Esq., Magistrate of the Calcutta Police, who has resided for a long time at Sealdah, a Suburb adjoining Entally, state, that in the opinion of the witness Calcutta is healthier than the Suburbs of Sealdah and Entally, an opinion founded on the general observation he had made of the comparative degree of sickness prevalent in the Town and Suburbs, and the degree of its malignity—He considers the neighbourhood of the Salt Water Lake exceedingly unwholesome.

Appendix (J)
No. VI. page 21.

During the administration of the Marquis of Wellesley he had occasion to establish a Police Chowkee (station) in the vicinity of the Lake, to prevent the escape of French prisoners of war by that route, and deputed a party of fine healthy Up-country Brijabassees, the greatest part of whom, to his astonishment in the course of a few days, were prostrated with severe Bilious Fevers, which rendered it necessary to relieve them by sending another set, who were equally unable to withstand the pernicious effects of the Malaria of the Lake, and were withdrawn after the loss of two of their number, who fell victims to its pestilential influence, which deterred him from sending any more there. He states, that he had observed a very material change in the salubrity of Sealdah since the excavation of the Entally Canal, previous to which sickness was very rare in the neighbourhood; whereas, since the existence of the Canal, Fevers, particularly those of a bilious type, have been highly prevalent, which he attributes in a great measure to the existence of the Canal, and its stagnant and filthy state—that the Inhabitants were of opinion, that its bad effects were less felt since the excavation of the Baug Bazar Canal, which had in some measure diminished the evils above stated, causing an influx and reflux of water into and out of the Entally Canal, which was scarcely perceptible before.

By this evidence it is sufficiently established, that the immediate neighbourhood of the Salt Water Lake labours under the full effect of pestilential vapour commonly infecting the borders of such places; but it would not appear that this effect was, in the judgment of this very intelligent gentleman, who has had so much experience of the varying state of their salubrity, to extend to Sealdah and Entally, at least to such degree as to attract his attention.

Mr. Pemble Strong concurs with Mr. Blaquiere in thinking Calcutta more healthy than Entally; but he distinctly refers in part to its being further removed from the vicinity of the Lake, and in part to its being kept in an infinitely clearer and cleaner condition than Entally; and he gives as an example of what may be done by cleaning, draining, &c. "Cornwallis

Ibid.—No. VII.
page 24.

Square, now remarkably clean and healthy,—a place described by the late Bishop Heber as having been dreadfully unhealthy.”

He states, that the Inhabitants of these Suburbs are subject to particular classes of disease. Fevers, Dysentery, and Spleen are among the most common diseases. These are diseases peculiarly caused by Malaria, and the observation of Mr. Blaquiere, that the hot season is the healthiest season of the year, seems at variance with the result of the observations, and commonly received opinions of the scientific Medical men in different parts of the world on the subject of Malaria, which Dr. Martin has collected in his valuable Note on the Draining of the Salt Water Lake, from which it appears that their opinion is, that the diseases produced by Malaria generally accompany the hot weather.

Your Committee adhere to the opinion expressed in their former Report, that there is no ground for thinking that the medical care required in March, April, May, and June is materially less than in the cold season, or that the diseases produced by Marsh Miasmata do not prevail during the whole year in Calcutta, and its Suburbs.

Mr. Strong, a Member of your Committee, to whose medical care the Suburbs are intrusted, and who, in the opinion of the other Members of your Committee, has paid great and most praiseworthy attention to the health of their Inhabitants, the nature of their diseases, and the natural circumstances which produce so great an amount of disease and mortality, states, that the villagers on the border of the Lake are great sufferers from Fevers, continued and intermittent, Dysentery, Spleen disease, Dropsy, and disease of the Alimentary Glands, and that their appearance generally is squalid and unhealthy. The depth of the Lake, he says, may be said to be about knee-deep, or from one foot to one foot and a half deep.—He believes at every reflux of the tide a very great portion of the Lake is left exposed to the sun by day, and the action of heat and damp at night.—He is of opinion, that, in this climate, where the sun is all powerful, the Malaria formed under the circumstances of Draining and Warping the Salt Water Lakes would be rapidly dissipated by its prevailing heat—that the illness produced by Drainage near *Chartreuse* in France is, he humbly submits, no guide to us in this climate; for we find, in more moderate climates than this, that the Marshes made for Rice cultivation are much more injurious than Rice Marshes here.—He is however of opinion, that Warping the Lake would be most advisable. Along with his answers to the queries put to him, Mr. Strong favoured your Committee with several Papers upon matters connected with the Drainage of the Lake, and the unhealthy state of the Suburbs generally, which he had drawn with great care at considerable length, and with a most praiseworthy zeal in these interesting matters so intimately connected with the salubrity of the extensive District under his medical charge.

To these, printed in their Appendix, your Committee beg leave to refer, and particularly to the valuable Abstracts and Statements regarding the Mortality in Calcutta, extending over a period of 20 years and upwards.

So far back as August 1828, Mr. Strong made a forcible representation to the Circuit Judge, appended to his half yearly Report upon the Insane Hospital, upon the state, not only of the ground contiguous to the Hospital Premises, but upon the Suburbs in their neighbourhood. He states, that, having for upwards of twenty years applied his attention to atmospherical disease, and having now for several years been Surgeon of the Suburbs of Calcutta, he considers much of the unhealthiness of the Suburbs as well

Appendix (J)
page 25.

Ibid.—page 27.

Ibid.—No. VII.
No. VII. a. to No.
VII. g.

Ibid.—No. VII. a.
page 63.

Appendix (I) No.
51. c. (1) page 85.

FEVER HOSPITAL AND MUNICIPAL INQUIRY. 61

as of Calcutta, attributable to the state of the Lands in the Suburbs, more particularly in the Soora, Entally, and Ballygunj parts of them.

These parts are on a line with each other about equally distant from the edge of the Salt Water Lake. But Mr. Strong does not mention the vicinity of the Marsh as among the circumstances which contribute to their unhealthiness, though without doubt that vicinity must, as above stated by him, contribute greatly to this effect. Parts of these Suburbs, as above stated, are at some distance from the Lake. But he particularly refers to the Lands bordering upon the Marsh as being more covered with Jungle than other parts, and says that in almost every part of them numerous irregular excavations are made for brick-making, and similar purposes, in which impure air is generated by the decay and putrefaction of vegetable matter in water, known to be capable of causing Fever and Dysentery, modifications of which Malaria may also be the cause of Cholera; which disease predominates in those climates and soils in which Fever and Dysentery abound. And he refers to instances of Cholera being so produced, and to Dr. McCulloch's work on Malaria, and he adds that he could name at that moment several families about Entally who were laid up with Fever by the impure air generated in their neighbourhood by the decomposition, or decaying of vegetable substances, and several other families there who were removing up to Chinsurah and other places; their removal being more conducive to their recovery than any medicine they could take, while they continued to breathe this atmospherick poison.

An extract of this Letter was transmitted to the Nizamut Adawlut and to the Magistrate of the Suburbs of Calcutta, and a copy of it to the Magistrate of the 24-Pergunnahs, and to the Secretary to the Government, for the information of the Governour General.

On the 25th of September 1828, Mr. Shakespear, Secretary to Government, wrote to the Magistrate of the Suburbs Mr. Master, by direction of the Governour General, to desire with reference to Dr. Strong's remarks his sentiments upon the practicability of abating the nuisances complained of by that gentleman, and of remedying generally the unhealthiness of the Environs of Calcutta. To this Letter Mr. Master on the 31st of October 1828, returns a long and elaborate answer, in which he states very fully the circumstances in the condition of the Suburbs, which in his opinion constitute the chief causes of the unhealthiness which prevails in them.

This, in the opinion of Your Committee, is an able paper, and besides the above description, contains many suggestions, which if carried into effect would undoubtedly have greatly improved the salubrity of these Suburbs—This correspondence is printed in the Appendix.

He says, that the Magistrate of the Suburbs would find little difficulty in promoting more effectual Drainage, were he supplied with an ample number of convicts, or put in possession of funds, which would enable him to command the services of hired labourers. He states the want of pure wholesome water to be a privation severely felt by the lower classes, and that the excavation of a few publick Tanks, would materially contribute to the health, comfort, and cleanliness of the Inhabitants; and he suggests the formation of certain broad Roads towards the Lake as anxiously desired by the Inhabitants, and considered by himself as particularly essential.

In reply to this communication the Secretary to Government informs Mr. Master, that the Governour General in Council, regrets that the necessity of strict economy prevented his authorising considerable immediate outlay from the Publick Treasury in furtherance of the very important object of improving the salubrity of the Environs of the City, and that it

Appendix (1) No. 51. a. No. 51. b. No. 51. c.

Ibid.—No. 51. d. page 86.

Ibid.—No. 51. e. pages 86 to 90.

Ibid.

Ibid.—No. 51. f. page 90.

only remained therefore to consider how far it might be practicable to supply the Allipore Jail with convicts from the Jails in Bengal.

Appendix (I) No. 51. A. page 91.

Upon reference to the Nizamut Adawlut, and by them to the Magistrates in the Mofussil, it appeared that no sufficient number of convicts could be spared for the purpose, and there the matter has been permitted to rest ever since.

Appendix (B) page 4.
Appendix (J) pages 21 to 90.
Appendix (I) pages 80 to 92.

The extreme insalubrity of the Suburbs has long since been universally acknowledged, as appears from representations both from Medical men and Magistrates, which will be found in the Appendix.—But it does not appear that the insalubrity of the Suburbs is attributed by them in an especial manner to the vicinity of the Marsh; in which this evidence concurs with that to which your Honour's attention has been above directed; although it is certain that the Malaria from the Marsh must contribute largely to that insalubrity.

Appendix (D) &c. and Mr. Martin's Topography of Calcutta.

Your Committee think it very probable, that, in a locality at a certain distance from a Marsh, in which locality the means of generating Miasma prevail in abundance at a much shorter distance, obviously quite sufficient to produce their necessary effects, those of the distant Marsh may escape observation, though sufficient of themselves to render the site in a high degree unhealthy, even were the other causes of Malaria removed.

Ibid.—No. VIII. page 73.

Answers were also received from Samuel Smith, Esq., Chairman of the Entally Conservancy Committee to the same Queries submitted to Mr. Blaquiere. This Gentleman considers Entally healthier than the densely occupied parts of Calcutta, and says that he always feels himself in better spirits in his garden in Entally than at his Town house in Tank Square. Upon other matters regarding the neglect of the cleansing the Suburbs, and the lamentable deficiency of good water, he concurs with the other witnesses. The subject, he says, has been brought to the notice of Government in the strongest terms by the Entally Conservancy Committee but without effect: but in regard to the Burying Grounds, he states that the Mahomedan Burying Grounds are not taken care of, and are at times very offensive.

Ibid.—No. VIII. page 74.

Ibid.—No. VIII. b. page 75.

The evidence of Mr. Wilson is much to the same effect, as is also that of Mr. Crow, both members of the Entally Conservancy Committee.

All the witnesses agree in considering Entally more healthy than Calcutta, and this though it is nearer to the Salt Water Lake, except Mr. Wilson, who says, that, although the climate is the same, he considers Calcutta healthier—He excepts, however, those spots where there are dense populations. Your Committee apprehend this exception embraces the whole of the Native Town.

Appendix (J) No. VIII. page 78.

Ibid.—No. VIII. b. page 78.

Mr. Wilson, in speaking of the filthy tanks and ponds in Entally, states, that in his Division, though the smallest yet not the least populous, every piece or parcel of ground has one or two of these ponds, or pits, which hold stagnant water during many months in the year, and that there must be upwards of a *thousand* of these ponds in his Division.—He says, the *distress* experienced from the want of publick Tanks, particularly in the hot season, is inconceivable.

In the hot season, when the Tanks get very low, the owners who had hitherto allowed their native neighbours water from their Tanks, are compelled to stop the supply: words are inadequate to express the grief of the neighbourhood on the occasion. At first they flock in numbers to the gates of the places where they were in the habit of getting water; and use intreaties and cries for admittance; but these avail not; they are driven away. They then go into the interior, and fetch water from Tanks which are sur-

rounded by trees—water on which the beams of the sun never play, and which of course must be very unwholesome—and by drinking this brackish water, subject themselves to many diseases.—He says, that this duty of procuring water for domestick purposes generally falls to the lot of the *females* of a Native family—many of whom are great sufferers by being obliged to leave their *infants* behind.—He states, that the yearly ravages of the Cholera is diminishing the population very much. The births fall short of the deaths. He adds, the want of a sufficient number of hands to clean out the Drains is severely felt. The Drains should be cleaned out at least twice every week; whereas they are cleaned only *once* in the year; some once in *two* years: and the Drains near the Tanneries *never*. The consequence is, that rank weeds grow in them; stagnant water and filth, &c. remain in them, and emit a very offensive smell.

Mr. Crow says nothing can be in a more deplorable state than the Drainage, throughout his Conservancy Division; most of these channels for the exit of rain water are completely blocked up, for want of hands to remove from them the vegetation of years, and the accumulation of mud; that, in consequence of this, almost the whole country is under water during the rains, and it is not until the rains have ceased for some months, that these localities become dry.

Mr. Martin furnished your Committee with a Note on the Draining of the Salt Water Lakes, and a Letter to the Chairman in continuation of that Note, to both of which very useful Papers they would humbly request your Honour's attention. He states most justly, that, as next in importance to the great works in and about the City of Calcutta to render its climate comparatively salubrious, the clearing of the Soondurbuns, and the Draining of the Salt Water Lakes claim our notice.

He states the Soondurbuns as extending 180 miles South and East of us, and covering a superficies of 20,000 square miles, and upwards, and necessarily exercising a very powerful influence on the electric condition of our atmosphere, besides loading it with all kinds of exhalations. He states, that it is a popular, as well as a medical belief, in malarious countries, that by diminishing the humidity of the air you at the same time diminish its capacity for Marsh poison. He cites Dr. Fergusson, Dr. McCulloch, Dr. Arnold, Mr. Georgini, Dr. Wetherhead, the Statistical Reports of the Sickness in the Colonies, and Dr. Robert Jackson, who illustrates the circumstances under which Marsh Miasmata are observed to be generated, and the method of preventing their production.

The result appears to be, that these noxious particles are not produced in ground covered with water though shallow, "for," as said by Dr. Fergusson, "the Marsh must cease to be a Marsh in the common acceptation of the word, and the sensible putrefaction of water and vegetables must alike be impossible, before its surface can become deleterious." So that this Malaria is not produced by the putrefaction of water and vegetables.

2ndly. It is said, that in Upper Canada Intermittent Fever is comparatively rare wherever the surface is covered with dense forest, even when the ground is wet and marshy—that the vicinity of lands recently cleared is more subject to it, particularly meadows, or open patches of the Forest, which, though denuded of trees, have not been brought under cultivation. This observation was made in a cold country; but the property of trees powerfully to attract Marsh exhalation is said to have been practically known to the Ancients in Italy, and to be now exemplified in Demerara, and other parts of Guiana, where the humid heat cherishes the seeds of disease—

Appendix (J) No.
Viii. pages 83, 84.

Appendix (I) No.
I. page 1.
Ibid.—No. II. p. 8.

Ibid.—No. I. (A)
page 2.

Ibid.—page 10.

and Dr. Fergusson states, that the Marsh poison can with difficulty be separated from trees. It would therefore seem, that ground covered with trees is not rendered by that circumstance peculiarly productive of Malaria.

The circumstances which seem to produce it are,

First.—Land being partially inundated, dry in some places, and wet in others, having pools and dry spots intermixed.

Secondly.—Its being boggy and soft from the mixture of earth and decayed vegetables with water.

Thirdly.—Its being subject to peculiar alterations of moisture and dryness, although, the moisture sometimes amounts to absolute inundation.

Fourthly.—The surface having been previously marshy, or covered with water, and having become arid and dry, with water to be found a short way below the surface.

It follows, that the Draining of a Lake or Marsh, unless it be rendered completely dry to a considerable distance below the surface, far from increasing the healthiness of its vicinity, is sure to be eminently productive of Malaria, and consequent disease, over all its neighbourhood, more particularly to the leeward of it; and that, on the contrary, if the ground were kept constantly and completely flooded, its former generation of Malaria while partially flooded and partially dry, or alternately flooded and dry, would be stopped. Thus the Marsh of Chartreuse near Bordeaux, being imperfectly drained in the year 1805, caused in that year alone 12,000 persons to be affected with Fever within the City, of whom 3,000 died within five months.

Your Committee, therefore, cannot agree with Mr. Strong in opinion, that such an operation would not be attended with danger here, "where the sun is all powerful, and where any Malaria caused by the Draining of the Lake would be rapidly dissipated by its prevailing heat;" for, if this were so, it appears to your Committee that Malaria generated by the natural causes of alternate moisture and dryness, or by an intermixture of pools and dry spots, would in like manner be dissipated before producing its febrile effects; which we know in this climate to be very far from the case.

Your Committee, therefore, could not concur in recommending an attempt to drain this Marsh, until it should be made certain that it can be at once perfectly, and effectually made dry to some considerable depth; and they were glad to find that the Warping of the Lake was considered by Mr. Strong himself the most advisable.

It appears also to be a settled fact, that the admixture of sea water with the fresh water of a Marsh, increases the malignity of the exhalation issuing from it. As an instance of this, it is said, that the Marshy tract between the Ligurian Apennines and the Mediterranean, which had been a most pestilential tract of country, was rendered salubrious by the construction of Valvular Gates, which permitted the efflux of the water of the Marshes, but prevented any reflux of water from the Ocean.

Dr. Johnson states, that, without doubt, the fortunate change in the salubrity of the District was owing to the exclusion of the salt water, and that it cannot be denied that the admixture of salt and marshy water might have a deleterious influence in the production of Malaria, though it was also unquestionable that most deleterious exhalations issue from Morasses which have no communication with the Sea.

From what has been said it would seem, that the Salt Water Lake of Calcutta unites in itself every quality the most conducive to the production of the most poisonous, and abundant supply of Malaria.

Dr. Wetherhead ascribes the peculiar insalubrity in and about Rome to the character of the soil, which he states to be permanently moist all the year round a few inches under the surface; and in all the situations described by Dr. Fergusson as peculiarly destructive of the British Army in Holland, in the West Indies, in Spain and Portugal, where that distinguished Military Physician attended that Army on various services and expeditions, though the surface of the soil was quite dry, water was found a short way below it.

Your Committee agree with Mr. Martin in thinking what Dr. Fergusson says upon this subject, applies with equal force in this, as in the Western Hemisphere. It is cultivation, which, Dr. Fergusson says, operates in converting an unhealthy Marsh into healthy fields. It acts by "opening the surface for the escape of pestilential gases, and exhausting the morbific principle by constant succession of crops; for, wherever Malaria prevails, the uncultivated surannah, even though used for pasture, is infinitely more pestiferous than the plantation." He instances the beneficial effects of cultivation following Drainage at the British Colony of Demerara, within six degrees of the Equator, where, he says, it has succeeded in rendering the cultivated portion of the deepest and most extensive Morass probably in the world an healthy, fertile, and most beautiful settlement.

In regard, therefore, to the Draining or Warping up of the Salt Water Lakes, your Committee think it quite established by the evidence, that all idea of an attempt to Drain them ought to be abandoned; but that the Warping them up, by the means which the Engineer Officers examined have proposed, ought to be immediately proceeded with. But your Committee recommend that, previous to this and without the loss of a day, orders should be given for immediately planting a thick belt of bamboos and forest trees upon the margin of the Lakes, between them and the Town and the Suburbs, as recommended in their First Report.

Nothing is more necessary, in a sanatory view, to a considerable population inhabiting the borders of those Lakes, or having occasion, from their occupations as fishermen, boatmen, mat-makers, salt manufacturers, and others, to resort to them, and occasionally to reside there, than the converting this immense tract of Land from a pestiferous Marsh into cultivated fields. Neither, although less immediately essential to the salubrity of Calcutta, and its Suburbs, than the removal of the pestilential generators of disease, which now flourish, without mitigation, or controul, in the very heart of them, can it be supposed that their salubrity is sufficiently provided for, while this tract remains a Marsh in their close neighbourhood. The benefits to the cultivators, and the publick, from the addition of such an extent to the productive Land in the immediate vicinity of the Capital, is obvious.

Your Committee have stated that they had obtained information relative to the price at which the Lease granted by the Government of the Salt Water Lake might be repurchased.

Lord William Bentinck states that the Lake had been disposed of in perpetuity, but that there was a doubt whether the Land as well as the water and the right of Fishery belonged to the Zemindar or Sircar, and that the right was about to be tried. Your Committee have ascertained from Mr. Dampier, formerly Commissioner of the Soondurbuns, in his Letter to your Committee of the 1st of September 1841, that he had decided a suit for the assessment of the Lands from which the water of the Lake had receded in favour of the Zemindar; that his decision was appealed from by the then

Appendix (I)
page 8.

Appendix (G)
No. VI. (n) page
38.
Appendix (J)
Nos. I to V. pages
1 to 20.
Nos. IX. a. and X.
pages 85 to 99.

Appendix (G)
No. I. page 5.

Appendix (I) No.
27, page 46.

Revenue Commissioner; but was finally upheld by the Special Commissioner, so that the right of the Zemindar was completely settled.

Appendix (I) No. 26, page 45.

It appears from a Letter from Mr. Shaw, Officiating Commissioner of the Soondurbuns, of the 10th of September 1841, that Mr. Dampier's decision was pronounced on the 21st of December 1831, and affirmed on appeal on the 25th of April 1832. Mr. Dampier states to the Chairman of your Committee, as had been before stated to Lord William Bentinck, that he believed that the profits of the owners of the Salt Water Lake, that is of those to whom the Lake was made over in perpetuity, were about 16,000 Rs. per annum; but he adds, that there are other Zemindars holding Land upon the borders of the Lake, who also derive some profits from the Fisheries immediately adjacent to their Estates, and these latter would require to be indemnified for the loss they would sustain by the proposed Drainage—that he recollects having estimated roughly the probable expense of purchasing the Lake, and indemnifying all parties, at five lacs of rupees; but that he had reason to think that the whole might be now purchased (at the time he wrote) at a less cost.

See Municipal Committee's Proceedings 11th May 1842, No. XXVII.

Your Committee have been in correspondence with one of the Zemindars, who has a right to one-half of the ground in question.

Ibid.—No. 30, page 48.

He has signified his readiness to dispose of his share at such price as your Committee should think reasonable. Of course they could not fix the price; but they have reason to believe that it might be purchased for probably somewhat less than the ordinary of years purchase given for the clear profits of Land in the Mofussil, and from the Letter of Mr. Shaw, Officiating Commissioner, Soondurbuns, of date the 11th of February 1842, it appears that the parties, meaning all the parties, are willing to dispose of their property on obtaining what they consider its value.

On the whole, therefore, of the evidence your Committee humbly report to your Honour their opinion, that no benefit would be derived, at least none at all commensurate with its expense, from the carrying a Canal round the Lake to enter the Creek below Bhamungutta, as suggested by Lord Wm. Bentinck—that the part of the Canal called the Lake Channel ought to be widened in the manner proposed by Captain Boileau—and that the construction of a sufficient Towing-path and embankments along the Lake Channel, also as proposed by that Officer, which would render the Lake Channel quite sufficient for all the purposes of the Navigation, as well as his proposal of widening the Balliaghatta Canal, and the excavating small Docks at convenient distances along the Entally and Circular Canals, for the accommodation of the great number of Boats which lie there to discharge their cargoes, are objects which it is of great importance as speedily as possible to effect.

Appendix (J) No. 1, page 4. No. IX. and No. X. pages 93 and 98.

But your Committee are of opinion, that the Circular Canal ought not to be continued behind Entally and Ballygunj into Tolley's Nullah, as proposed by Captain Boileau, for the reasons assigned by Colonel Forbes. Your Committee, however, in answer to a question put to Col. Forbes subsequently, have obtained his opinion, that the obstruction in the Circular Canal, and in Tolley's Nullah, from want of sufficient accommodation for the craft, may be remedied by the formation of Boat Basins, or Wet Docks, in the line that would have been given to the Circular Canal, if it had been prolonged to Tolley's Nullah, but separated from each other where this line would be intersected by the Town Drainage, Scouring Canal, and Side Sewers proposed; and, having re-examined the levels, he finds that the Town Drainage Canal and Side Sewers could not, consistently with keep-

ing up the uninterrupted Drainage of the Town, be carried under the Circular Canal, even with the expensive contrivance of locks at each end of the prolonged portion of the Canal to keep up its water surface to the level of high water in Tolley's Nullah. Your Committee, therefore, humbly recommend the formation of the Basins or Docks suggested by Col. Forbes for the remedy of the great inconvenience spoken of by Captain Boileau.

Your Committee also humbly recommend that Tolley's Nullah be surveyed, cleared out, and deepened wherever required, and that all obstructions, as well for the passage of Boats, as for the flow of the water, be removed, under the directions and superintendence of a competent Engineer.

They now beg to call your Honour's attention to a considerable improvement, which it is desirable to make in Tolley's Nullah by straightening its Channel at some distance down.

The great obstructions, and crowded state of this Canal, and its insufficiency to the important purposes to which it would otherwise be subservient, have been already noticed; but it will be observed from inspection of the survey of this Canal, a Lithographick copy of which is inserted in the Appendix, that, from the River Hooghly down to a little below old Tolleygunj near Cherooly, the line of the Canal is sufficiently straight, although part of it is described as almost dry at low-water, and only navigable in spring tides. But from this point it diverges suddenly a considerable distance to the East, where it becomes again usually almost dry at low-water, and only navigable during spring tides. At that point it makes a sudden bend, almost at a right angle, to the West, continuing usually almost dry at low-water, till it comes to Goryahat, when it again resumes its northerly course, and continues it in a sufficiently straight line down to the Tardah Nullah. The distance from Cherooly to Goryahat in a straight line appears to be about 2 miles. Your Committee would humbly recommend the excavating a Canal between these places. It would not only save a considerable distance, but would render that part of the communication navigable at all times.

If this work is not done, it will be necessary to deepen the tortuous line, probably at a much greater expense.

Below Goryahat it appears that there is a short distance which may require deepening. But all this of course will fall under the observation of the Engineer appointed to survey this important Cut or Nullah, the improvement of which appears to your Committee to be one of the objects, whose accomplishment is the most essential to the commerce of Calcutta, and the adjacent country.

The number of Boats which entered Tolley's Nullah from the Soondurbuns from the 1st of May 1837 to the 30th of April 1845, was 148,575. The number of Boats which entered from the Hooghly was 134,140. The Tolls collected from Boats which entered the Nullah from the Soondurbuns was Rs. 2,41,655. The Tolls collected from Boats which entered the Nullah from the River Hooghly was Rs. 1,44,160. The great importance, therefore, of the traffick which passes through Tolley's Nullah is apparent.

Your Committee would also humbly suggest a re-survey of the lower parts of Major Schalch's Canal, as at present excavated from the Salt Water Lake to Hosynabad, with the view of perfecting Towing-paths, and repairing and deepening the Canal wherever this may be necessary; and they would beg earnestly to submit to your Honour's consideration, the construction of the Bunds upon the three Khals mentioned in the preceding

Appendix (H) No.
2, page 5.
Appendix (G) E.
59, page cci.

Appendix (I) No.
XVI. a. page 105.

parts of this Report, and the completion of that Canal from Hosynabad to Koolna, agreeably to the line reported by Major Schalch, and approved by the Committee of 1822, and the Government of that period.

Appendix (J)
page 5.

Your Committee would also recommend a survey, with a view to the execution of the Canal suggested by Captain Boileau through Mr. Heatley's lands near the Booree-Gang, which that Officer states would shorten the Navigation of the Mofussil Canals two tides, or perhaps 24 hours, the distance to be cut being only $1\frac{1}{2}$ mile, and the probable expence only 30,000 Rupees.

Supr. page 7.

With reference to the outlay, which your Committee have ventured to recommend it to the Government to incur upon the completion and improvement of those important Canals, they would beg again to call to your Honour's attention the Resolution recorded by the then Government of India on the 20th of March 1823, so much to its honour, and of which they find the principle again recognised in the official letter of date the 10th of July 1843, from Mr. Beadon, Under-Secretary to the Government of Bengal to the Military Board. From the statement compiled by the Clerk to your Committee it appears, that there is now in the hands of the Government a sum amounting to Rupees 15,14,782:13:5, being the surplus of the Tolls received upon the Calcutta Canals alone, after deducting the whole amount expended upon their formation and repair, from their commencement. With such a sum at their credit, your Committee think they have some claim to attention.

Appendix (J)
No. XXXIX.
page 145.

Generally upon the subject of these Canals, your Committee would humbly suggest for your Honour's consideration, whether it would not be advisable to divide the practical management of the Canals between two distinct Officers,—the one not an Engineer, but a good accountant, and an active and intelligent man, who should have charge of collecting, and accounting for the Tolls,—the other an Engineer Officer, who should have charge of regulating the passage of the Boats, and preventing useless delay, and thereby unnecessary crowding—the keeping the Canal free from wrecks and obstructions of all sorts, and the Banks from being damaged—and generally recommending from time to time all such works as are necessary to remove defects in the Canals, and to increase their usefulness—and the carrying the works which should be approved into execution. It appears to your Committee quite certain from the immense number of Boats of all descriptions, which pass daily through the Canals, and from the nature of the Canals themselves, and of the locality in which they are situated, that it is wholly impossible for one Officer to discharge all these duties in such an efficient and useful manner as is consistent with the publick benefit, and the credit of the Government; not to mention that they require persons of wholly different characters,—and that the one should be stationary in an Office, and the other constantly moving about.

Appendix (I) No.
31. a. page 49.
Ibid.—No. 31.

An extract from a Despatch from the Honourable Court of Directors to the Governour of Bengal, under date the 26th of October 1842, was transmitted to your Committee, along with a Map alluded to in that Despatch, by order of the Honourable the Governour of Bengal.

Ibid.—No. 31. a.
page 50.

The Despatch transmitted a Copy of a Letter from Mr. Henry Wood to the Court, on the Drainage of Calcutta, and Protection of the City from inundation during spring tides.

Your Committee having previously fully reported on the Drainage, and not being aware of any danger which the City lay under from inundation, did not think it necessary to trouble the Government upon this particular Letter, but reserved it for observation in this Report.

The Chairman, by desire of your Committee, communicated these Documents to Colonel, then Major Forbes, of the Engineers, requesting him to take the trouble of drawing up a short Note on Mr. Wood's Letter, which might enable your Committee to make a satisfactory answer upon the subject to the Government.

Appendix (1)
No. 33, page 53.

They received from that gentleman a Letter addressed to their Chairman, containing in their opinion a satisfactory answer to Mr. Wood's proposal. They beg to refer your Honour to Colonel Forbes' Letter, in which he goes with sufficient minuteness into the particulars of the proposed Plan, showing to the satisfaction of your Committee that the erection of the Embankment beyond the Suburbs of the City, and along the Edge of the Salt Water Lake, &c., such as described by Mr. Wood, "is not merely unnecessary for the protection of the Town and Suburbs, but, under the circumstances speculated on by Mr. Wood, chiefly an extraordinary rise of Tide in the River Hooghly, could scarcely fail of producing the very effect it was intended to avert, by damming up the water, which under such extraordinary circumstances would overflow the River Bank, and which, if not checked by any embankment, or other impediment, would be able to discharge itself into the Salt Water Lake, where it would find a surface of 40 square miles of water, seven feet at its high-water level below the level of the City, and a still lower level of country extending 150 miles, which would pass harmlessly off to the Ocean any body of water, that, barring a second deluge, could ever overflow the River Bank."

Ibid.—No. 34,
page 53.

Your Committee need hardly add, that Mr. Wood's proposal, founded no doubt in the best intentions of benefitting the Capital of India, proceeds upon a want of knowledge of the levels of the Country, which would have been corrected, had reference been made to the accurate surveys detailed in the Appendices to your Committee's First Report.

The City of Calcutta stands in no need of protection from inundation, which it has no cause to fear; but stands in great need of Draining and Cleansing. This might be accomplished, as your Committee believe, at a greatly less expense than the costly Embankment proposed by Mr. Wood, by the Plan your Committee have suggested in their preceding Report, which would accomplish its purpose without detriment or danger; and this Mr. Wood's Plan assuredly would not.

Your Committee had the honour to receive a considerable time ago from the Government of Bengal, Papers relative to certain Municipal Laws proposed by Mr. McFarlan, then Chief Magistrate of Calcutta, which the Government of India had directed to be forwarded to the Deputy Governour of Bengal, with a request that the necessary communications relative thereto, might be made to your Committee.

Appendix to Ap-
pendix (F)

These Papers consisted of a Letter from the Secretary to the Indian Law Commission to the Secretary to the Government of India, of date the 19th of January 1838, a Letter from the same person to D. McFarlan, Esq. of date the 23rd of September 1837, and that gentleman's answer of date the 12th of October 1837. These Papers were taken into consideration by the Honourable the President in Council, on 27th February 1838.

Ibid.

Ibid.

Ibid.

Ibid.

Two of the matters only, to which the measures proposed related, the opinion of your Committee was desired upon, viz. the necessity of passing a Law for the regulation of Ferry Boats plying between Calcutta and the opposite bank of the River, and a Law to prevent the obstruction of Public Ghauts by Boats remaining for a long time in front of them.

Some further inquiry being necessary in regard to the practical means of regulating these Ferry Boats, and removing this obstruction, your Com-

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mittee, in order to prevent the further extension of the delay, which, they regret to say, has already taken place in the preparation of this Report, will make these matters, and that of the new Clinical Hospital, the subject of a short supplement to this Report.

We have the honour to submit this our Report to your Honour's consideration.

COMMITTEE ROOM :—TOWN HALL.

7th August 1846.

(Signed) J. P. GRANT, *Chairman.*
" H. GOODWYN, *Engineers.*
" A. H. E. BOILEAU, *Engineers.*
" F. P. STRONG.
" A. ROGERS.
" PROSSUNNOCOMAR TAGORE.
" J. GRANT, *Surg. Med. charge 2d Bat. Art.*
" RUSTOMJEE COWASJEE.
" J. H. PATTON.