PUBLIC WORKS DEPARTMENT

From
Er. E. Rajaraman., B.E.,
Assistant Executive Engineer, WRD,
Sathanur Dam Sub Division,
Sathaur Dam,
Tiruvanamalai District – 606070.

To
The District Forest officer,
Tiruvannamalai Division.
Thiruvannamalai.

Letter No. F3/2024.AEE/S.DAM, Dated:21.03.25.

Sir,

Sub: Forest (Conservation) Act, 1980 – Proposals for diversion of 0.90 ha of Forest land in Pennaiyar RF for the construction of Fuse Plug pertaining to Thandarampattu Taluk of Thiruvannamalai District - In principal (Stage-I) approval –Compliance Report submitted – reg.

Ref:
1. Online application uploaded by the User Agency – The Assistant Executive Engineer, PWD, Sathanur Dam, Tiruvannamalai District, Tiruvannamalai Proposal No.FP/TN/IRRG/118339/2021, dated:03.01.2021.
2. The Principal Chief Conservator of Forests (Head of Forest Force) Chennai, Ref.No.TS3/1022/2021, dated:19.01.2021
3. Part-II of Form-A uploaded by the District Forest Officer on 23.03.2022.
4. This Office Ref.No.2373/2021/D dt:24.03.2022.
5. The Principal Chief Conservator of Forests (Head of Forest Force) Chennai, Ref.No.TS3/1022/2021, dated:06.06.2022.
6. This Office Ref.No.2373/2021/D dt:14.06.2022.
7. The Conservator of Forests, Vellore Circle, Vellore Ref.No.3104/2022/D1 dt:17.06.2022.
8. The Principal Chief Conservator of Forests (Head of Forest Force) Chennai, Ref.No.TS3/1022/2021, dated:06.07.2022.
9. E-mail received from the Government of India, MoEF&CC, IRO Chennai on 22.12.2022.
10. The Principal Chief Conservator of Forests (Head of Forest Force) Chennai, Ref.No.TS3/1022/2021, dated:03.08.2022.
11. Government Lr.No.14151/FR.10/2022-2 dt:17.02.2023.
12. The Principal Chief Conservator of Forests (Head of Forest Force) Chennai, Ref.No.TS3/1022/2021, dated:03.03.2023.
13. This Office Ref.No.2373/2021/D dt:21.03.2023 & 22.05.2023.

14. The Executive Engineer, Middle Pennaiyar Division, TiruvannamalaiLr.No.120M/F.145/2023/JDO.2 t:17.05.2023.

15. The Government of India, MoEF, Regional Office, Chennai Ref.No.F.No.4-TNB097/2022-CHN/1117 dt:03.09.2023.

16. The Principal Chief Conservator of Forests (Head of Forest Force) Chennai, Ref.No.TS3/1022/2021, dated:30.10.2023.

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With the above reference 16th cited, Stage – 1 approval was given by the Government of India with following conditions. I furnish here with the Compliance report on the conditions laid down by the Government of India in Stage-1 approval for the Diversion of 0.90 ha Forest land in Pennaiyar RF for the construction of Fuse Plug pertaining to Thandarampattu Taluk of Tiruvannamalai District as below.

Sl.No.	Conditions stipulated by Government of India	Compliance report by the User agency
1.	Legal status of the diverted forest land shall remain unchanged	The legal status of land will remain as forest land
2.	Demarcation of the proposed forest area shall be carried out by erecting 4 feet high cement concrete pillars duly numbered at an interval of 20 meters at the cost of the User Agency	Demarcation of the proposed diversion area has been completed by erecting 4 feet height reinforced cement concrete pillars duly numbered at an interval of 20m at their cost. Photos enclosed.
3.	The State Forest Department shall carry out compensatory afforestation over an extent of 1.80 ha of degraded forest area in Pinjur C Block RF at the cost of the User Agency.	The User Agency have deposited an amount of **Rs.27,48,702/- (Rupees Twenty-seven lakhs forty-eight thousand seven hundred and two only)** for compensatory afforestation on 15.03.2024 by NEFT/RTGS and verified by CAMPA
4.	Identified CA area and CA scheme shall not be changed without prior approval of Central Government;	Does not arise

5.	The State Government shall charge the Net Present Value of the diverted forest land measuring O.9O ha from the User Agency as per the orders of the Hon'ble supreme court dated 28.03.2008 and 09.05.2008 in IA Nos.826 in 566 with related IA's in writ Petition (civil) No.20211995 and Ministry's guideline No.5-3l2/2011-FC(Vol-I) dated 06.01.2022 and clarification issued vide letter dated 19.01.2022 and 22.03.2022	The Net present Value of the proposed forest area has been deposited **Rs.11,05,731/- (Rupees Eleven Lakhs Five thousand Seven hundred and Thirty one only)**on 15.03.2024 by NEFT/RTGS and payment verified by CAMPA. Copy of Payment verification by CAMPA is attached separately.
6.	Additional amount of the Net Present Value (NPV) of the diverted forest land if any, becoming due after revision of the same by the Hon'ble Supreme Court of India in future, shall be charged by the State Government from the User Agency. The User Agency shall furnish an undertaking to this effect	Undertaking enclosed.
7.	All the funds received from the User Agency under the project shall be transferred/ deposited to CAMPA fund only through e-portal (https://parivesh.nic.in/)	All the funds deposited by the User Agency under the project transferred/deposited to CAMPA fund through the portal (https://parivesh.nic.in)

8.	The User Agency shall construct retaining walls and check walls wherever required, by consulting the DFO concerned, at the project cost;	Undertaking enclosed.
9.	No additional / new path shall be made during execution of the project	Undertaking enclosed.
10.	The User Agency shall obtain prior approval / permission from the Hon'ble SC of India/ CEC for felling of spontaneous trees.	The User agency has obtained approval from the Hon'ble Supreme Court of India for felling of spontaneous trees. Copy of order attached separately.
11.	After thorough examination on all aspects, the separate proposal for downstream Channel / pipeline upto reach the nearest or any such point of the original river course shall be submitted under FCA, 1980;	The User Agency has assured separate proposal for downstream channel / pipeline up to reach the nearest or any such point of original river under FCA 1980 will be furnished if any required.
12.	CAT plan may be insisted, if required as per the field conditions.	Undertaking enclosed.
13.	The State Government shall ensure to obtain approval / permission from the competent authority for increasing of water holding capacity of the dam. The State Government/ UA shall strictly comply with the hon'ble court / tribunalsorders if any in this regard	Undertaking enclosed.

14.	By conducting study by the reputed institution, the State Government shall ascertain whether additional forest will be submerged due to increasing height by constructing of proposed fuse plug and shall seek prior approval of the Central Government under FCA, 1980 for usage of such additional forest area, if required.	As per Dam Safety Review Panel Doc. No. DSRP-1/2020 by State Government conducted the inspection of total area of dam. The storage does not rise due to construction of fuse plug. So, does not arise this additional area of forest land required.
15.	Details of forest area leased for the dam and its allied activities by the State Government shall be submitted along with the compliance report i.e., extent of forest area leased out and period of lease, actual extent of forest area utilized etc., along with the supporting documents.	As per GO MS No. 2357 dt. 30.06.65 an extent of 1066 acre was placed under disposal of Public works Department (irrigation wing). copy enclosed.
16.	The project may involve cuttings and fillings which require engineering support shall be provided as per the instructions of the DFO concerned so as to stabilize the soil.	Undertaking enclosed.
17.	The dug out material / over burden shall be dumped outside the forest area. storage of any material shall not be done in the forest area	Undertaking enclosed.
18.	The layout plan of the proposal shall not be changed without the prior approval of the Central Government	Undertaking enclosed.
19.	The User Agency shall provide fire wood preferably alternate fuel to labourers working at the site to avoid damage/tree felling and no labour camp shall be established inside the forest area.	Undertaking enclosed.

20.	Disturbance shall be kept minimum by creating labour camps outside the forest area as far as possible and it shall be the responsibility of the User Agency to ensure that the labourers & staff engaged in execution of work do not destruct nearby forest flora & fauna.	Undertaking enclosed.
21.	The total forest area utilized for the project shall not exceed 0.90 ha and the forest area diverted shall not be used for any purpose other than those shown in the diversion proposal. The User Agency shall furnish an undertaking to this effect.	Undertaking enclosed.
22.	The forest land proposed for diversion shall under no circumstances be transferred or sublet to any other agency, department or person without prior approval of the Central Government;	Undertaking enclosed.
23.	The User Agency and the State Government shall ensure compliance to provisions of the all Acts, Rules, Regulations and Guidelines, for the time being in force, as applicable to the project.	Undertaking enclosed.
24.	Any other conditions that the Central Government or DDG, RO, Chennai may impose from time to time in the interest of afforestation, conservation and management of flora and faunain the area, shall be complied by the user agency	Undertaking enclosed.

25.	In the event of failure to comply with any of the above conditions the user agency is liable for penal action as provisions of rules /guidelines made under FCA, 1980.	Undertaking enclosed.
26.	The State Government shall process and submit compliance report on the above conditions through online (https://parivesh.nic.in/);	The user agency processed and submit the compliance report on the above conditions through online. (https://parivesh.nic.in/);

The User Agency has submitted the compliance report on the above conditions to take further action.

Encl: As stated above

Yours faithfully,

Assistant Executive Engineer,PWD,,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.6

This is to certify that additional amount of the Net Present Value (NPV) of the diverted forest land if any, becoming due after revision of the same by the Hon'ble Supreme Court of India in future, shall be charged by the State Government from the User Agency. The User Agency shall furnish an undertaking to this effect

21/3/25

Assistant Executive Engineer,PWD.,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.8

This is to certified that the User Agency shall construct retaining walls and check walls wherever required, by consulting the DFO concerned, at the project cost;

21/3/25

Assistant Executive Engineer,PWD.,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.9

This is to certify that No additional / new path shall be made during execution of the project

21/3/25

Assistant Executive Engineer,PWD.,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.11

This is to certify that, after thorough examination on all aspects, the separate proposal for downstream Channel / pipeline upto reach the nearest or any such point of the original river course shall be submitted under FCA, 1980;

21/3/25

Assistant Executive Engineer, PWD.,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.12

This is to certify that CAT plan not required for the project

Assistant Executive Engineer,PWD,,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.13

This is to certify that the State Government shall ensure to obtain approval / permission from the competent authority for increasing of water holding capacity of the dam. The State Government/ UA shall strictly comply with the hon'ble court / tribunals orders if any in this regard

Assistant Executive Engineer,PWD,,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.16

This is to certify that the project may involve cuttings and fillings which require engineering support shall be provided as per the instructions of the DFO concerned so as to stabilize the soil.

Assistant Executive Engineer,PWD,,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.17

This is to certify that the dug-out material / over burden shall be dumped outside the forest area. storage of any material shall not be done in the forest area

Assistant Executive Engineer,PWD,,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.18

This is to certify that the layout plan of the proposal shall not be changed without the prior approval of the Central Government.

Assistant Executive Engineer,PWD,,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.19

This is to certify that the User Agency shall provide fire wood preferably alternate fuel to labourers working at the site to avoid damage/tree felling and no labour camp shall be established inside the forest area.

Assistant Executive Engineer,PWD,,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.20

This is to certify that the Disturbance shall be kept minimum by creating labour camps outside the forest area as far as possible and it shall be the responsibility of the User Agency to ensure that the labourers & staff engaged in execution of work do not destruct nearby forest flora & fauna.

Assistant Executive Engineer,PWD,,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.21

This is to certify that the total forest area utilized for the project shall not exceed 0.90 ha and the forest area diverted shall not be used for any purpose other than those shown in the diversion proposal. The User Agency shall furnish an undertaking to this effect.

Assistant Executive Engineer,PWD,,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.22

This is to certify that the forest land proposed for diversion shall under no circumstances be transferred or sublet to any other agency, department or person without prior approval of the Central Government.

Assistant Executive Engineer,PWD,,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.23

This is to certify that the User Agency and the State Government shall ensure compliance to provisions of the all Acts, Rules, Regulations and Guidelines, for the time being in force, as applicable to the project.

Assistant Executive Engineer,PWD,,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.24

This is to certify that the Any other conditions that the Central Government or DDG, RO, Chennai may impose from time to time in the interest of afforestation, conservation and management of flora and faunain the area, shall be complied by the user agency

Assistant Executive Engineer,PWD,,
Sathanur Dam,
Thiruvannamalai.

Undertaken – Sl. No.25

This is to certify that the event of failure to comply with any of the above conditions the user agency is liable for penal action as provisions of rules /guidelines made under FCA, 1980.

Assistant Executive Engineer,PWD,,
Sathanur Dam,
Thiruvannamalai.

AGENCY COPY

यूनियन बैंक Union Bank of India

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 02-02-2024

Agency Name.	AEE PWD SATHANUR DAM
Application No.	57118339686
MoEF/SG File No.	4-TNB097/2022-CHN
Location.	TAMILNADU
Address.	SATHANUR DAMTiruvannamalai
Amount(in Rs)	3854433/-

Amount In Words : Thirty-Eight Lakh Fifty-Four Thousand Four Hundred and Thirty-Three Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	TAMILNADU CAMPA
IFSC Code:	UBIN0996335
Pay to Account No.	150875711833968 Valid only for this challan amount.
Bank Name & Address:	Union Bank Of India FCS Centre,21/1, III Floor, Jellita Towers, Mission Road, Bengaluru-560027

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

BANK COPY

यूनियन बैंक Union Bank of India

NEFT / RTGS CHALLAN for CAMPA Funds

Date : 02-02-2024

Agency Name.	AEE PWD SATHANUR DAM
Application No.	57118339686
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Bank Name & Address:	Union Bank Of India FCS Centre, 21/1, III Floor, Jellita Towers, Mission Road, Bengaluru-560027

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

Note:After making the required payment through challan, if the payment status has not been updated even after 7 working days, then kindly mail a copy of your challan with transaction date and reference id to Email: fcsblr@unionbankofindia.bank , epurse@unionbankofindia.bank, ubin0903710@unionbankofindia.bank

Attested.

21/3/25

ASSISTANT EXECUTIVE ENGINEER, WRD
SATHANUR DAM SUB-DIVISION
SATHANUR DAM

[illegible]

FOOD & AGRI.(FOR) DEPT.

ABSTRACT

Land required for

Forests - [illegible] Reservoir Project - [illegible] spread area of the reservoir 3,000 acres [illegible] control - [illegible] acres permanently required [illegible] (Irrigation) [illegible] Orders passed.

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Read:-

1. G.O.Ms.No.1939, F&A, dt. [illegible].8.1957

~~2. G.O.Ms.No. 272, Revenue dt. 10.1.1962.~~

2. G.O.Ms.No.2571, F&A dt. 24.8.63.

Read also:-

3. From the C.C.F., [illegible].No.47[illegible]/60-[illegible] dt.[illegible]

4. From the C.E.(I) Lr.No.2216/69 [illegible].13.dt.14.11.[illegible]

5. From the C.C.F. Ref.No.8421/63 [illegible]4 dt.7.1.64.

6. From the C.E.(I) Lr.No.2215/59-[illegible]14 dt.25.[illegible]

7. From the C.C.F. Ref.No.400[illegible]/64-[illegible]4 dt.10.[illegible].64

8. From the Dy. of Agr.(L.[illegible]) D.F.Ms.No.1598 ([illegible]) dt. 28.10.1964.

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G.O.Ms.No. 2357 Dated: 30.6.65

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In the G.O. ~~third~~ second read above, the Govt. have ordered inter alia ~~[illegible]~~ that whenever forest land is transferred for a commercial purpose, land value should be collected by the Forest Dept., irrespective of the fact whether the Dept. requiring the land is classified as commercial or not.

2. In connection with the [illegible] Reservoir Project, the following areas were transferred to [illegible] by the Forest Dept.:-

(i) Water spread area of the Reservoir	...	3,20[illegible] acres
(ii) Head works, camp and main canal	...	1,033 acres
Total	...	4,[illegible] acres

[illegible] forms [illegible] part of [illegible]

... the Forest Dept. is losing the benefits of these lands. To remove this anomaly, the C.C.F. suggested leasing of the entire area to the P.W.D. on a rental of Rs 12/- (Rupees Twelve only) per acre per annum. The C.E. (I) is not agreeable to the suggestion. He has reported that it is sufficient in respect of the water-spread area if his Dept. officers are allowed freedom of movement to collect materials like earth required for the maintenance and repairs of the dam, and the Forest Dept. may continue to have control over the water-spread area, viz. 3,200 acres, as in the case of Mettur Vanimuthar Project, and that the Forest Dept. may continue to have control over this area. As for the area under the works, camp and main canal, viz. 1,033 acres, the C.E. (I) is of the view that this area is permanently required by the P.W.D. and should therefore be transferred to that Dept.

2. The Board of Revenue has suggested that in respect of the water-spread area it is enough if the P.W.D. officers were given freedom to remove earth etc. for maintenance wherever necessary in respect of this area and thus allowing the Forest Dept. to continue to retain the control of this area.

As regards the area of 1,033 acres covered by the head works, main canal, and camp, the Board has stated that mere permission to move about and to remove earth from this area will not meet the requirements of the Irrigation Dept. as the Sathanur Reservoir area also serves as a tourist centre. The Board has, therefore, recommended that this area should be placed under the complete control of P.W.D. and that the P.W.D. should pay for the cost of these lands (1,033 acres) to the Forest Dept. and the amount then credited to the Forest Dept.

3. The Govt. accept the recommendations of the Board of Revenue. The C.C.F. is requested to take action ... with the recommendations of the Board of Revenue referred to in para 2 above and to submit proposals in

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consultation with the ... of Revenue ... for determining ~~fixing-up~~ the value of 2,036 acres of land referred to.

4. This order issues with the concurrence of the Fin. Dept. vide its U.O.No.50898/Accts/65-1, dt. 6.5.65.

The ..., Madras-5. 16.6.65
The ... (I), Madras-5.

Copy to:

The Bd. of Rev.(L.R.), Madras-5.
The ... P.W.D. Dept.
The ... Dept.

2/8/65

[C B E 10.10.65 re-para 3.]

[C.B. entry made against S.No 35 dt 29.7.65]

Asst. Commissioner
Tamil Nadu Archives
Egmore, Chennai-600 008

Attested.

21/3/25

ASSISTANT EXECUTIVE ENGINEER, WRD
SATHANUR DAM SUB-DIVISION
SATHANUR DAM

FOOD & AGRL (DIS) DEPT.

ABSTRACT

Forests – land required for Sathanur Reservoir Project – through to

P.W.D. further orders passed.

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Read:-

1 G.O Ms.No.1939, F&A at. 25.6.1957.

2. G.O.Ms.No.2571, F&A at. 24.8.1963.

Read also:-

3.From the C.C.F. Reg.No.47449/60-D4 dt.14.8.62

4.From the C.E. (I) Lr.No.2216/69 H 13.dt.14.11.62

5.From the C.C.F. Reg.No.5421/63-D4 dt.7.1.64

6.From the C.E. (I) Lr.No.2216/59 H14.dt.25.4.64

7.From the C.C.F. Reg.No.4002/64-D4 dt.10.6.64

8.From the Bu. OF Rev. (L.R) B.P.Ms.No.1598 (I) dt.28.10.64.

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G.O.Ms.No. 2357 DATED: 30.6.65

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In the G.O. seven read above, the Govt.have ordered inter alia that whenever forest land is trasferred for a commercial purpose, land value should be collected by the forest Dept. irrespective of the fact whether the Dept. requiring the land is classified as commercial or not.

2. In connection with the Sathanur Reservoir Project the following areas were transferred to P.W.D. by the Forest Dept. :-

(1) water spread area or the Reservoir...3,200 acres

(2) Heda works, camp and main canal ....1,066 acres

Total .....4,266 acres

Attested

ASSISTANT EXECUTIVE ENGINEER, WRD
SATHANUR DAM SUB-DIVISION
SATHANUR DAM

One forest dept. is losing the benefits of these lands. C.C.F. suggested the leasing of the entire area to the P.W.D. on a rental of Rs.12/- (Rupees Twelve only) per acre annum. The C.E.(I) is not agreeable to this suggestion. He had reported that in respect of the water spread area of it is sufficient, if his Dept. Officers are allowed freedom of movement to collect the materials like earth required for the maintenance of the dam 1099 acres and that the Forest Dept – may continue to control over this area. The Board of Rev. Agreeable this view of 2,99,000 as in case or Manimuthaar Project.As for the area under the works Camp and main canal VIZ 1066 acres, the C.E (I) has furnished only that this area is permanently required by the P.W.D and should therefore be transferred to that dept.

The Board has stated that mere permission to move about and to remove earth from this area will not meet the requirement of the Irrigation Dept as the Sathanur Reservoir area also serves as a tourist Centre. The Board has, therefore, recommended that this area should be placed under the complete control of P.W.D and that the P.W.D should pay for the cost of this land (1,066 acres) to the forest Dept.

3) The Govt accept the recommendations of the Board of Revenue. The C.C.F is requested to take action accordingly with the recommendation of the board of Rev suggested to in Para 3 above and to submit proposals in.

On consultation with the board of Revenue (D.R) for determining the value of the 1,066 acres of land referred to.

4. This order issues with the concurrence of the Fin.Dept. vide its G.O.No.50898/ Acc.ts/65-1 dt.6.5.65

-Sd-

28.6.65

[C.B.E 10.10.65 re. para 3]

C.B. Entry made aqueduct – Sl.No.35 dt.29.7.65

Copy of G.O.Ms.No.2357, Food and Agriculture Department, dt.30.6.1965.

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Sub: Forest --Land required for Sathanur "Reservoir project—Transfer to Public Works Department – Further Orders passed.

Ref:
1. G.O.Ms.No.1939, Food and Agriculture, dt.25.6.1957.
2. G.O.Ms.No.1939, Food & Agriculture, dt.24.8.1963.
3. From the Chief Conservator of Forests, Ref.No.47449/60 –D4 dt.14.8.1962.
4. From the Chief Engineer (Irrigation) Letter No.2216/59H15 dt.14.11.1962.
5. From the Chief Conservator of Forests, Ref.No.5421/63 D4 dt.7.1.1964.
6. From the Chief Engineer (Irrigation) Letter No.2216/59H14 dt.25.4.64.
7. From the Chief Conservator of Forests, Ref.No.4002/64D4. dt.10.6.1964.
8. From the Board of Revenue (Land Revenue) B.P.Ms. No. 1598(Q) dated.20.10.1964.

ORDER:-

In the G.O. second read above, the Government have ordered inter alia that wherever forest land is transferred for a commercial purpose , land value should be collected by the forest Department irrespective of the fact whether the Department requiring the land is classified as commercial or not.

In connection with the Sathanur Reservoir Project, the following areas were transferred to public works Department.

(1)Water spread area of the Reservoir .... 3200 acres

(2)Read works, camp and main canal ..... 1066 acres

Total .... 4266 acres

The chief Concervator of Forests suggested the lease of the entire area of the public works department on a rental of Rs.12(Rupees twelve only) per acre per annum. The Chief Engineer (Irrigation) is not agreeable to this suggestion has reported that in respect of the water spread area of 3200 acres it is sufficient if his departmental officers are allowed freedom of movement to collect the materials like required for the maintenance of the dam as in the case of Manimuthar Project and that the Forest Department may continue to have control over this area. The Board of Revenue agree this view. As for the area under the works, camp and main canal viz. 1066 acres, the Chief Engineer (Irrigation) has pointed out that this area is permanently required by the public works Department and should therefore be transferred to that Department. The board has stated that more permission to move and to remove earth from this area will not meet the

Requirement of the Irrigation Department as the Sathanur Reservoir area also serves as a tourist center. The Board therefore recommended that the area should be placed under the complete control of public works Department and the Public works department should pay for the cost of this (1066 acres) to the forest department.

4) The Government accept the recommendations of board of Revenue. The Chief conservation of forest is suggested to take accordingly and submit proposals on consultation with the Board of Revenue (Land Revenue) for determining the value of the 1066 acres of land referred to value of the 1066 acres of land referred to.

5) This order issues with the concurrence of the finance Department vides its G.O.No.50398 Accts/ 65-1/ dt.06.05.1965

(By the order of the Governor)

To be or edited to L.1.Forests € Miscellaneous Other Sources Vellore West Division, Salam Circle

(Half Sheet)

Invoice for goods supplied to Government Department.

District Forest Officer, Vellore West Dn.....Tirupattur

---------- Dr.

To the ----------

Month and date	Reference to indent number and date.	Description of goods, number and date of sanction where necessary	Quantity supplied	Rate			Value		
Y 67	G.O.No.106263/D-II 65-15, Agri – Culture Department dated 13-4-67	Value of land for Sathanur Reservoir Project in Ponniar R.F/ to P.W.D. on permanent basis collection of land value	1066 acres	Rs. 240	A 00	P	2,55,	840.	00
(Rupees Two lakhs and fifty five thousand and eight hundred and forty only)									
							2,55,	840.	00

• In words

Station
Dated 195

Signature
Designation

Accepted and countersigned and credited in the accounts for the month of

Instructions for countersigning officer.

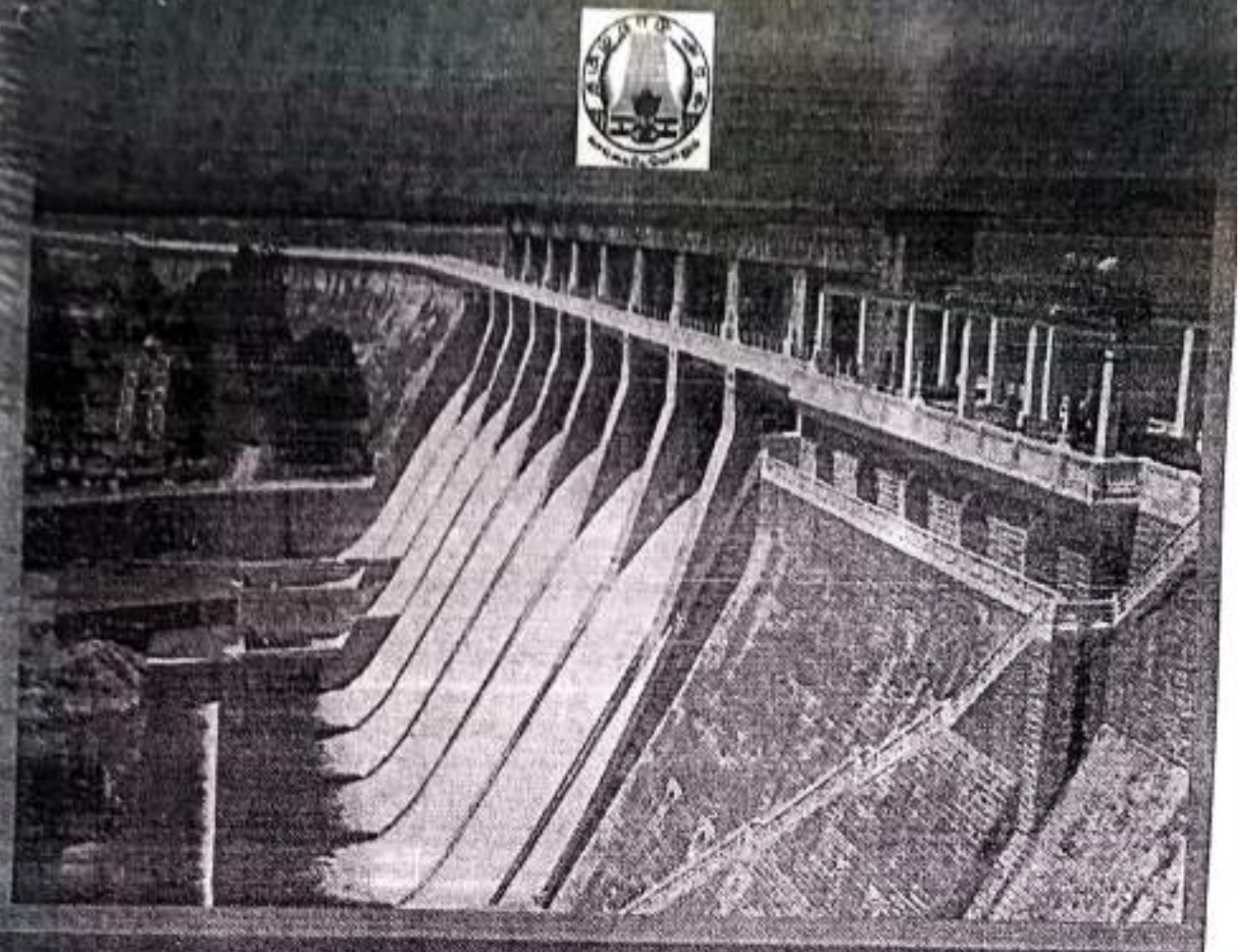
It is essential for accounting purpose that the entries below be filled in. Failure to do so with result in unnecessary delay and return of this invoice for compliance;-

(1) Head of charge (major, sub-head, primary and secondary units)----------
(2) Month and year to which the charge related----------
(3) Designation of the account officer by whom the charge is adjustable----------
(4) Name of the province to which debatable----------

(Signature of officer supplied)

Attested
Spoony
6/10/20

ASSISTANT EXECUTIVE ENGINEER, WRD



Dam Safety Review Panel (DSRP) Inspection Report of *SATHANUR DAM*

Doc. No. DSRP-1/2020

JANUARY 2020

WATER RESOURCES DEPARTMENT

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Annexures:

Annexure-I : Scheduled Dam Safety Inspection Form

Annexure-II : Checklist of Various Instruments Installed On Large dams

Dam Safety Review Panel (DSRP) Report
SATHANUR DAM

PREAMBLE

The Government of Tamil Nadu have constituted Dam Safety Review Panel (DSRP) vide G.O M.S No 246 Public Works (WR 1) Department Dated 26.12.2019 with 6 members for carrying out safety inspection of Dams in Tamil Nadu. The main objective of the DSRP is to conduct a site visit to each DRIP II dams proposed by TNWRD and to recommend remedial measure and additional interventions to ensure safety of the dam. Based on the recommendation of the DSRP the dams proposed by TNWRD will be considered for rehabilitation under DRIP II programme of Government of India with the loan assistance of World Bank. The government order for constitution of DSRP for DRIP II is annexed in **Appendix A.** The panel comprises of the following members:

1	DR. B.K.Mittal, Former Chairman, CWC, New Delhi	Chairman of the DSRP and Hydrology and Dam design Expert
2	Thiru. MurariRathinam, Former Director, CSMRS, New Delhi	Member and Instrumentation Expert
3.	Thiru.V.K.Maini, Former Chief General Manager, NHPC, Faridabad	Member and Hydro mechanical Expert
4.	Thiru. R.Selvam, Former Chief Engineer, TNWRD	Member and Dam safety and design expert
5.	Thiru. G. Rajagopalan, Former Director, GSI	Member and Geologist
6.	Thiru. S. Rustham Ali, Former Chief Engineer, TNWRD	Member and Construction and Supervision Expert

Subsequently Vide G.O Ms. No. 35 Public Works (WR 1) Department Dated 24.1.2020 sanction has been accorded to constitute one additional DSRP team with

additional members who will function as **DSRP Team II** with the same Terms of Reference as approved in the G.O M.S No 246 Public Works (WR 1) Department Dated 26.12.2019 and according to the guidelines issued by Central Water Commission in order to speed up the inspection process. Also approval has been accorded to substitute the members of DSRP Team I with members of Team II and vice versa considering their availability to proceed with the inspection and hence the team composition will be decided by the Project Director, SPMU then and there based upon the requirement and situation. The government order for constitution of additional team for DSRP for DRIP II is annexed in **Appendix B**

The additional members approved in DSRP team II and their expertise is as follows:

1.	Thiru. Naresh Kumar Mathur, Member, D&R	Chairman of the Committee and Hydrologist and Dam Design Expert
2.	Thiru. K. Padmanabhan, Former Special Secretary to the Government, PWD, Tamil Nadu	Member and Hydrologist and Dam Safety Expert
3.	Thiru. H K Sahu Former Chairman, Godaveri River Management Board	Member and Hydro-mechanical Expert, Dam Safety Expert, Design Expert
4.	Thiru. Vivek Tripathi, Director, CMDD (E&NE), Central Water Commission (current)	Member and Dam Safety and Designs Expert, Seismic Expert
5.	Dr. R. Srinivasan, Former Deputy Director General, Geological Survey of India	Member and Geologist
6.	Thiru. C. Thanavelu, Former Director, Geological Survey of India	Member and Geologist
7.	Thiru. V.K. Gupta, General Manager – Hydro Mechanical, Jaypee Infra Ventures	Member and Hydro-mechanical Expert
8.	Thiru. Shailesh Kumar Srivastava, Former Chairman, Krishna River Management Board, Hyderabad.	Chairman and Hydro-Mechanical

Based on the availability of the members, Dam Safety Review Panel inspection comprising of the following members was proposed from 28.1.2020 to 1.2.2020 for inspection of four TNWRD Dams namely Sathanur, Vaniar, Kelavarapalli and Krishnagiri..

1	DR. B.K.Mittal, Former Chairman, CWC, New Delhi	Chairman of the DSRP and Hydrology and Dam design Expert
2	Thiru. Murari Ratnam, Former Director, CSMRS, New Delhi	Member and Instrumentation Expert
3.	Thiru.V.K.Maini, Chief General Manager, NHPC, Faridabad	Member and Hydro mechanical Expert
4.	Thiru. R.Selvam, Former Chief Engineer, TNWRD	Member and Dam safety and design expert
5.	Thiru. C. Thanavelu,, Former Director, GSI	Member and Geologist
6.	Thiru. S. Rustham Ali, Former Chief Engineer, TNWRD	Member and Construction and Supervision Expert

The team members travelled from their respective stations and assembled at Chennai on 28.1.2020. The team accompanied by State Project Management Unit officials proceeded to Thiruvannamali for inspection of Sathanur Dam.

On 29th January, 2020, after having preliminary discussions with the TNWRD officials the DSRP members along with TNWRD officials proceeded for inspection of Sathanur Dam.

The list of officers accompanied the panel for the inspection is given at **Appendix C.**

1. General

The Sathanur dam has been constructed across the river Pennaiyar in Sathanur village of Tiruvannamalai district in Tamil Nadu at Latitude of 12^0 11' 0.51"N and Longitude of 78^0 51'1.41"E during the period from 1954-1957. The dam can be accessed by the rail head Tiruvannamalai at a distance of 32 km and the nearest airport is Chennai which can be reached by road at a distance of 217 km.

The Pennaiyar River originates on the South Eastern slopes of Chennakesava Hills, North West of Nandidurg in Karnataka State at an altitude of 1000 m. The total length of Pennaiyar River is 432 kms. of which 112 kms. lies in Karnataka State, 180 kms. inDharmapuri, Krishnagiri& Salem districts, 34 kms. inThiruvannamalai district and 106 kms. inCuddalore and Villupuram districts of Tamil Nadu.

The main tributaries of Pennaiyarriver are Chinnar I, Chinnar II, Markandanadhi, Kambainallur, Pambar, Vaniyar, Kottapatti, Kallar, VayalarOdai, Ramakal, Pambanar, Aliyar, Mushkundanadhi and Thurinjilar.

The dam is of masonry-cum-earth dam. The **total length** of the Reservoir is **780m** of which **masonry dam** is **419m** the balance **361m** is of **earth dam**. The masonry dam is designed as a gravity structure. The sill of the river sluice is fixed as **+185.93m** above Mean Sea Level. The **height of the dam** (i.e) crest of spillway above the sill of river sluice is **36.27m**.The catchment area of the Sathanur dam is 10825.78 sq.km. The capacity of the dam at FRL of + 222.20 m is 228.91 MCM. The MWL is + 222.20 m.

The Spillway consists of 9 vents of size 12.20m x 6.10m, the maximum discharging capacity of the spillway is 3282 cumecs. The balance flood discharge will be disposed through the saddle and additional spillway at the right flank.

During the constructions of II nd stage, the capacity of the Reservoir was increased from 4600 Mcft. to 8100 Mcft by providing additional facilities in the main spillways and saddle spillway. This was made possible by providing 6.10m (20') high gates on the crest of the spillway. The right flank saddle which was at low level was

converted into vented escapes. The saddle is having 11 vents of size 12.20m x 4.577m (40ftx15ft) which is 31.700m (+104ft). above river sluice sill level. Thus the full reservoir level was raised from 30.175m to 36.270m(99ft to 119ft).

The earth dam is a zoned rolled fill type with front slopes 2.5:1 & 3:1 and rear slope of 2:1 & 2.5:1 the top width is 6.10 m (20ft). A cut off trench is provided for section of more than 3.00 m (10') height. The front slope is reverted with stones and rear slope is turfed and 3.00m (10ft) side berms at 6.10 m (20ft) vertical intervals. For effective drainage horizontal traverse filters are provided.

The original capacity of the reservoir for the FRL height of 119.00ft was 8100 M.cft. Due to the gradual siltation in the reservoir in the past 25 years, the original capacity has been reduced. The present capacity of the reservoir as per the soil siltation studies conducted by the IIH, Poondi in 1982 is 7321M.cft.

During the Dam Safety Assurance & Rehabilitation Project (1996), the Probable Maximum Flood value was revised as 21,181cumecs (747917cusecs) and vetted by the Central Water Commission. To route the PMF, an additional spillway with 11 gates of 12.20 m x 4.57m size with vertical lift gate and hoist in the row saddle on the right flank of the reservoir was constructed along with non-structural measures.

There are 5 Nos. of River sluices in which two nos. are connected to Power House and Three nos. of River sluices service gates and one emergency gate each of size 1.52 mx1.83 m located at a sill level of +185.93 m.

There are two main canals taking off from the Pickup Anicut located 7.50 km downstream side of Sathanur Dam and the length of Left Bank canal is 35.20 Km having a registered ayacut of 9700 Ha. The length of Right Bank canal is 26.64 Km having a registered ayacut of 8500 Ha.

Total command area of the dam is 20,242 ha (50,000 acres) lying in Thandarampattu Taluk of Thiruvannamalai District. Tirukoilur & Sankarapuram Taluk of Villuppuram & Kallakurichi District. The general index map of the project is appended in **Appendix D.**

2. Salient Features

The salient features of the dam is given below:

i. **SATHANUR DAM year of construction 1954 -1957**

1.	Name of Project	:	Sathanur Reservoir Project
2.	Name of River Basin	:	Pennaiyar
3.	Latitude	:	12°11' N
4.	Longitude	:	78°50' E
5.	River bed level	:	+602.00 Ft (or) 183.490 M
6.	Top of Dam	:	+737.00 Ft (or) 224.640 M
7.	Full Reservoir level	:	+729.00 Ft (or) 222.200 M
8.	Maximum Rear water level	:	+640.00 Ft (or) 195.070 M
9.	Height of Dam	:	119.00 Ft (or) 36.270 M
10.	Original Capacity at FRL during construction	:	8100Mcft. (or) 229.36Mcm
11.	Present Capacity at FRL		7321 Mcft. (or) 207.307 Mcm
12.	Water spread area	:	4500 Acres (or) 1821.10 Ha
13.	Catchment area	:	4180 Sq.miles (or) 10826 Sq km
14.	Maximum Flood Discharge	:	2,75,608 C/s (or) 7804.28Cumec
15.	River sluices	:	8,492 Cusecs (or) 240.47 Cumec
16.	Spillway	:	1,15,900Cusec (or) 3281.89Cumec
17.	Saddle vents	:	75,608 Cusecs (or) 2140.96Cumec
18.	Additional Saddle vents	:	75,608 Cusecs (or) 2140.96Cumec
19.	Total length of Dam	:	2558 Ft (or) 780 M
20.	Length of the Masonry Dam	:	1373 Ft (or) 419 M
21.	Length of Earth Dam	:	1185 Ft (or) 361 M

RIVER SLUICE

1.	No. of Vents	: 5 Nos.
2.	Size of Vents	: 5ft x 6ft (or) 1.53m x 1.83m
3.	Maximum Discharge	: 8492 Cusecs (or) 240.47 cumecs
4.	Sill of River sluices	: +610.00Ft (or) +185.97 m

SPILLWAY

1.	No. of Vents	: 9 Nos.
2.	Size of Vents	: 12.19 m x 6.10m
3.	Maximum Discharge	: 1,15,900 Cusecs (or) 3281.80 Cumecs
4.	Crest of Spillway	: +217.63 m (or) + 709.00Ft

SADDLE

1.	Length of the Masonry work between abutments	: 530 Ft. (or) 161.700m
2.	Maximum height of Masonry above foundation	: 55 Ft. (or) 16.76 m
3.	Saddle sill level	: +714.00 Ft. (or) + 217.68 m
4.	No. of Vents	: 11 Nos.
5.	Size of vents	: 40ft x 15ft (or) 12.20m x 4.57m
6.	Maximum Discharge	: 75608 Cusecs (or) 2140.96 cumecs

ADDITIONAL SPILLWAY OF SATHANUR DAM

1.	Length of Masonry work between abutments	: 161.700 M

2.	Number of Vents with size	:	11 Vents of 12.20m x 4.57m
3.	Designed flood discharge	:	75608 Cusecs (or) 2140.96 cumecs
4.	Foundation level	:	+216.000 m
5.	Bed level	:	+217.000 m
6.	Sill of additional spillway (Crest Level)	:	+217.630 m
7.	F.R.L.	:	+222.200 m
8.	M.W.L.	:	+224.640 m
9.	Top of Road way	:	+226.400 m
10.	Top of Hoist Bridge platform.	:	+233.000 m

3. Geology :

The project is located in the southern granulite terrain of Achaean age. Charnokite, Pyroxene granulite and the retrograded derivatives – hornblende biotite gneiss, biotite gneiss, amphibolite, etc. The terrain has undergone acidic, intermediate and basic magmatison of later ages. The injuction of acidic magma and the regional tectonic deformations led to formation of islands of gray magmatite gneiss.

3.1 Regional Geology:

Pyroxene – granulite, charnockite gneisses, magmatite gneisses and dolerite dykes are the predominant rock types exposed in the area. The rock is in general massive and at places well foliated. Three sets of dolerite dykes are delineated in the area are, 1 with trend in NW-SE, 2.Trending in NW-SE direction, 3. With strike NW-SE all the three sets are found to be parallel to the regional lineaments area present in the area.

The regional gneissosity / foliation of the rock types trends in a general NE-SW direction with moderate dips on either side. Local swerves are commonly seen in the foliation trends which are reflected very well by the pyroxene granulite stringers and linear bands.

3.2 Site specific geology:

Granitic gneiss with bands and patches of Pyroxene – granulite charnockitic gneisses and dolerite dykes are exposed on the left abutment of the masonry dam, river bed area, saddle and additional spillway area.

The foliation trend of these rocks is N 15^{0}E to N 20^{0}W – S20^{0}E and dip 40 ^{0} to 70^0 towards S75^{0}E to N 70^0 E direction. The foliation / foliation joint is generally feeble to moderately in addition to the foliation, four sets of joints are the discontinuities present in the rock mass. The details of the joints sets are giver here under

1. Strike N 60^{0}W -S 60^{0}E, dip 20^0 towards N30^{0}E this is the most prominent joints well absorbed on the left abutment hill and the river bed.
2. Strike N 70^{0}W – S 70^{0}E, dip 70^0 towards S 20^{0}W this set is disposed near parallel to the dam
3. Strike N 30^{0}E – S 30^{0}W, dip 80^0 towards N 60^{0}W this set is disposed near normal to the dam access.
4. Strike N 55^{0}E - 55^{0}W, dip vertical.

Spheroidal weathering controlled by the joint planes 1, 2 and 3 is prominently noticed in the top part of the left abutment hill.

The masonry dam is inferred to be abutted against partly weathered rock mass in the top part on the left side. Fresh bed rock is assessed to be the foundation medium of the lower part of the left abutment, river bed portion and in the core wall provided on the right hand side in the transition area. The cutoff of the embankment bank is to inferred to be positive. Both saddle and additional spill structures are founded in fresh Charnockite gneiss, granite and migmatite gneiss. Thin shear zones trending in North South directions is observed to be present in the rock mass exposed downstream of ED arrangements in the saddle spillway.

Precariously perched rock blocks are observed to be present on the slope just downstream of the dam. These boulders are core stones or spheroids bounded by highly or completely weathered seams. There exists possibility of these boulders get released and fall over the toe of the dam or ED arrangements. Hence suggested detailed study and

carry out in place protective measures.

Scouring due to removal of rock blocks are noticed just downstream of the ED arrangements of masonry dam and saddle spillway. Part of the end sill of the second stilling basin is found to be damaged due to under scouring. Recommended to study the scouring status and execution of remedial measures.

A rock ledge is observed to be present above the apron level of the ED arrangement of right end gates. Suggested to remove the rock ledge above apron level in order to facilitate smooth flow. The geology report is attached in **Appendix E**

Seismic analysis may be carried out as per IS codes for checking the stability during earthquakes.

4. Hydrological safety review :

The Sathanur Dam is constructed across river Pennaiyar in Tiruvannamalai District in Tamil Nadu at latitude of 120 11' N and longitude 780 50' E. The Dam is a composite Dam . The length of masonry Dam is 419.00 m and the length of earth Dam is 361.00 m. The Project was completed in 1958.

The height of the dam is 38.71 m from the river bed. The FRL / MWL of the dam is at an EL 222.20 m. The top of the dam is at an EL 224.64 m. The gross storage of capacity of the dam at FRL is 229.36 Mcum. The Catchment area of Sathanur River up to dam site is 10825.78 sq.km

The dam is classified as large dam as per BS11223-1985 criteria and hence the dam is qualified for PMF . The value of PMF is worked out as 21181m^3 /s vide CWC letter No. DSRD/1033-1039 dated 01.08.2014.

The total discharging capacity of the spillway including the additional spillway and saddle spillway is 7562 m^3 /s. The river sluices have a discharging capacity of 240.47 m^3 /s. There is a less capacity of surplusing works by a quantum of 13619 m^3 /s.

Since the PMF is higher than the existing surplising capacity, it is recommended to study the following alternatives for adoption.

1. Preparation of integrated flood management plan considering the flood absorbing capacity of the existing upstream two reservoirs and/or
2. Provide surplusing works on either side of the dam and/or
3. EAP (Emergency Action Plan) may be developed as per guidelines issued by CWC Government of India and put up into action for the extreme event along with dam break analysis.
4. Combination of above or any other arrangement.

The approved reports of hydrology review study and flood routing study are appended in **Appendix F.**

5 & 6 Issues in Dam and Appurtenant Structures

(Masonry / Earth Dams / Spillway)

a) Repairs and Renovation in Left Abutment Hillock portion

Seepage was noticed at the junction between masonry dam and hillock in the left abutment. The seepage was observed even in the skin wall provided at the downstream side which was already provided in DRIP I. The boulders in the hillock at downstream side were slipped here and there and seepage is found in that portion also. After inspection it is inferred that the seepage occurred at the left abutment contact the surface is due to presence of weathered rock in the contact surface.

Perusal of the drawings indicated that the top part of the dam has been abutted against partly to moderately weathered rock with spheroidal weathered seams.

The seepage is of moderately high flow type. It is informed by the project authorities that the issuance of seepage starts at the reservoir level of 210.97 m. it is also informed by the project engineers that the seepage was noticed to be through sub horizontally disposed weather joints. (Photo) The pH of reservoir water as well as the seepage water is found to be same. Based on the above it is inferred that the reservoir water through a moderately weathered seam and escape out on the hill slope downstream of the dam. The seepage water is in general clean without perceptible material carriage.

The total quantum of seepage measured was 74.99 lpm in 1993 at FRL got reduced to about 27.21 lpm in 2000. Since then the quantum of seepage at FRL shows increasing trend to a maximum of 131 lpm in 2016.

It is recommended to carryout consolidation grouting including the interface between the rock and the dam structure.

b) Removal of Rock ledge

A linear rock ledge is present across the lead channel of the additional spillway which was acting as a coffer to facilitate the construction of additional spillway is left unexcavated obstructions the flow to additional spillway. Part of the rock ledge is found to be above the FRL level obstructing the flow through the channel. In order to facilitate the smooth flow it is suggested to remove the rock ledge and the smoothen the channel.

c) Surface drains on dam top

Surface drains of suitable size and interval may be provided to drain the rainwater on the top of the masonry dam.

d) Reaming the Porous drains in Masonry Dam

Most of the porous drain in the body of the masonry dam are fully clogged with lime leachate. Hence it is essential for reaming the porous drains in body of the masonry dam for effective functioning.

e) Water Quality Studies

Provided water quality studies being generated by the Project authority may be assessed for its possible effect on components of masonry and other metallic parts.

7. Hydro mechanical items

7.1 Replacement of Spillway Shutters and saddle spillway shutters.

The Shutters in the spillway and Saddle spillway were made at the time of construction. It is reported by the Project authorities that the shutters are rusted at many places and parts are worn out. It is recommended to measure the thickness of main

members of the shutters through NDT method. In case there is significant reduction in thickness from design value the shutters may be replaced for efficient operation.

7.2 Changing the Electrical Cables, Starters for shutters

The electrical cables in spillway and saddle shutters are mostly damage and short circuits occurred in the cable line. Hence this cable should be fully replaced to avoid any electric accident and better operation of the shutters.

8. Instrumentation, Surveillance, SCADA and Data Transfer

Instrumentation

It was informed by the project authorities that only V-notches have been provided in the entire dam. Therefore,

Following instruments are required to be installed.

- Automatic water level Recorder.
- Automatic weather station.
- Piezometer for uplift pressure measurement.
- Automatic V notches.
- GNSS (Global Navigation Satellite System)
- Data logger with appropriate computer system.
- Automatic Rain Gauges in the catchment area.

Provision of SCADA

It is proposed to bring all the dam gates under SCADA with provision of remote/ local operation from control room.

Alternate Power Supply

It is also proposed that alternate power supply by the way of DG sets of suitable capacity may be provided.

Communication

The existing communication system may be improved and Surveillance (CCTV) camera to be installed.

9. Investigation

Necessary investigation is recommended in already enumerated under different items.

10. Non-Structural Measures

Emergency Action Plan may be prepared in conjunction with dam break analysis. Necessary arrangements and facilities are to be provided in accordance with the Emergency Action Plan.

11. OPERATION AND MAINTENANCE MANUAL

The operation and maintenance manual has been prepared as per the guidelines prepared by CWC and submitted to CWC for approval.

12. SECURITY ARRANGEMENTS FOR DAM AND DAM APPURTANANCES

At present two police constables of Tamilnadu state Police Department are available at the entrance gate for security arrangement for Sathanur dam.

13. BASIC DAM FACILITIES

i) Lightening arrester

During the year 2019 lightening was observed (thunder) in u/s side of the main spillway the electric motor and shutters cable arrangements have been severely damaged. Hence it is essential to provide lightening arrester in the main spillway, saddle spillway and additional spillway.

ii) In gallery hand rail facilities should be provided.

iii) The fencing arrangement around the dam camp area should be provided.

iv) Repair and Renovation of Roads

The approach road in around the park and camp area shall be renovated.

ASSISTANT EXECUTIVE ENGINEER, WRD
SATHANUR DAM SUB-DIVISION
SATHANUR DAM

v) Repair and Renovation of Pickup Road

The distance between Sathanur Dam to pickupanicut was 7.5 K.M. The B.T road connecting the pickup anicut from Sathanur Dam was formed at the time of construction of the Dam. At present this road was unfit for usage and eroded in most of the places. Hence the road shall be renovated.

vi) Construction of new Quarters

The asbestos roofed temporary sheds with mud mortar are constructed during the construction of dam for the purpose of accommodate the workers involved in the construction work. The quarters are under fully damaged condition and not fit for accommodation. All the door and windows and the rafters in the roof are dilapilated condition. The floors have also been in damaged in condition. Hence necessary renovation shall be made to the quarters.

It is recommended that the above item of works may be included.

14. SOURCES OF SECONDARY REVENUE GENERATION

For the generation of secondary revenue it is recommended that necessary tourism facility may be developed and updated.

15. RECOMMENDATIONS :

- To accommodate the PMF, suitable surplussing arrangements may be provided
- Consolidation grouting at the junction of masonry dam and left abutment
- Stability of the Dam body wall has to be checked for the seismic conditions.
- Reaming the Porous drains holes in the masonry dam
- Removal of Rock ledge in Upstream additional saddle spillway
- Replacement of spillway and saddle shutters
- Provision of SCADA for dam gates

- Additional Instruments as identified
- Replacement of Existing damaged quarters
- Improvements to Park
- Improvement to Approach Road to Pickup Anicut and Camp Area
- Provision of Electrical cables, Starters for Shutters and lightening arrester at dam site.
- Emergency Action Plan should be prepared and put it in place.

16. CONCLUSION:

The dam is performing fairly and safe. However a fuse plug of appropriate length may be provided at the earliest.

17. IMPORTANT DOCUMENTS ANNEXED

The following documents are attached :

- Government orders for Constitution of DSRP - Appendix A. & B
- List of TNWRD officers present during inspection - Appendix C.
- General index map of Sathanur Reservoir - Appendix D.
- Geological report of Sathanur Dam – Appendix E
- Hydrology Study Report - Appendix F
- Plan and cross-section of main dam - Appendix G
- Photographs taken during the visit- Appendix H
- Water quality Test Results – Appendix I
- DRIP – Phase I - DSRP Recommendation – Appendix J
- Extract of hillock portion seepage register – Appendix K

18. PHOTOGRAPHS

The photographs taken during the visit are enclosed in Appendix H.

19. REFERNCES

Guidelines issued for DSRP inspection by CWC

R.Selvam
(Member)

S. Rustham Ali,
(Member)

C. Thanavelu
(Member)

Murari Ratnam,
(Member)

V.K.Maini
(Member)

Dr. B.K.Mittal,
(Chairman)

Attested
4/12/25
ASSISTANT EXECUTIVE ENGINEER, WRD
SATHANUR DAM SUB-DIVISION
SATHANUR DAM

ANNEXURE – XV

FLOOD ROUTING OF SATHANUR DAM

S.E/P.D.	
E.E.	
A.E.E.	
SUPDT.	

GOVERNMENT OF TAMILNADU
WATER RESOURCES ORGANISATION

From
Er.K.Balaiya. M.E
Superintending Engineer, PWD,
Designs Circle. WRD,
Chepauk, Chennai-5.

To
The Project Director/ Superintending Engineer,WRD,
State Project Management Unit,(DRIP)
No;6, Palar House,
KamarajarSalai. Chennai-5.

07 MAR 2016

Lr.No:42 M / SE (D) / T – 5 / F- DRIP / 2014. Dt: 12.02.2016

Sir,

Sub: Revised Flood Routing Study of SathanurDam underDRIP-Reg.

Ref:1.DeputyDirector,DSR,CWC ,Lr.No:16/3/TN-Design Flood Review/DSRD/623-1034/Dated:31.07.2014.
2. PD/SE, SPMU, Chennai-5 Lr.No: F1001/Sathanur Dam/2014 dated:19.08.2014.
3. SE(D) lr No. 157M / F- 39/AEE III /2014. Dt: 28.01 15
4. Lr nNo. DRIP/ TNSPMU/ Sathanur/2014/dt 23.11.2015

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In the reference first cited, the CWC has recommended a design flood hydrograph with peak value of 21181cumecs for Sathanur dam. As per the request of the Project Director, SPMU, DRIP in the reference second cited flood routing study for the above dam was carried out as the revised recommended flood exceeds the design flood of 5664Cumecs and the report communicated in the ref third cited.

From the flood routing study with the existing surplus arrangements it was inferred that the water level rises beyond FRL at 27th hour. At 42nd hour the water level in the reservoir reaches beyond TBL and the dam is overtopped. Accordingly non structural measures were recommended. However it was also recommended to carry out a joint inspection of the dam by CE (PF) and CE (Chennai region) to explore the possibility of providing a fuse plug as it was suggested by the DSRP during inspection on 11.12.14

Accordingly a joint inspection has been carried out on 24.10.15 and the inspection notes were received in this office in the PD, DRIP letter reference fourth cited. In the inspection report the following were suggested. Since the earth dam is provided with wave deflector parapet wall with top level 2.0m higher than TBL the flood routing may be revised taking into account the top of parapet. The site for the possible fuse plug on the foreshore of the left rim was explored. The proposed location was found to be feasible with some constraints such as land acquisition etc.

The Project director in his letter fourth cited had requested to revise the flood routing study taking into account the top parapet wall which is 2m higher than the TBL. Hence a revised flood routing study was taken up in this office. Though the parapet of the earth dam is 2.0m

higher than the TBL the parapet of the non spillway is lower than that of the eath dam, hence water levels upto the top of the parapet of the non spillway ie + 225.55 was accounted in the analysis. Levels beyond this will cause overtopping of the non spillway which cannot be permitted.

The routing was carried out by modified plus method and it was found that in spite of considering the parapet the Reservoir level rose beyond the top of parapet overtopping the dam with the existing surplus arrangements. Hence the routing study was carried out with the existing surplus arrangements namely Main spillway, Saddle spillway, Additional spillway and a fuse plug. A fuse plug 650m long is required to contain the flood without the dam overtopping.

It is observed that the water level almost rises to the parapet top at the 58th hour reaches the peak level of +225.54 (only 0.01m below the top of parapet)at the 63rd hour The WL remains within 0.25m below the parapet from 57th hour to 75th hour (for 18 hours) before the flood recedes. The peak outflow through the dam at the 63rd hour is 20993cumecs.

The PMF for the dam is three times higher than it's discharging capacity inspite of the saddle and additional spillways provided. Hence a fuse plug is additionally required to prevent overtopping of the dam. However the practical feasibility of providing such a long fuse plug in the reservoir, formation of surplus course on its downstream has to be considered. Likely areas to be inundated due to the fuse plug in addition to the discharge from the other three surplus arrangements may have to be explored.

Whether limiting the length of the fuse plug combined with other nonstructural measures or totally dispensing with and providing nonstructural methods as suggested earlier shall be decided weighing the pros and cons involved.

The detailed report on the flood routing study is enclosed.

Encl: Report of Sathanur dam Flood routing study.

22.2.16.

For Superintending Engineer, PWD,
Designs Circle, WRO,
Chepauk, Chennai-5.

REPORT

Sathanur Dam was constructed during the year 1954 to 1958 across the Ponnaiyar River. The dam is located at Latitude 12°11' N and Longitude 78°50'E in Thiruvannamalai District. As per the BIS 11223 : 1985 criteria the dam is classified as large dam and qualified for Probable Maximum Flood.

Hydraulic Particulars: (as furnished by the Field Engineers)

FRL	: +222.2 m
MWL	: +224.64 m
TBL	: +224.64m
Top of parpet of non spillway	: +225.55 m
Top of parapet in earth dam	: + 226.64 m
Capacity at FRL	:207.305 Mm^3 (7321Mcft)
Main spillway:	
Designed MFD	: 3261.8 Cumecs (or) 1,15,900 Cusecs
Crest	: +216.1m
Type of shutter	: Lift gates
No. of gates	: 9Nos.
Size of gates	: Size 12.19 m X 6.1m
Deepest bed level	
Saddle spillway:	
Designed MFD	: 2140 Cumecs (or) 75,608 Cusecs
Crest	: +217.63m
Type of shutter	: Lift gates
No. of gates	: 11Nos.
Size of gates	: Size 12.19 m X 4.57m
Additional spillway:	
Designed MFD	: 2140 Cumecs (or) 75,608 Cusecs
Crest	: +217.63m
Type of shutter	: Lift gates
No. of gates	: 11Nos.
Size of gates	: Size 12.19 m X 4.57m

Inflow Hydrograph

According to the classification of IS: 11223 - 1985, Sathanur dam is a '**Large dam**'.

The finalized inflow hydrograph approved by CWC with the peak inflow of 21181cumecs The PMF inflow hydrograph (Inflow from intermediate catchment between Krishnagiri and

determined considering the flow as an orifice using the formula as per IS 6934-1998

the saddle surplus course as a certain distance. The RWL is computed iteratively for each increment of u/s water level.

As in the saddle spillway the discharge is computed unde the three conditions mentioned above with the same coefficient of discharge.

Fuse plug

In addition to existing surplus arrangements , a fuse plug providing fuse plug to breach @ level of +222.8m and sill @ +222.2m was considered.. For the levels corresponding to the surplus arrangements above the sill level of fuse plug (+222.2 m), the outflow is determined for free flow considering it as a bye wash with 'Cd' value of 0.437.

$$Q = 2/3 * C_d \times (2g)^{(3/2)} \times B \times h^{(3/2)}$$

$$C_d = 0.43$$

A length of 650m had to be considered to prevent overtopping of the parapet of the nonspillway.

Stage Vs Capacity

The Stage Capacity table as received from the field is interpolated for every 0.20 m interval from the elevation of +216.1mupto FRL (+222.2m) and extrapolated upto +225.55m in the interval of 0.20 m. The Stage Vs Capacity curve has been derived for interpolated and extrapolated values separately and plotted.

Flood routing

Modified Puls Method of flood routing is being adopted for the reservoir routing.

Flood routing studies are made using PMF inflow hydrograph with the existing main spillway (9 vents), saddle spillway (11 vents) and additional spillway (11 vents) and fuse plug.

. Flood routing is carried out with impinging level as +221.60m. i.e., 0.6m below FRL

i. The Instantaneous inflow is made equal to the outflow maintaining the reservoir level at +221.6m.

ii. When the inflow is close to the spillway capacity @ +221.6 between 21st and 24thhour, the process of flood routing is carried out in the 21st hour.

It is observed that the water level riser higher than FRL at 27th hour rises above the TBL of @ 48th hour and almost rises to the parapet top at the 58th hour reaches the peak level of +225.54 (only 0.01m below the top of parapet) at the 63rd hour. The Reservoir level remains within 0.25m below the parapet from 57th hour to 75th hour (for 18 hours). The reservoir level falls back to FRL by the 90th hour. The peak outflow through the dam at the 63rd hour is 20993cumecs.

iii. $Q = Cg*Go*L*(2*g*Hc)^{0.5}$

coefficient Cg is taken varying from 0 .77 to 0.825 for various heads

Go is the Ht of gate opening

Hc is the Ht of FMWL to the centre of gate opening

Saddle spillway:

The discharge, for every 0.20 m increase in water level in the reservoir starting from crest of +217.7 m to +225.55m is determined. The gates are considered to be completely lifted upto +222.20

From the LS of the surplus course of the saddle spillway river furnished for a length of 1KM the slope of the course was determined using a trend line and works out to 1 in 70. From the cross section of the surplus course 50m D/ s of the saddle spillway the bed width is adopted as 225m and the side slope as 0.5:1 The RWL is computed iteratively for each increment of u/s water level.

i. The outflow through the surplus arrangement is determined considering the free flow over a broad crested weir till the RWL is below the sill of the saddle usinfg the following formula

1.7 Leff H^ 1.5

ii. For RWL above the sill level the outflow is computed as a drowned weir until the upstream water level reaches the top of opening (gate ie +222.2) using the following formula(i.e.FRL).

$Q = 2/3*C_{d1}*(2g)^{(3.5)*}L_e*h^{(3/2)} + C_{d2}*(2gh)^{(3.5)*}L_e*h_1$

where

$C_{d1} = 0.577$ & $C_{d2} = 0.80$

h=WL- RWL, h1= RWL- Crest level

iii. For reservoir level above the bottom of the breast wall, the discharge is calculated b orifice discharge formula discharging under partially submerged conditions, the outflow is determined using the formula as below

$Q = C_d * Le * sqrt(2g) * \{[(H_2 - H) * sqrt(H)] + 2/3 * (H^{(3/2)} - H_1^{(3/2)})\}$

$C_d = 0.77$

H= WL- RWL, H1= WL- FRL, H2= top of opening – Crest level

Additional spillway:

Similar to the saddle spillway The discharge, for every 0.20 m increase in water level in the reservoir starting from crest of +217.7m to +225.55m is determined. The gates are considered to be completely lifted upto +222.2. from the CS of the surplus of the additional spillway the bed width of the course is adopted as 165m with side slope of 0.5:1 the slope of the surplus course is considered to be the same as that of saddle as the course merges with

Recommendations

The PMF for the dam is quite high than its discharging capacity in spite of the saddle and additional spillways provided. Hence as per the flood routing studies a 650m fuse plug is required to prevent overtopping of the dam. However the practical feasibility of providing such a long fuse plug in the reservoir, formation of surplus course on its downstream has to be reconsidered. Likely areas to be inundated due to the fuse plug in addition to the discharge from the other three surplus arrangements may have to be explored. The detailed flood inundation area plan (flood plain zoning) has to be prepared and used for communicating the flood warnings

Whether limiting the length of the fuse plug combined with other nonstructural measures or totally dispensing with and providing nonstructural methods shall be decided weighing the pros and cons involved.

For Superintending Engineer, PWD,
Designs Circle, WRD,
Chepauk, Chennai-5.

FLOOD ROUTING STUDY OF SATHANUR DAM

Hydraulic Particulars of Main spillway

Top Bund Level	= +	224.640 m			
Maximum water Level	= +	222.200 m			
Full Reservoir Level	= +	222.200 m			
Crest of Spillway	= +	216.100 m			
U/s Bed level	= +	183.490 m			(from Drawing)
Sill Level	= +	216.100 m			
Height of Spillway, P	=	32.610 m			
Design Head, H_o	=	6.100			
No. of Vents	=	9			
Size of Vent	=	12.19	x	6.1	
Length of Spillway	=	133.71			
Thickness of pier	=	3 m			(Assumed)
Clear waterway, L	=	109.71 m			
Total length	=	133.71 m			
Acceleration due to gravity, g	=	9.81 m/sec^2			
Discharging Capacity (Original)		3143.00 Cumecs			110995 Cusecs

Hydraulic Particulars of Saddle spillway

Top Bund Level	= +	224.640 m			
Maximum water Level	= +	224.640 m			
Full Reservoir Level	= +	222.200 m			
Crest of saddle	= +	217.630 m			
U/s Floor level	= +	217.000 m			(from Drawing)
Sill Level	= +	217.630 m			
Height of weir, P	=	0.630 m			
Design Head, H_o	=	4.570			
No. of Vents	=	11			
Size of Vent	=	12.19	x	4.57	
Length of weir	=	164.09			
Thickness of pier	=	3 m			(from Drawing)
Clear waterway, L	=	134.09 m			

Total length	=	164.09 m		
Acceleration due to gravity, g	=	9.81 m/sec^2		
Original Discharging Capacity		2140.96 Cumecs	75608 Cusecs	

Hydraulic Particulars of Additional spillway

Top Bund Level	= +	224.640 m		
Maximum water Level	= +	224.640 m		
Full Reservoir Level	= +	222.200 m		
Crest of anicut	= +	217.630 m		
U/s Floor level	= +	217.000 m	(from Drawing)	
Sill Level	= +	217.630 m		
Height of weir, P	=	0.630 m		
Design Head, H_o	=	4.570		
No. of Vents	=	11		
Size of Vent	=	12.19	x 4.57	
Length of weir	=	164.09		
Thickness of pier	=	3 m	(from Drawing)	
Clear waterway, L	=	134.09 m		
Total length	=	164.09 m		
Acceleration due to gravity, g	=	9.81 m/sec^2		
Original Discharging Capacity		2140.96 Cumecs	75608 Cusecs	

DISCHRGE CALACULATIONS OF MAIN SPILLWAY - SATHANUR DAM

Top Bund Level	=	224.64 m	
Top of parapet Crest Spillway	=	225.55 m	
Full reservoir level		222.2 m	
Maximum water Level	=	222.2 m	
Crest of ~~actual~~ Spillway	=	216.1 m	
U/s Bed level	=	183.49 m	
D/s Bed level	=	183.49 m	
Height of weir, P	=	32.61 m	
Design Head, H_e	=	6.1	
No. of Vents	=	9	
Size of Vents	=	12.19 x	6.1
clear water way	=	109.71 m	
Length of weir	=	133.71 m	
Thickness of pier	=	3 m	
Clear waterway, L	=	109.71 m	
Total length	=	133.71 m	
Acceleration due to gravity, g	=	9.81 m/sec^2	
Bed Width of River, b	=	190 m	
Discharging Capacity	=	3143 Cumecs	
Side Slope	=	1.5 H : 1 V	
	=	1.5 H : 1 V	
Rugosity coefficient (n)	=	0.025	
Bed Slope	=	1 in 120	
	=	0.0083	
C_e from USBR chart	=	2.2 in MKS units	C for design head
RWL =	=	195.07 m	

MAIN SPILLWAY

Reservoir Level	m	216.1	216.30	216.50	216.70	216.90	217.10	217.30	217.50	217.70	217.90
Design Head Ho =	m	0.00	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80
P / H_o		0.00	163.05	81.53	54.35	40.76	32.61	27.18	23.29	20.38	18.12
calculation of Q for velocity head		0.00	21.59	61.06	112.17	172.70	241.36	317.28	399.82	488.48	582.88
Velocity of Approach, P / Ho < 1.33, Va = Q / A P / Ho > 1.33, Va = 0	m / sec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Effective head, h_e $H_o + V_a^2 / 2g$	m	0.00	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80
Effective length, Le L - 2(N*Kp+Ka)he	m	109.71	109.64	109.57	109.49	109.42	109.35	109.28	109.21	109.13	109.06
C		2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
He	m	0.00	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80
He/Ho	m	0.00	0.03	0.07	0.10	0.13	0.16	0.20	0.23	0.26	0.30
C/C0		0.000	0.800	0.810	0.820	0.830	0.840	0.850	0.860	0.865	0.880
Correction coefficient		0.000	1.760	1.782	1.804	1.826	1.848	1.870	1.892	1.903	1.936
H/Hd		-	-	-	-	-	-	-	-	-	-
C_d		-	-	-	-	-	-	-	-	-	-
Hc		-	-	-	-	-	-	-	-	-	-
$Q = C \times L \times H^{3/2}$		**0.00**	**17.26**	**49.39**	**91.80**	**142.97**	**202.08**	**268.62**	**342.26**	**420.32**	**509.90**
$Q1=C_d*G_d*L*(2*g*Hc)^{0.5}$		-	-	-	-	-	-	-	-	-	-
Discharge (Main) =		0.00	17.26	49.39	91.80	142.97	202.08	268.62	342.26	420.32	509.90

MAIN SPILLWAY

Reservoir Level	218.10	218.30	218.50	218.70	218.90	219.10	219.30	219.50	219.70	219.90	220.10
Design Head Ho =	2.00	2.20	2.40	2.60	2.80	3.00	3.20	3.40	3.60	3.80	4.00
P / H_o	16.31	14.82	13.59	12.54	11.65	10.87	10.19	9.59	9.06	8.58	8.15
calculation of Q for velocity head	662.67	787.59	897.40	1011.88	1130.85	1254.15	1381.64	1513.17	1648.63	1787.90	1930.90
Velocity of Approach, P / Ho < 1.33, Va = Q / A P / Ho > 1.33, Va = 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Effective head, h_e $H_o + V_a^2 / 2g$	2.00	2.20	2.40	2.60	2.80	3.00	3.20	3.40	3.60	3.80	4.00
Effective length, Le L - 2(N*Kp+Ka)he	108.99	108.92	108.85	108.77	108.70	108.63	108.56	108.49	108.41	108.34	108.27
C	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
He	2.00	2.20	2.40	2.60	2.80	3.00	3.20	3.40	3.60	3.80	4.00
He/Ho	0.33	0.36	0.39	0.43	0.46	0.49	0.52	0.56	0.59	0.62	0.66
C/C0	0.890	0.895	0.900	0.910	0.915	0.920	0.925	0.930	0.940	0.945	0.950
Correction coefficient	1.958	1.969	1.980	2.002	2.013	2.024	2.035	2.046	2.068	2.079	2.090
H/Hd	-	-	-	-	-	-	-	-	-	-	-
C_d	-	-	-	-	-	-	-	-	-	-	-
Hc	-	-	-	-	-	-	-	-	-	-	-
$Q = C \times L \times H^{3/2}$	603.59	699.81	801.30	912.95	1025.22	1142.46	1264.59	1391.55	1531.40	1668.50	1810.27
$Q1=C_d*G_o*L*(2*g*Hc)^{0.5}$	-	-	-	-	-	-	-	-	-	-	-
Discharge (Main) =	603.59	699.81	801.30	912.95	1025.22	1142.46	1264.59	1391.55	1531.40	1668.50	1810.27

MAIN SPILLWAY

Reservoir Level	220.30	220.50	220.70	220.90	221.10	221.30	221.50	221.70	221.90	222.10	222.30
Design Head Ho =	4.20	4.40	4.60	4.80	5.00	5.20	5.40	5.60	5.80	6.00	6.20
P / H_o	7.76	7.41	7.09	6.79	6.52	6.27	6.04	5.82	5.62	5.44	5.26
calculation of Q for velocity head	2077.51	2227.65	2381.25	2538.23	2698.51	2862.03	3028.72	3198.53	3371.40	3547.28	3726.12
Velocity of Approach, P / Ho < 1.33, Va = Q / A P / Ho > 1.33, Va = 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Effective head, h_e $H_o + V_a^2 / 2g$	4.20	4.40	4.60	4.80	5.00	5.20	5.40	5.60	5.80	6.00	6.20
Effective length, Le L - 2(N*Kp+Ka)he	108.20	108.13	108.05	107.98	107.91	107.84	107.77	107.69	107.62	107.55	107.48
C	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
He	4.20	4.40	4.60	4.80	5.00	5.20	5.40	5.60	5.80	6.00	6.20
He/Ho	0.69	0.72	0.75	0.79	0.82	0.85	0.89	0.92	0.95	0.98	1.02
C/C0	0.955	0.960	0.965	0.970	0.975	0.980	0.985	0.990	0.995	0.998	1.020
Correction coefficient	2.101	2.112	2.123	2.134	2.145	2.156	2.167	2.178	2.189	2.196	2.244
H/Hd	-	-	-	-	-	-	-	-	-	-	1.016
C_d	-	-	-	-	-	-	-	-	-	-	0.77
Hc	-	-	-	-	-	-	-	-	-	-	3.15
$Q = C \times L \times H^{3/2}$	1956.68	2107.67	2263.22	2423.30	2587.68	2756.93	2930.43	3108.36	3290.70	3470.49	
$Q1=C_d*G_0*L*(2*g*Hc)^{0.5}$	-	-	-	-	-	-	-	-	-	-	3963.52
Discharge (Main) =	1956.68	2107.67	2263.22	2423.30	2587.68	2756.93	2930.43	3108.36	3290.70	3470.49	3963.52

MAIN SPILLWAY

Reservoir Level	222.50	222.70	222.90	223.10	223.30	223.50	223.70	223.90	224.10	224.30	224.50
Design Head Ho =	6.40	6.60	6.80	7.00	7.20	7.40	7.60	7.80	8.00	8.20	8.40
P / H_o	5.10	4.94	4.80	4.66	4.53	4.41	4.29	4.18	4.08	3.98	3.88
calculation of Q for velocity head	3907.86	4092.46	4279.89	4470.09	4663.02	4858.66	5056.96	5257.88	5461.40	5667.48	5876.08
Velocity of Approach, P / Ho < 1.33, Va = Q / A P / Ho > 1.33, Va = 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Effective head, h_e $H_o + V_a^2 / 2g$	6.40	6.60	6.80	7.00	7.20	7.40	7.60	7.80	8.00	8.20	8.40
Effective length, Le L - 2(N*Kp+Ka)he	107.41	107.33	107.26	107.19	107.12	107.05	106.97	106.90	106.83	106.76	106.69
C	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
He	6.40	6.60	6.80	7.00	7.20	7.40	7.60	7.80	8.00	8.20	8.40
He/Ho	1.05	1.08	1.11	1.15	1.18	1.21	1.25	1.28	1.31	1.34	1.38
C/C0					-	-	-	-	-	-	-
Correction coefficient	-	-	-	-	-	-	-	-	-	-	-
H/Hd	1.049	1.082	1.115	1.148	1.180	1.213	1.246	1.279	1.311	1.344	1.377
C_d	0.77	0.77	0.77	0.80	0.80	0.80	0.80	0.80	0.80	0.810	0.810
Hc	3.35	3.55	3.75	3.95	4.15	4.35	4.55	4.75	4.95	5.15	5.35
$Q = C \times L \times H^{3/2}$	-	-	-	-	-	-	-	-	-	-	-
Q1=Cd*Go*L*(2*g*Hc)^0.5	**4084.67**	**4202.01**	**4315.86**	**4587.65**	**4699.20**	**4807.87**	**4913.85**	**5017.30**	**5118.39**	**5302.35**	**5400.68**
Discharge (Main) =	4084.67	4202.01	4315.86	4587.65	4699.20	4807.87	4913.85	5017.30	5118.39	5302.35	5400.68

MAIN SPILLWAY

Reservoir Level	224.70	224.90	225.10	225.30	225.50	225.70
Design Head Ho =	8.60	8.80	9.00	9.20	9.40	9.60
P / H_o	3.79	3.71	3.62	3.54	3.47	3.40
calculation of Q for velocity head	6087.19	6300.76	6516.77	6735.20	6956.02	7179.19
Velocity of Approach, P / Ho < 1.33, Va = Q / A P / Ho > 1.33, Va = 0	0.00	0.00	0.00	0.00	0.00	0.00
Effective head, h_e $H_o + V_a^2 / 2g$	8.60	8.80	9.00	9.20	9.40	9.60
Effective length, Le L - 2(N*Kp+Ka)he	106.61	106.54	106.47	106.40	106.33	106.25
C	2.20	2.20	2.20	2.20	2.20	2.20
He	8.60	8.80	9.00	9.20	9.40	9.60
He/Ho	1.41	1.44	1.48	1.51	1.54	1.57
C/C0	-	-	-	-	-	-
Correction coefficient	-	-	-	-	-	-
H/Hd	1.410	1.443	1.475	1.508	1.541	1.574
C_d	0.810	0.810	0.820	0.822	0.825	0.827
Hc	5.55	5.75	5.95	6.15	6.35	6.55
$Q = C \times L \times H^{3/2}$	-	-	-	-	-	-
$Q1=C_d*G_o*L*(2*g*Hc)^{0.5}$	5496.99	5591.38	5754.12	5860.33	5972.55	6076.46
Discharge (Main) =	5496.99	5591.38	5754.12	5860.33	5972.55	6076.46

FLOOD ROUTING STUDY OF SATHANUR DAM - Saddle Spillway

Top Bund Level	=	226.4 m		
Full reservoir level	=	222.2 m		
Maximum water Level	=	222.2 m		
sill of regulator	=	217.63 m		
U/s Bed level	=	217.00 m		From dwg
D/s Bed level	=	217.00 m		
Height, P	=	0.63 m		
Design Head, H_e	=	4.57		
No. of Vents	=	11		
Size of Vents	=	12.19	x 4.57	
clear water way	=	134.09 m		
length between abutments	=	164.09		
Thickness of pier	=	3	m	From dwg
Clear waterway, L	=	134.09	m	
TOTAL Length	=	164.09	m	
Acceleration due to gravity, g	=	9.81	m/sec^2	
Bed Width of River, b	=	225	m	
Discharging Capacity	=	4255	Cumecs	(furnished)
Side Slope	=	0.5 H	: 1 V	
	=	0.5 H	1 V	
Rugosity coefficient (n)	=	0.025		
Bed Slope	=	1 in 70		
	=	0.0143		
C_d for broad crested weir	=	1.7 Free over fal		
Cd for partially submerged (gated)	=	0.7		
~~RWL =~~	=	~~219.66 m~~		~~(As per the drawing furnished)~~

SADDLE SPILLWAY

Reservoir Level	m	217.63	217.70	217.90	218.10	218.30	218.50	218.70	218.90	219.10	219.30	219.50	219.70	219.90	220.10
RWL =	m	217.63	217.63	217.63	217.63	217.63	217.63	217.63	217.63	217.63	217.63	217.63	217.63	217.63	217.63
Reservoir Water Depth =	m	0	0.07	0.27	0.47	0.67	0.87	1.07	1.27	1.47	1.67	1.87	2.07	2.27	2.47
Design Head Ho =	m	0.00	0.07	0.27	0.47	0.67	0.87	1.07	1.27	1.47	1.67	1.87	2.07	2.27	2.47
P / H_o		0.00	9.00	2.33	1.34	0.94	0.72	0.59	0.50	0.43	0.38	0.34	0.30	0.28	0.26
calculation of Q for velocity head		0.00	4.22	31.98	73.45	125.01	184.98	252.30	326.25	406.26	491.95	582.92	678.89	779.62	884.89
Velocity of Approach, P / Ho < 1.33, Va = Q / A P / Ho > 1.33, Va = 0	m / sec	0.00	0.00	0.00	0.00	0.59	0.75	0.90	1.05	1.18	1.30	1.42	1.53	1.64	1.74
$v^2/2g$		0.00	0.00	0.00	0.00	0.02	0.03	0.04	0.06	0.07	0.09	0.10	0.12	0.14	0.15
Effective head, h_e ($H_o + V_a^2 / 2g$)	m	0.00	0.07	0.27	0.47	0.69	0.90	1.11	1.33	1.54	1.76	1.97	2.19	2.41	2.62
Effective length, Le (L - 2(N*Kp+Ka)he)	m	134.09	134.06	133.98	133.90	133.81	133.73	133.65	133.56	133.47	133.39	133.30	133.21	133.13	133.04
C		1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Corrected C		1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700
h_1 - RWL-crest												0.06	0.14	0.21	0.28
h - FWL-RWL												1.81	1.93	2.06	2.19
$Q_{drowned}$ = 2/3Cd sqrt(2*g)Bh^(3/2) + Cd_2.B.$h_1$sqrt(2*g*h) (drowned weir)												585.31	692.81	804.91	921.48
H - MWL-RWL															
H1 - MWL-FRL/(top of opening)															
H2 -MWL-CREST(bottom of opening)															
$Q_{drowned}$ = (C_d.B. v(2*g) x ((H2-H) H^0.5 +2/3 ($H^{3/2}$-$H_1^{3/2}$)) (patially sub - gated)															
$Q = C \times L \times H^{3/2}$ (free overfall)		0.00	4.22	31.96	73.35	129.69	193.72	266.31	346.62	434.00	527.93				
Top width		225.00	225.04	225.12	225.20	225.28	225.36	225.43	225.51	225.58	225.63	225.69	225.77	225.84	225.91
Area of the cross section, A		0	8.0973	27.268	44.938	63.278	80.529	97.501	114.24	130.78	141.95	156.55	173.27	189.64	205.73
Perimeter		225.00	225.08	225.27	225.45	225.63	225.80	225.97	226.13	226.30	226.41	226.55	226.72	226.88	227.04
Hydraulic mean Depth		0.00	0.04	0.12	0.20	0.28	0.36	0.43	0.51	0.58	0.63	0.69	0.76	0.84	0.91
Velocity		0	0.521	1.171	1.632	2.049	2.406	2.731	3.034	3.319	3.504	3.739	3.998	4.244	4.479
Discharge(saddle spillway) =		0.00	4.22	31.96	73.35	129.68	193.72	266.31	346.61	433.99	497.38	585.31	692.81	804.91	921.48

SADDLE SPILLWAY

Reservoir Level	220.30	220.50	220.70	220.90	221.10	221.30	221.50	221.70	221.90	222.10	222.30	222.50	222.70	222.90
RWL =	217.93	218.05	218.12	218.19	218.26	218.32	218.39	218.46	218.52	218.58	218.74	218.79	218.83	218.88
Reservoir Depth =	0.93	1.05	1.12	1.19	1.26	1.32	1.39	1.46	1.52	1.58	1.74	1.79	1.83	1.88
Design Head Ho =	2.67	2.67	3.07	3.27	3.47	3.67	3.87	4.07	4.27	4.47	4.67	4.87	5.07	5.27
P / H_o	0.24	0.22	0.21	0.19	0.18	0.17	0.16	0.15	0.15	0.14	0.13	0.13	0.12	0.12
calculation of Q for velocity head	994.52	1108.33	1226.18	1347.93	1473.48	1602.67	1735.45	1871.70	2011.35	2154.30	2300.49	2449.85	2602.30	2757.79
Velocity of Approach, P / Ho < 1.33, Va = Q / A P / Ho > 1.33, Va = 0	1.84	1.93	2.02	2.11	2.19	2.27	2.35	2.43	2.50	2.57	2.65	2.71	2.78	2.85
$v^2/2g$	0.17	0.19	0.21	0.23	0.24	0.26	0.28	0.30	0.32	0.34	0.36	0.38	0.39	0.41
Effective head, h_e ($H_o + V_a^2 / 2g$)	2.84	3.06	3.28	3.50	3.71	3.93	4.16	4.37	4.59	4.81	5.03	5.25	5.46	5.68
Effective length, Le (L - 2(N*Kp+Ka)he)	132.95	132.87	132.78	132.69	132.60	132.52	132.43	132.34	132.25	132.17	132.08	131.99	131.90	131.82
C	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Corrected C	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.70	1.70	1.70	2.890
h_1 - RWL-crest	0.35	0.42	0.49	0.56	0.63	0.69	0.76	0.82	0.89	0.95	1.11	1.16	1.20	1.25
h - FWL-RWL	2.32	2.45	2.58	2.71	2.84	2.98	3.11	3.25	3.38	3.52	3.56	3.71	3.87	4.02
Q_{Reg} = 2/3Cd1 sqrt(2*g)Bh^(3/2) + Cd2.B.h1sqrt(2*g*h) (drowned weir)	1042.36	1167.43	1296.55	1429.60	1566.46	1707.03	1851.19	1998.87	2149.95	2304.36				
H - MWL-RWL											3.56	3.71	3.87	4.02
H1 - MWL-FRL/(top of opening)											0.10	0.30	0.50	0.70
H2 -MWL-CREST(bottom of opening)											4.67	4.87	5.07	5.27
Q_{Reg} = (C_d.B. √(2*g) x ((H1-H) H^0.5 +2/3 ($H^{3/2}$-$H_1^{3/2}$)) (patially sub - gated)											2683.48	2819.54	2944.25	3061.13
Q = C x L x $H^{3/2}$ (free overfall)														
Top width	225.98	226.05	226.12	226.19	226.26	226.32	226.39	226.45	226.52	226.58	226.74	226.79	226.83	226.88
Area of the cross section, A	221.583	237.236	252.716	268.042	283.231	298.296	313.247	328.094	342.843	357.502	391.945	403.834	414.533	424.402
Perimeter	227.20	227.35	227.51	227.66	227.81	227.96	228.10	228.25	228.40	228.54	228.88	229.00	229.10	229.20
Hydraulic mean Depth	0.98	1.04	1.11	1.18	1.24	1.31	1.37	1.44	1.50	1.56	1.71	1.76	1.81	1.85
Velocity	4.704	4.921	5.130	5.333	5.531	5.723	5.910	6.092	6.271	6.446	6.847	6.982	7.103	7.213
Discharge(saddle spillway) =	1042.36	1167.43	1296.55	1429.60	1566.46	1707.03	1851.19	1998.87	2149.95	2304.36	2683.48	2819.54	2944.25	3061.13

SADDLE SPILLWAY

Reservoir Level	223.10	223.30	223.50	223.70	223.90	224.10	224.30	224.50	224.70	224.90	225.10	225.30	225.50	225.70
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Design Head Ho =	5.47	5.67	5.87	6.07	6.27	6.47	6.67	6.87	7.07	7.27	7.47	7.67	7.87	8.07
P / H_o	0.12	0.11	0.11	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08
calculation of Q for velocity head	2916.26	3077.65	3241.92	3409.01	3578.88	3751.47	3926.76	4104.69	4285.23	4468.35	4654.00	4842.15	5032.77	5225.83
Velocity of Approach, P / Ho < 1.33, Va = Q / A P / Ho > 1.33, Va = 0	2.91	2.98	3.04	3.10	3.16	3.22	3.28	3.34	3.39	3.45	3.50	3.56	3.61	3.66
$V^2/2g$	0.43	0.45	0.47	0.49	0.51	0.53	0.55	0.57	0.59	0.61	0.62	0.64	0.66	0.68
Effective head, h_e $(H_o + V_a^2 / 2g)$	5.90	6.12	6.34	6.56	6.78	7.00	7.22	7.44	7.66	7.88	8.09	8.31	8.53	8.75
Effective length, Le (L - 2(N*Kp+Ka)he)	131.73	131.64	131.55	131.47	131.38	131.29	131.20	131.12	131.03	130.94	130.85	130.76	130.68	130.59
C	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Corrected C	1.70	1.70	1.70	1.70	1.700	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
h_1 - RWL-crest	1.29	1.33	1.36	1.40	1.43	1.46	1.49	1.52	1.55	1.58	1.60	1.63	1.65	1.68
h - FWL-RWL	4.18	4.34	4.51	4.67	4.84	5.01	5.18	5.35	5.52	5.69	5.87	6.04	6.22	6.39
Q_{Reg} = 2/3Cd₁ sqrt(2*g)Bh^(3/2) + Cd₂.B.h₁sqrt(2*g*h) (drowned weir)														
H - MWL-RWL	4.18	4.34	4.51	4.67	4.84	5.01	5.18	5.35	5.52	5.69	5.87	6.04	6.22	6.39
H1 - MWL-FRL/(top of opening)	0.90	1.10	1.30	1.50	1.70	1.90	2.10	2.30	2.50	2.70	2.90	3.10	3.30	3.50
H2 - MWL-CREST(bottom of opening)	5.47	5.67	5.87	6.07	6.27	6.47	6.67	6.87	7.07	7.27	7.47	7.67	7.87	8.07
Q_{Reg} = (C_d.B. √(2*g) x ((H₂-H) H^0.5 +2/3 ($H^{3/2}$-$H_1^{3/2}$)) (patially sub - gated)	3171.89	3277.62	3379.06	3476.75	3571.13	3662.52	3751.22	3837.45	3921.41	4003.28	4083.19	4161.28	4237.66	4312.44
Q = C x L x $H^{3/2}$ - (free overfall)														
Top width	226.92	226.98	226.99	227.03	227.06	227.09	227.12	227.15	227.18	227.21	227.23	227.26	227.28	227.31
Area of the cross section A	433.621	442.301	450.528	458.38	465.845	473.021	479.918	486.562	492.976	499.178	505.186	511.012	516.668	522.168
Perimeter	229.29	229.38	229.46	229.53	229.61	229.68	229.75	229.81	229.88	229.94	230.00	230.05	230.11	230.16
Hydraulic mean Depth	1.89	1.93	1.96	2.00	2.03	2.06	2.09	2.12	2.14	2.17	2.20	2.22	2.25	2.27
Velocity	7.315	7.410	7.500	7.585	7.666	7.743	7.816	7.887	7.955	8.020	8.083	8.143	8.202	8.259
Discharge(saddle spillway) =	3171.89	3277.62	3379.06	3476.75	3571.13	3662.52	3751.22	3837.45	3921.41	4003.28	4083.19	4161.28	4237.66	4312.44

FLOOD ROUTING STUDY OF SATHANUR DAM - Additional Spillway

Top Bund Level	=	228.4 m		
Full reservoir level	=	222.2 m		
Maximum water Level	=	225 m		
Crest of anicut	=	217.63 m		
U/s Bed level	=	217.00 m		From dwg
D/s Bed level	=	217.00 m		
Height of weir, P	=	0.63 m		
Design Head, H_e	=	7.37		
No. of Vents	=	11		
Size of Vents	=	12.19	x	4.57
clear water way	=	134.09 m		
Length of weir	=	164.09		
Thickness of pier	=	3 m		From dwg
Clear waterway, L	=	134.09 m		
Total length	=	164.09 m		
Acceleration due to gravity, g	=	9.81 m/sec^2		
Bed Width of River, b	=	165 m		
Discharging Capacity	=	4255 Cumecs		
Side Slope	=	0.5 H : 1 V		
	=	0.5 H : 1 V		
Rugosity coefficient (n)	=	0.025		
Bed Slope	=	1 in 70		
	=	0.0143		
C_d for BC weir	=	1.7 free overfall		
Cd for partially submerged (gated)	=	0.7		
RWL =	=	218.55 m		(As per the drawing furnished)

ADDITIONAL SPILLWAY

Reservoir Level	m	217.63	217.70	217.90	218.10	218.30	218.50	218.70	218.90	219.10	219.30	219.60	219.70	219.90	220.10	220.30
RWL	m	217.63	217.70	217.90	218.10	218.30	218.50	218.70	218.90	219.10	219.30	219.60	219.70	219.90	220.10	220.30
Real Water Depth	m	0	0.07	0.27	0.47	0.67	0.87	1.07	1.27	1.47	1.67	1.97	2.07	2.27	2.47	2.67
Design Head Ho =	m	0.00	0.07	0.27	0.47	0.67	0.87	1.07	1.27	1.47	1.67	1.87	2.07	2.27	2.47	2.67
P / H_o		0.00	9.00	2.33	1.34	0.94	0.72	0.59	0.50	0.43	0.38	0.34	0.30	0.28	0.26	0.24
calculation of Q for velocity head		0.00	4.22	31.98	73.45	125.01	184.98	252.36	326.25	406.28	491.95	582.92	678.89	779.62	884.89	994.52
Velocity of Approach, P / Ho < 1.33, Va = Q / A P / Ho > 1.33, Va = 0	m / sec	0.00	0.00	0.00	0.00	0.59	0.75	0.90	1.05	1.18	1.30	1.42	1.53	1.64	1.74	1.84
$v^2/2g$		0.00	0.00	0.00	0.00	0.02	0.03	0.04	0.05	0.07	0.09	0.10	0.12	0.14	0.15	0.17
Effective head, h_e $H_o + V_a^2 / 2g$	m	0.00	0.07	0.27	0.47	0.69	0.90	1.11	1.33	1.54	1.76	1.97	2.19	2.41	2.62	2.84
Effective length, Le L - 2(N*Kp+Ka)he	m	134.09	134.06	133.98	133.90	133.81	133.73	133.65	133.56	133.47	133.39	133.30	133.21	133.13	133.04	132.95
C		1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Corrected C		1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700
h_1 - RWL-crest										0.04	0.14	0.23	0.32	0.40	0.49	0.57
h - FWL-RWL										1.43	1.53	1.64	1.75	1.87	1.98	2.10
Q_{free} = 2/3Cd1 √(2*g)Bh^(3/2) +Cd2 B.h1√(2gh) (drowned weir)										407.34	506.42	610.19	718.60	831.55	948.93	1070.60
H - MWL-RWL																
H1 - MWL-FRL/(top of opening)																
H2 -MWL-CREST (bottom of opening)																
Q_{Reg} = Cd.B. Sqrt(2*g)((H2-H)H^0.5+2/3(H^3/2-H1^3/2))																
Cg		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hc		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Q = C \times L \times H^{3/2}$ Free fall		0.00	4.22	31.96	73.36	129.68	193.72	266.31	346.62							
Top width		165.00	165.04	165.15	165.24	165.34	165.43	165.52	165.61	165.67	165.77	165.86	165.95	166.03	166.12	166.20
Area of the cross section, A		0	7.1531	24.112	39.715	55.934	71.198	86.22	101.04	111.36	126.96	142.05	156.77	171.2	185.4	199.41
Perimeter		165.00	165.10	165.33	165.54	165.76	165.98	166.17	166.37	166.51	166.72	166.92	167.12	167.31	167.50	167.69
Hydraulic mean Depth		0.00	0.04	0.15	0.24	0.34	0.43	0.52	0.61	0.67	0.76	0.85	0.94	1.02	1.11	1.19
Velocity		0	0.590	1.325	1.847	2.318	2.721	3.088	3.430	3.658	3.989	4.296	4.584	4.857	5.118	5.369
Discharge(additional spillway) =		0.00	4.22	31.96	73.35	129.68	193.72	266.31	346.62	407.34	506.42	610.19	718.60	831.55	948.93	1070.61

ADDITIONAL SPILLWAY

Reservoir Level	220.50	220.70	220.90	221.10	221.30	221.50	221.70	221.90	222.10	222.30	222.50	222.70	222.90	223.10	223.30
FWL	218.21	218.37	218.45	218.53	218.61	218.69	218.77	218.85	218.93	219.07	219.13	219.19	219.24	219.29	219.34
Full Water Depth	1.21	1.37	1.45	1.53	1.61	1.69	1.77	1.85	1.93	2.07	2.13	2.19	2.24	2.29	2.34
Design Head Ho =	2.87	3.07	3.27	3.47	3.67	3.87	4.07	4.27	4.47	4.67	4.87	5.07	5.27	5.47	5.67
P / H_o	0.22	0.21	0.19	0.18	0.17	0.16	0.15	0.15	0.14	0.13	0.13	0.12	0.12	0.12	0.11
calculation of Q for velocity head	1108.33	1226.18	1347.93	1473.46	1602.67	1735.45	1871.70	2011.35	2154.30	2300.49	2449.85	2602.30	2757.79	2916.26	3077.65
Velocity of Approach, P / Ho < 1.33, Va = Q / A P / Ho > 1.33, Va = 0	1.93	2.02	2.11	2.19	2.27	2.35	2.43	2.50	2.57	2.65	2.71	2.78	2.85	2.91	2.98
$v^2/2g$	0.19	0.21	0.23	0.24	0.26	0.28	0.30	0.32	0.34	0.36	0.38	0.39	0.41	0.43	0.45
Effective head, h_e $H_o + V_a^2 / 2g$	3.06	3.28	3.50	3.71	3.93	4.15	4.37	4.59	4.81	5.03	5.25	5.46	5.68	5.90	6.12
Effective length, Le L - 2(N*Kp+Ka)he	132.87	132.78	132.69	132.60	132.52	132.43	132.34	132.25	132.17	132.08	131.99	131.90	131.82	131.73	131.64
C	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Corrected C	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700
h_1 - RWL-crest	0.66	0.74	0.82	0.90	0.98	1.06	1.14	1.22	1.30	1.44	1.50	1.56	1.61	1.66	1.71
h - FWL-RWL	2.21	2.33	2.45	2.57	2.69	2.81	2.93	3.05	3.17	3.23	3.37	3.51	3.66	3.81	3.96
Q_{Req} = 2/3Cd_1 √(2*g)Bh^(3/2) +Cd_2.B.h_1√(2gh) (drowned weir)	1196.44	1326.32	1460.12	1597.74	1739.05	1883.98	2032.41	2184.26	2339.45						
H - MWL-RWL										3.23	3.37	3.51	3.66	3.81	3.96
H1 - MWL-FRL/(top of opening)										0.10	0.30	0.50	0.70	0.90	1.10
H2 -MWL-CREST (bottom of opening)										4.67	4.87	5.07	5.27	5.47	5.67
Q_{Req} = Cd.B. Sqrt(2*g)((H2-H)H^0.5+2/3($H^{3/2}$-$H_1^{3/2}$))										2635.83	2769.30	2891.78	3006.69	3115.68	3219.80
Cg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hc	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q = C x L x $H^{3/2}$ Free fall															
Top width	166.29	166.37	166.45	166.53	166.61	166.69	166.77	166.85	166.93	167.07	167.13	167.19	167.24	167.29	167.34
Area of the cross section, A	213.253	226.955	240.533	253.988	267.362	280.634	293.821	306.931	319.967	343.967	354.431	363.863	372.572	380.716	388.393
Perimeter	167.88	168.06	168.25	168.43	168.61	168.78	168.96	169.14	169.31	169.63	169.77	169.90	170.01	170.12	170.23
Hydraulic mean Depth	1.27	1.35	1.43	1.51	1.59	1.66	1.74	1.81	1.89	2.03	2.09	2.14	2.19	2.24	2.28
Velocity	5.610	5.844	6.070	6.290	6.504	6.713	6.917	7.116	7.312	7.663	7.813	7.947	8.070	8.184	8.290
Discharge(additional spillway) =	1196.44	1326.32	1460.12	1597.74	1739.05	1883.98	2032.41	2184.26	2339.45	2635.83	2769.30	2891.78	3006.69	3115.68	3219.80

ADDITIONAL SPILLWAY

Reservoir Level	223.60	223.70	223.90	224.10	224.30	224.50	224.70	224.90	225.00	225.30	225.50	225.70
RWL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	225.14	[illegible]	[illegible]	[illegible]
Crest Level	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.14	[illegible]	[illegible]	[illegible]
Design Head Ho =	5.87	6.07	6.27	6.47	6.67	6.87	7.07	7.27	7.47	7.67	7.87	8.07
P / H_o	0.11	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08
calculation of Q for velocity head	3241.92	3409.01	3578.68	3751.47	3926.76	4104.69	4285.23	4467.35	4650.59	4842.15	5022.77	5205.83
Velocity of Approach, P / Ho < 1.33, Va = Q / A P / Ho > 1.33, Va = 0	3.04	3.10	3.16	3.22	3.28	3.34	3.39	3.45	3.50	3.56	3.61	3.66
$V^2/2g$	0.47	0.49	0.51	0.53	0.55	0.57	0.59	0.61	0.62	0.64	0.66	0.68
Effective head, h_e $H_a + V_a^2 / 2g$	6.34	6.56	6.78	7.00	7.22	7.44	7.66	7.88	8.09	8.31	8.53	8.75
Effective length; Le L - 2(N*Kp+Ka)he	131.55	131.47	131.38	131.29	131.20	131.12	131.03	130.94	130.86	130.76	130.68	130.59
C	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Corrected C	1.700	1.700	1.700	1.700	1.700	1.700	1.700	1.700	3.118	3.118	3.118	3.118
h_1 - RWL-crest	1.75	1.79	1.83	1.87	1.91	1.94	1.98	2.01	2.51	2.57	2.63	2.68
h - FWL-RWL	4.12	4.28	4.44	4.60	4.76	4.93	5.09	5.26	4.96	5.10	5.24	5.39
Q_{Reg} = 2/3Cd_1 v(2*g)Bh^(3/2) +Cd_2.B.h_{1v}(2gh) (drowned weir)												
H - MWL-RWL	4.12	4.28	4.44	4.60	4.76	4.93	5.09	5.26	4.96	5.10	5.24	5.39
H1 - MWL-FRL/(top of opening)	1.30	1.50	1.70	1.90	2.10	2.30	2.50	2.70	0.10	0.30	0.50	0.70
H2 -MWL-CREST (bottom of opening)	5.87	6.07	6.27	6.47	6.67	6.87	7.07	7.27	7.47	7.67	7.87	8.07
Q_{Reg} = Cd.B. Sqrt(2*g)((H2-H)H^0.5+2/3($H^{3/2}$-$H_1^{3/2}$))	3319.76	3416.09	3509.20	3599.43	3687.03	3772.24	3855.24	3936.20	5247.56	5421.81	5584.08	5738.38
Cg	-	-	-	-	-	-	-	-	-	-	-	-
Hc	-	-	-	-	-	-	-	-	-	-	-	-
Q = C x L x $H^{3/2}$ Free fall												
Top width	167.38	167.42	167.46	167.50	167.54	167.57	167.61	167.64	168.14	168.20	168.26	168.31
Area of the cross section, A	395.674	402.61	409.244	415.61	421.73	427.629	433.327	438.8404	522.838	533.348	543.0456	552.1536
Perimeter	170.32	170.42	170.50	170.59	170.67	170.75	170.83	170.90	172.02	172.16	172.29	172.41
Hydraulic mean Depth	2.32	2.36	2.40	2.44	2.47	2.50	2.54	2.57	3.04	3.10	3.15	3.20
Velocity	8.390	8.485	8.575	8.661	8.743	8.821	8.897	8.970	10.037	10.165	10.283	10.393
Discharge(additional spillway) =	3319.76	3416.09	3509.20	3599.43	3687.03	3772.24	3855.24	3936.20	5247.56	5421.81	5584.08	5738.38

SATHANAUR DAM - FUSE PLUG PORTION (Proposed)

Crest of Fuse Plug	=	222.2000 m
U/s Bed level	=	220.0000 m
D/s Bed level	=	217.0000 m
Height, P	=	2.2400 m
Top Width of Crest (b)	=	3.6000 m
Clear waterway , L	=	650.0000 m
cd	=	0.4370
g	=	9.8100

Front MFL	m	222.3000	222.50	222.70	222.90	223.10	223.30	223.50	223.70	223.90
Head over crest, Ho FMFL - crest	m	0.1000	0.30	0.50	0.70	0.90	1.10	1.30	1.50	1.70
$Q_1 = 2/3 * C_{d1} \times (2g)^{(0.5)} \times B \times h^{(3/2)}$	m^3 / sec	26.5249	137.827	296.557	491.247	716.171	967.703	1243.277	1540.955	1859.201

Front MFL	m	224.1000	224.30	224.50	224.70	224.90	225.10	225.30	225.50	225.70
Head over crest, Ho FMFL - crest	m	1.9000	2.10	2.30	2.50	2.70	2.90	3.10	3.30	3.50
$Q_1 = 2/3 * C_{d1} \times (2g)^{(0.5)} \times B \times h^{(3/2)}$	m^3 / sec	2196.7642	2552.595	2926.801	3315.607	3721.334	4142.381	4578.209	5028.332	5492.311

TOTAL DISCHARGE OF ALL SURPLUS ARRANGEMENTS

Reservoir Level, m	216.1	216.3	216.5	216.7	216.9	217.1	217.3	217.5	217.7	217.9	218.1	218.3	218.5	218.7
Discharge (Main) =	0	17.25912	49.394	91.8023	142.969	202.079	268.62	342.263	420.32	509.903	603.59	699.80879	801.299	912.95
Discharge (Saddle) =	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.22	31.96	73.35	129.68	193.72	266.31
Discharge(Additional spillway) =	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.22	31.96	73.35	129.68	193.72	266.31
Total Discharge =	0.00	17.26	49.39	91.80	142.97	202.08	268.62	342.26	428.76	573.81	750.29	959.17	1188.73	1445.57
Fuse plug discharge														
Total Discharge =	0.00	17.26	49.39	91.80	142.97	202.08	268.62	342.26	428.76	573.81	750.29	959.17	1188.73	1445.57

Reservoir Level, m	218.9	219.1	219.3	219.5	219.7	219.9	220.1	220.3	220.5	220.7	220.9	221.1	221.3	221.5
Discharge (Main) =	1025.22	1142.46	1264.59	1391.55	1531.40	1668.50	1810.27	1956.68	2107.67	2263.22	2423.30	2587.88	2756.93	2930.4
Discharge (Saddle) =	346.62	434.00	527.93	585.31	692.81	804.91	921.48	1042.36	1167.43	1296.55	1429.60	1566.46	1707.03	1851.19
Discharge(Additional spillway) =	346.62	407.34	506.42	610.19	718.60	831.55	948.93	1070.60	1196.44	1326.32	1460.12	1597.74	1739.05	1883.98
Total Discharge =	1718.45	1983.80	2298.94	2587.04	2942.81	3304.97	3680.68	4069.64	4471.54	4886.09	5313.02	5752.07	6203.01	6665.60
Fuse plug discharge														
Total Discharge =	1718.45	1983.80	2298.94	2587.04	2942.81	3304.97	3680.68	4069.64	4471.54	4886.09	5313.02	5752.07	6203.01	6665.60

TOTAL DISCHARGE OF ALL SURPLUS ARRANGEMENTS

Reservoir Level, m	221.7	221.9	222.1	222.3	222.5	222.7	222.9	223.1	223.3	223.5	223.7	223.9	224.1
Discharge (Main) =	3108.36	3290.704	3470.488	3963.515	4084.67	4202.011	4315.859	4587.652	4699.203	4807.87	4913.8486	5017.303	5118.391
Discharge (Saddle) =	1998.87	2149.95	2304.36	2683.48	2819.54	2944.25	3061.13	3171.89	3277.62	3379.06	3476.75	3571.13	3662.52
Discharge(Additional spillway) =	2032.41	2184.26	2339.45	2635.83	2769.30	2891.78	3006.69	3115.68	3219.80	3319.76	3416.09	3509.20	3599.43
Total Discharge =	7139.64	7624.92	8114.30	9282.82	9673.50	10038.04	10383.67	10875.23	11196.63	11506.69	11806.69	12097.63	12380.34
Fuse plug discharge				26.52	137.83	296.56	491.25	716.17	967.70	1243.28	1540.95	1859.20	2196.76
Total Discharge =	7139.64	7624.92	8114.30	9309.35	9811.33	10334.60	10874.92	11591.40	12164.33	12749.97	13347.65	13956.84	14577.11

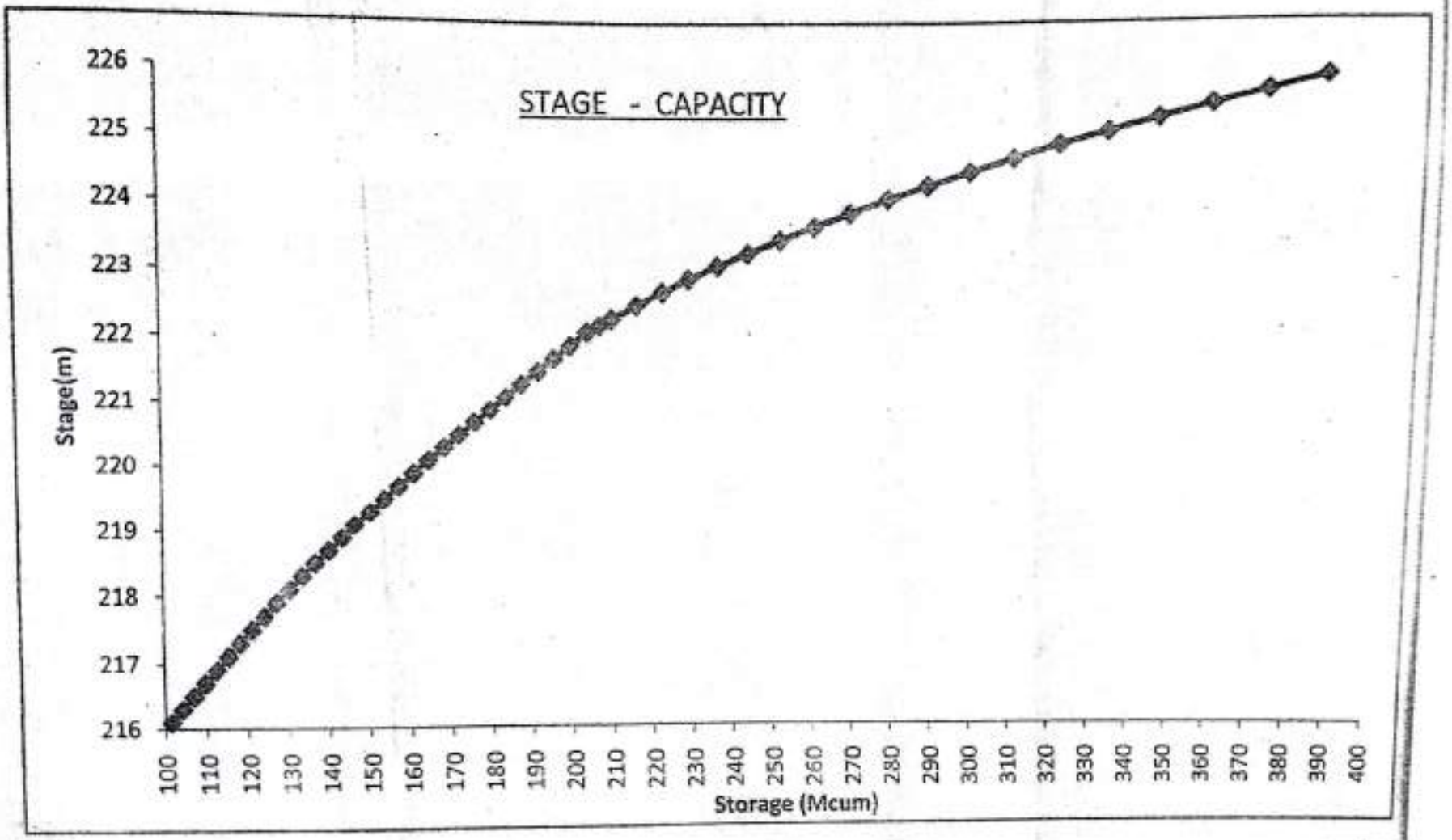
Reservoir Level, m	224.3	224.5	224.7	224.9	225.1	225.3	225.5	225.7
Discharge (Main) =	5302.35	5400.683	5496.992	5591.381	5754.12	5860.331	5972.548	6076.462
Discharge (Saddle) =	3751.22	3837.45	3921.41	4003.28	4083.19	4161.28	4237.66	4312.44
Discharge(Additional spillway) =	3687.03	3772.24	3855.24	3936.20	5247.56	5421.61	5584.08	5738.38
Total Discharge =	12740.60	13010.37	13273.65	13530.86	15084.87	15443.22	15794.30	16127.29
Fuse plug discharge	2552.60	2925.80	3315.61	3721.33	4142.38	4578.21	5028.33	5492.31
Total Discharge =	15293.20	15936.18	16589.26	17252.20	19227.25	20021.43	20822.63	21619.60

STAGE CAPACITY
SATHANUR DAM

0	Storage Mcft	Difference	From the table furnished Storage Mcm	Elevation (m)
216.100	3584.416		101.499	216.10
216.300	3679.696		104.175	216.30
216.500	3774.152		106.872	216.50
216.700	3872.020		109.643	216.70
216.900	3972.000		112.475	216.90
217.100	4072.664		115.331	217.10
217.300	4173.666		118.190	217.30
217.500	4277.848		121.135	217.50
217.700	4383.640		124.137	217.70
217.900	4491.832		127.195	217.90
218.100	4602.552		130.330	218.10
218.300	4714.816		133.509	218.30
218.500	4829.784		136.764	218.50
218.700	4946.900		140.081	218.70
218.900	5064.240		143.403	218.90
219.100	5169.484		146.383	219.10
219.300	5306.720		150.270	219.30
219.500	5428.960		153.759	219.50
219.700	5556.200		157.334	219.70
219.900	5683.596		160.942	219.90
220.100	5813.680		164.625	220.10
220.300	5945.920		168.370	220.30
220.500	6079.160	133.240	172.143	220.50
220.700	6214.400	135.240	175.972	220.70
220.900	6351.640	137.240	179.858	220.90
221.100	6490.468	138.828	183.790	221.10
221.300	6631.832	141.364	187.793	221.30
221.500	6775.196	143.364	191.852	221.50
221.700	6919.520	144.324	195.939	221.70
221.900	7064.924	145.404	200.056	221.90
222.100	7211.288	146.364	204.201	222.10
222.200	7321.000	109.712	207.308	222.20
222.300	7430.712	219.424	210.414	222.30
222.500	7650.136	228.000	216.628	222.50
222.700	7878.136	240.000	223.084	222.70
221.900	8118.136	256.000	229.880	222.90
223.100	8374.136	270.000	237.129	223.10
223.300	8644.136	288.000	244.775	223.30
223.500	8932.136	300.000	252.930	223.50
223.700	9232.136	317.000	261.425	223.70
223.900	9549.136	332.000	270.401	223.90
224.100	9881.136	350.000	279.803	224.10
224.300	10231.136	367.000	289.714	224.30
224.500	10598.136	375.000	300.106	224.50
224.700	10973.136	393.000	310.725	224.70
224.900	11366.136	410.000	321.853	224.90
225.100	11776.136	430.000	333.463	225.10
225.300	12206.136	452.000	345.639	225.30
225.500	12658.136	467.000	358.439	225.50
225.700	13125.136	489.000	371.662	225.70
225.900	13614.136	510.000	385.509	

Interpolated

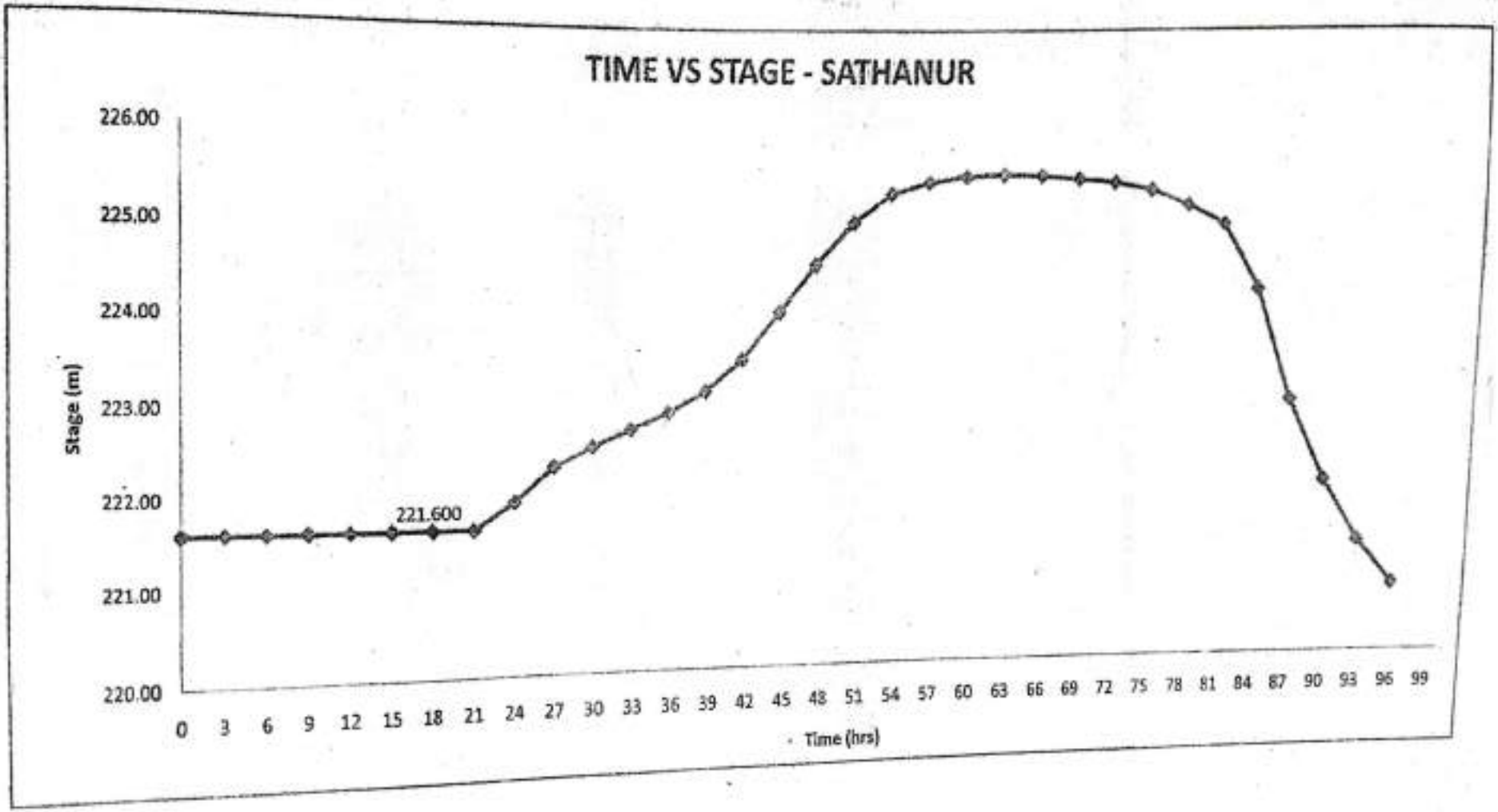
Extrapolated


STAGE - CAPACITY
Stage(m)
226
225
224
223
222
221
220
219
218
217
216
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290
300
310
320
330
340
350
360
370
380
390
400
Storage (Mcum)

RESERVOIR ROUTING - MODIFIED PULS METHOD

(Impinging level as 0.6m below FRL)

Time	Ins.Inflow	Mean Inflow	S / t -O/2	S / t +O/2	Outflow	Res.lvl.
Hours	Cumecs	Cumecs			Cumecs	m
0	600.0				600	221.600
3	622.0	610.97			622	221.600
6	725.0	673.48			725	221.600
9	1043.0	884.02			1043	221.600
12	1668.1	1355.56			1668	221.600
15	2637.9	2152.98			2638	221.600
18	4107.7	3372.79			4108	221.600
21	6162.1	5134.91		21252.70	6162	221.600
24	8371.8	7266.95	15090.66	22357.51	7642	221.907
27	9909.4	9140.58	14716.00	23856.58	9023	222.304
30	10529.5	10219.43	14833.45	25052.88	9866	222.521
33	10880.7	10705.07	15187.31	25892.37	10376	222.715
36	11545.8	11213.22	15516.23	26729.46	10880	222.901
39	12660.7	12103.23	15849.80	27953.02	11707	223.140
42	14417.6	13539.13	16245.88	29784.99	12745	223.498
45	16927.5	15672.53	17040.30	32712.83	14323	224.018
48	18346.5	17637.00	18369.68	36026.67	16071	224.541
51	20923.6	19635.04	19955.37	39590.41	18366	225.013
54	21180.7	21052.14	21224.44	42276.59	20154	225.333
57	21145.4	21163.08	22122.66	43285.74	20664	225.460
60	21159.9	21152.67	22621.93	43774.60	20908	225.522
63	21000.2	21080.05	22866.26	43946.31	20993	225.543
66	20728.9	20864.56	22953.85	43818.22	20930	225.527
69	20575.6	20652.27	22888.46	43540.73	20793	225.493
72	20345.7	20460.65	22748.08	43208.74	20625	225.451
75	19590.7	19968.17	22583.83	42552.01	20293	225.368
78	18320.4	18955.54	22258.92	41214.47	19605	225.195
81	16925.3	17622.85	21608.73	39232.58	18023	224.978
84	8876.4	12900.82	21209.27	34110.09	15090	224.243
87	7324.7	8100.55	19020.00	27120.55	11152	222.977
90	6164.1	6744.40	15968.70	22713.10	7918	222.020
93	5128.8	5646.43	14794.68	20441.11	6166	221.284
96	4226.9	4677.86	14274.86	18952.72	5047	220.775
99	2470.2	3348.56			2470	
102	2856.3	2663.27			2856	
105	2361.6	2608.98			2362	
108	1962.1	2161.86			1962	
111	1640.7	1801.43			1641	
114	1381.5	1511.11			1381	
117	1172.2	1276.87			1172	
120	1004.1	1088.16			1004	
123	867.9	936.00			868	
126	757.8	812.87			758	
129	668.7	713.27			669	
132	597.6	633.19			598	
135	539.6	568.63			540	
138	494.0	516.79			494	
141	456.0	474.98			456	
144	425.0	440.49			425	
147	401.0	413.00			401	


TIME VS STAGE - SATHANUR
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0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54 57 60 63 66 69 72 75 78 81 84 87 90 93 96 99
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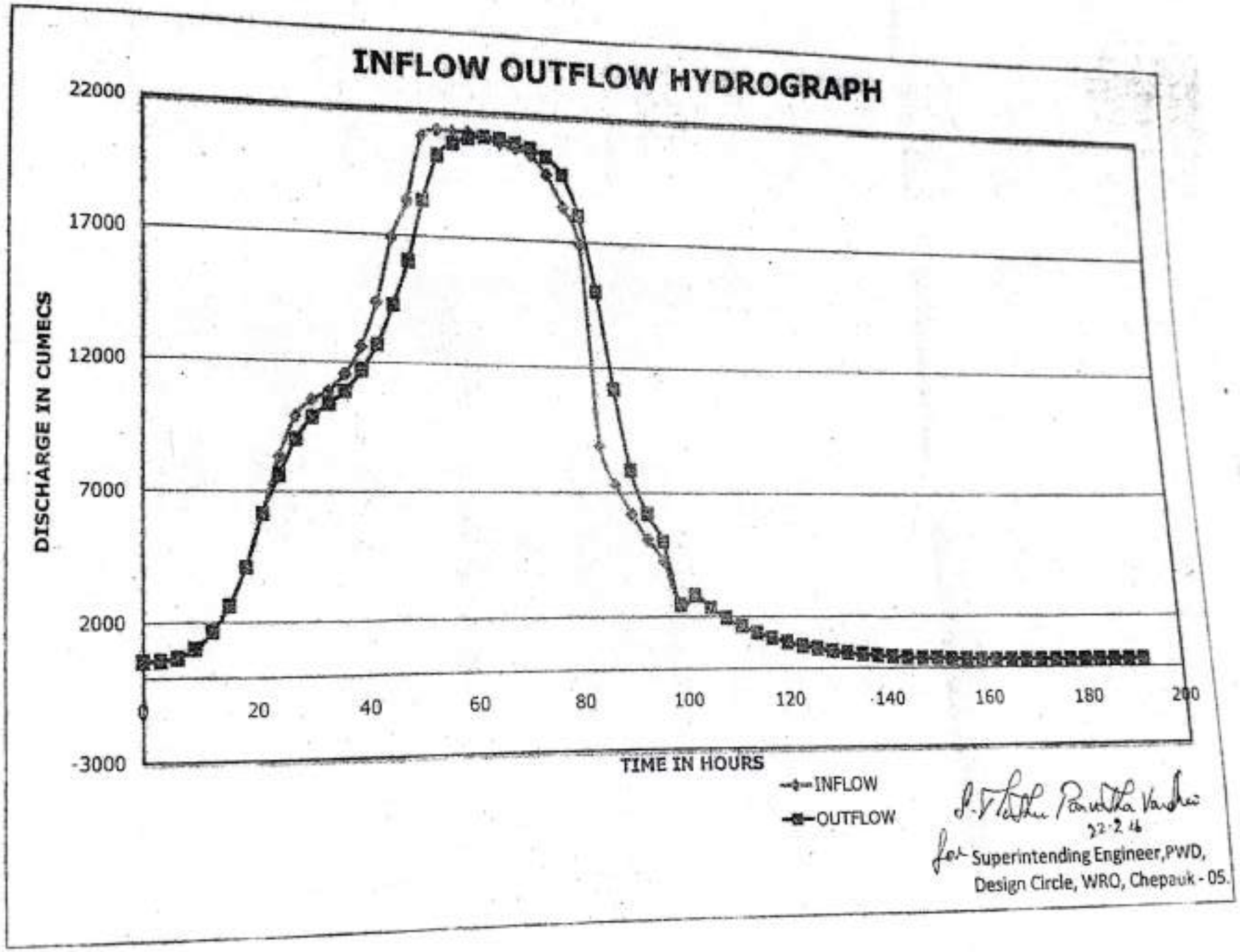

22.2.16

for Superintending Engineer, PWD,
Design Circle, WRO, Chepauk - 05.

Attested

ASSISTANT EXECUTIVE ENGINEER, WRD
SATHANUR DAM SUB-DIVISION
SATHANUR DAM

DSRP REPORTS

REPORT OF DSRP-II OF TAMIL NADU OF THEIR VISIT FROM 10TH DECEMBER 2014 TO 14TH DECEMBER 2014 TO WRD DAMS

On the request of SPMU for DRIP of Tamil Nadu, DSRP-II comprising the following Members visited Tamil Nadu from 10th December 2014 to 14th December 2014 to inspect five WRD dams which are a part of the dams under DRIP.

Shri. A.K. Ganju, Chairman

Shri. Rajan Nair, Member

Shri. D.K. Mehta, Member

Shri. J.K.Tiwari, Member could not participate in the inspection as he was unwell &

Shri.Rajagopalan, Member could not participate in the inspection as he was out of the country.

DAMS INSPECTED

1. **SATHANUR**
2. **SHENBAGATHOPE**
3. **KELAVARAPALLI**
4. **KRISHNAGIRI**
5. **PAMBAR**

The salient features of these dams are annexed at Annexure I to V and the list of officers who accompanied the DSRP during their visit to these dams is at Annexure-VI.

The inspection report of the DSRP-II of their visit to the above dams is as follows:

1. SATHANUR DAM

1.1 Introduction

The Sathanur dam is constructed across river Pennaiyar in Tiruvannamalai district in Tamil Nadu at Latitude of 12^0 11' N and Longitude of 78^0 50' E. The project consists of masonry cum earthen dam of length 426.72 m and 359.66 m respectively. The project was completed in the year 1958. The catchment area of Sathanur river upto the dam site is 10825.78 km^2. The height of the dam is 44.81 m. The gross storage capacity of the dam at FRL is 228.91 MCM. The main Spillway was designed for 5664 Cumec, the additional Spillway can discharge 4255 Cumec and the Saddle spillway can discharge 4255 Cumec.

1.2 Hydrology

As per BIS: 11223 – 1985 criteria, the dam is classified as large dam and therefore qualifies for Probable Maximum Flood as the design flood. The unit hydrograph of one hour duration was derived using Clarke's model.

The PMF with peak of 21181 Cumec was finalised by CWC earlier and is the recommended design flood against the existing design flood discharge. For evacuating the PMF there are an additional saddle spillway and an additional spillway on the right flank. These with the river sluices take care of more than 67% of the PMF. **It is recommended that:**

1. **The possibility of disposing the remaining PMF may be explored by providing a fuse plug on the left rim of the reservoir.**
2. **There being two reservoirs upstream of this dam; an integrated operation of these dams would help in better flood management of the PMF. As such a management plan may be prepared accordingly.**

1.3 Geology

Pyroxine-granulite, charnockitic gneisses, migmatitic gneisses and dolerite dykes are the major rock types. The dam site falls in Zone II of the Seismic zonation map. The abutments are consisting of good rock.

It is recommended that:

- **The dam to be checked against seismic forces since the dam falls in a higher seismic zone.**

1.4 Masonry Dam

Overall the masonry dam is in good condition. On the road at the top of the dam some surface cracks were seen. On the left flank on the upstream side there was an outlet for draining the overflows from a road nearby into the reservoir. Some loose muck is also there on the abutment which may get displaced into the reservoir. The project authorities reports that there is some seepage seen on the downstream side of the abutment to the masonry dam when the reservoir level is above 24m. The metal gauge provided to measure the reservoir level is in badly rusted condition.

It is recommended that:

1. ***The road drain on the left flank of the dam be realigned in such a manner to discharge the rain water towards the downstream side.***
2. ***All the loose muck near the junction of the masonry dam with the rock abutment on the upstream side be removed and the***

junction between the dam and the hill be grouted to prevent leakage from the reservoir side.

3. The cracks observed on the concrete road on the top of the masonry dam be grouted using bituminous grout.
4. Any masonry joint which lost its pointing may be regrouted with Epoxy mortar after cleaning the joints.
5. The metal gauge may be replaced with new one.

1.5. Spillway:

The downstream glacis is in good condition. The Cistern could not be inspected as it was full of water. A few joints had lost the mortar. Some vegetation growth has come up on the spillway joints.

It is recommended that:

1. The Vegetation which has come up in the masonry joints may be uprooted.
2. Any masonry joint which lost its pointing may be regrouted with Epoxy mortar after cleaning the joints.

1.6. Drainage Gallery:

The drainage gallery was inspected and found to be in very good condition. Only, clogging of drainage holes were seen near the end point which may be cleared by poking with iron bar.

1.7. Additional Spillway:

The Spillway is in good condition. However, A portion of the Coffer dam is still existing upstream of the spillway. It will be

causing obstruction to the free movement of water towards the Spillway. The left guide bund on the downstream side is damaged at the end.

It is recommended that

1. **The left over portion of the coffer dam may be removed.**
2. **The damaged portion of the guide bund may be repaired and extended further by about 5m.**

1.8.Earthern Bund:

(a)Downstream Slope:

The downstream slope as well as the rain water chutes are well maintained. However, the holes provided at the top of the dam to discharge rainwater falling on the dam top road are choked. A rain water drain is existing at the junction of the earthern bund and the masonry dam. This is causing erosion in the area.

It is recommended that:

1. **The choked drainage holes provided on the top of the dam for free discharge of rain water into the chutes.**
2. **A 30cm x 30cmx5cm deep plastered depression may be created in front of the drainage hole at the top to avoid scouring of road top layer near the drainage hole location.**
3. **The rain water drain existing at the junction of the earthern dam and the masonry dam may be suitably shifted to safely discharge the rain water into the toe drain.**

(b)Upstream Slope:

The stone pitched upstream slope is generally in order. However, as rainwater is finding way towards the downstream slope at a location of the junction earthern portion with the masonry dam an area of about 10m x10m Rip-Rap has got sunk.

It is recommended that:

1. **The sunken portion of the Rip-Rap (10mx10m) near the junction of the earthen bund may be relayed to the original slope after backfilling to the suitable material as provided in the original design.**
2. **A concrete wall of about 15cm height may be constructed In the opening provided on the upstream parapet to prevent discharge of rain water towards the upstream slope.**

1.9.Hydro mechanical Works:

(a)Spillway Gates (Main, Saddle and Additional):

There are 9 Nos. of 12.19mx6.10m vertical lift gates operated by chain hoists for Main Spillway. The saddle spillway is provided with 11Nos. of 12.19m x 4.57m vertical lift gates operated by chain hoists. The additional spillway has 11Nos. of 12.19m x 4.57m vertical lift gates operated by rope hoists. There is no provision of stop logs and the spillway gates are maintained when the water level goes below the crest (i.e. for about 6 to 7 months in a year). The gates are observed to be in good condition. However, the leakage takes place through the bottom 'and side seals. The drain holes in the horizontal members of the gate are not functional. During the visit, Gate No.5 of Main Spillway was electri..

It is recommended that:

1. **The side and bottom rubber seals of all gates may be replaced.**

2. **The drain holes may be cleaned and wherever not existing may be provided.**

(b)River Sluices:

There are 5 Nos. of Sluices of size 1.52mx1.83m are provided, out of which Sluice No.3,4,5 are meant for irrigation releases and Sluice No.1 & 2 are carrying water for Power generation. The irrigation sluice gates are operated by Screw gearing. There is one Emergency gate which is utilized for maintenance of 3Nos. of irrigation sluices by using the Gantry crane, is in good condition. However, it was reported that the River sluice gate leaves and embedded parts of the gate groove are in heavily rusted condition. These gates were installed in late 1950s. The Gates (3 Nos.) and their groove embedded parts need replacement.

It is recommended that:

1. **The three irrigation sluice gates may be replaced along with their embedded parts in the groove.**

1.10. Lightening Arrestor:

A lightening Arrestor may be provided on the highest point of the gate hoisting structure.

1.11. Generator Room:

The room provided to house the Saddle spillway generator is in dilapidated condition and leakage is taking place through the roof and

1.12.Flood Control Room:

The accommodation existing for the maintenance staff near the dam site for their use is in bad condition and during the flood period they find difficult to operate as they have to work during the day as well as during the night period. It is therefore recommended that the existing accommodation may be repaired.

1.13. Watch Tower:

The Doors and Windows of the Watch tower existing on the main spillway are in broken condition. As such these may be replaced.

1.14.Inspection Quarters:

For proper inspection and maintenance of dam and its appurtenance works one quarter each of 'B' and C type may be built near the dam site.

1.15.Electric Wiring:

The Electric cables carrying power to the dam for supply of power to the electrically operated equipments appear to be in good condition. However, the wiring networks near these equipments are damaged at many locations and need replacement. It is therefore recommended that the wiring along with the switch boards may be replaced with modern system.

ACKNOWLEDGEMENT

The DSRP acknowledges the full cooperation from the officials of SPMU, Water Resources Department of Chennai Region and other field officials in facilitating the work of the DSRP and in making the stay of the Members comfortable.

(Shri.Rajan Nair)
Member

(Shri. D.K. Mehta)
Member

(Shri.A.K.Ganju)
Chairman

Ms. Limayinla Jamir, Adv.
Mr. Amit Kumar Singh, Adv.
Ms. Chubalemla Chang, Adv.
Mr. Prang Newmai, Adv.

UPON hearing the counsel the Court made the following

O R D E R

[1] IA Nos. 149950 and 149951 of 2024

As prayed, list these applications on 11.11.2024.

[2] IA Nos. 138800 of 2024

1. By way of present application, the applicant seeks following relief:

> (a) Issue appropriate orders/directions and permit the Applicant for diversion of 0.90 ha of forest land in Pennaiyar RF in Tiruvannamalai forest division area for Construction of Fuse plug pertaining to Thandarampattu Taluk of Tiruvannamali district for discharge of heavy floods from Sathanur reservoir in Tiruvannamali district in favour of Assistant Executive Engineer, PWD, Sathanur Dam, Tiruvannamali District."

2. The total number of trees to be felled for the said project is 71.

3. This Court has passed the following order on 11.01.2023:

> "We are, therefore, of the considered view that in order to ensure that delay in projects is avoided and at the same time the environment concerns are addressed, the order dated 12.12.1996 passed by this Court needs to be modified so far as it concerns the State of Tamil Nadu.
>
> We, therefore, direct that the order requiring permission of this Court for felling of trees in all forest areas in respect of any road projects initiated by the State Government, National Highway Authority of India or any other instrumentality of the State, which involves cutting of up to 500 trees is recalled, however, subject to the following conditions:-
>
> 1. Such felling shall be done only after necessary approval under the Forest Conservation Act, 1980, Forest Conservation Rules, 2022, Compensatory

2. The projects would be permitted only after the concurrence of the Integrated Regional Office (IRO), Chennai.
3. While granting such permissions, the authorities also should provide for necessary mitigation measures for ensuring free flow of the wildlife from one part of the forest to the other whenever such forest is divided by roads."

4. Since in the present case the number of trees to be felled is less than 500, the permission of the Court is not necessary.

5. The State, however, will have to follow the direction as issued in paragraph 1 of the said order.

6. Though, Shri K. Radhakrishanan, learned senior counsel appearing for the State of Tamil Nadu submits that, in principle, the approval has been granted by the Central Government, we find that the entire formalities as directed under clause (1) of the said order, will have to be followed by the State Government.

7. With the above observations, the application is disposed of.

[3] IA Nos. 172422, 172425, 172427, 172429 of 2024 WITH IA NO. 179359 OF 2024

List these applications on 21.10.2024.

[4] IA No. 172781 of 2024 with IA NO. 172375 OF 2024 IN W.P.(C) NO. 171 OF 1996

List these applications on 21.10.2024.

[5] IA NOS. 36847 AND 36852 OF 2024

1. As request by Ms. Aishwarya Bhati, learned Additional Solicitor General, list these applications on 21.10.2024.

2. In the meantime, rejoinder, if any, be filed.

[6] IA NOS. 66542, 66546, 66548 OF 2024

1. Vide order dated 27th January, 2021, learned single judge

[9] I.A. NOS. 99457 AND 99462 OF 2024 WITH Interlocutory Application No. 211469 of 2024

List on 11.11.2024.

[10] I.A. NO. 263809 /2023 WITH I.A. NOS. 263810, 263811 AND 263812/2023 AND I.A. NO. 92980/2024 IN I.A. NO. 263809/2023 AND I.A. NO. 141598/2024

List on 11.11.2024.

[11] I.A. NO. 108587 OF 2024 WITH I.A. NO. 108243 OF 2024

List on 11.11.2024.

[12] I.A. NOS. 153500 & 153501 OF 2024 WITH I. A. NO. 153502 OF 2024

List on 21.10.2024.

[14] I. A. Nos. 118236 AND 129623 OF 2020 WITH I.A. No. 179389/2018 IN I. A. NO. 502] AND I.A. No. 69399/2021 AND I.A. No. 144539/2021 AND I.A. No. 13413/2023 [CEC REPORT NO. 2/2023

List on 11.11.2024.

[15] I.A. NO. 117204 OF 2024 (CEC REPORT NO. 5 OF 2024-Status Report in Delhi Ridge)

List on 11.11.2024.

[16] [i] I.A. NO. 19010 OF 2019 WITH [ii] I.A. NO. 75982 OF 2019 [iii] I.A. NO. 86706 OF 2019 WITH [iv] I.A. NO. 90640 OF 2019 WITH [v] I.A. NO. 122128 AND 122130 OF 2019 WITH [vi] I.A. NO. 129260 AND 129264 OF 2019 AND [vii] I.A. NO. 129279 OF 2019 AND [viii] I.A. NOS. 150901 AND 150915 OF 2019 AND Interlocutory Application No. 211801 of 2024

List on 21.10.2024.

(DEEPAK SINGH)
ASTT. REGISTRAR-cum-PS

(ANJU KAPOOR)
COURT MASTER (NSH)

ITEM NO.11+12 COURT NO.3 SECTION PIL-W

S U P R E M E C O U R T O F I N D I A
RECORD OF PROCEEDINGS

Writ Petition(s)(Civil) No(s). 202/1995

IN RE : T.N. GODAVARMAN THIRUMULPAD Petitioner(s)

VERSUS

UNION OF INDIA & ORS. Respondent(s)

Date : 18-09-2024 This petition was called on for hearing today.

CORAM :
HON'BLE MR. JUSTICE B.R. GAVAI
HON'BLE MR. JUSTICE ARAVIND KUMAR
HON'BLE MR. JUSTICE K.V. VISWANATHAN

For parties(s)

Mr. K. Parameshwar, leaned Sr. Advocate (A.C.)
Ms. Kanti, Adv.
Ms. Aarti Gupta, Adv.
Mr. Chinmay Kalgaonkar, Adv.

Mr. Katubadi Ismail, Adv.
Mr. Ravinder Singh, Adv.
M/S. Lawyer S Knit & Co, AOR

Mr. Visnu Kant, AOR
Ms. Shikha Bharti, Adv.
Ms. Rajnandini, Adv.

Ms. Aishwarya Bhati, A.S.G.
Mr. Gurmeet Singh Makker, AOR
Ms. Suhashini Sen, Adv.
Mr. S. S. Rebello, Adv.
Ms. Ruchi Kohli, Adv.
Ms. Shagun Thakur, Adv.
Ms. Manisha Chava, Adv.

Mr. Raj Kishor Choudhary, AOR

Mr. Shuvodeep Roy, AOR
Mr. Saurabh Tripathi, Adv.

Mr. Gaichangpou Gangmei, AOR
Ms. Asha Gopalan Nair, AOR
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Ms. K. V. Bharathi Upadhyaya, AOR
Mr. T. N. Singh, AOR
Mr. T. V. George, AOR
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Mr. Sudhir Kulshreshtha, AOR

Mr. Himanshu Shekhar, AOR
Mr. Parth Shekhar, Adv.
Mr. Shubham Singh, Adv.
Ms. Moni Tomar, Adv.
Mr. Mukesh Kumar Verma, Adv.
Mr. Nikhil Kumar, Adv.

Mr. B V Deepak, AOR
Mr. Gopal Singh, AOR
Mr. Punit Dutt Tyagi, AOR
Mr. Rathin Das, AOR
Mr. Ratan Kumar Choudhuri, AOR
Mr. G. Prakash, AOR
Mr. E. M. S. Anam, AOR

Mr. Chanchal Kumar Ganguli, AOR
M/S. Plr Chambers And Co., AOR
Mr. Syed Mehdi Imam, AOR
Mr. T. Harish Kumar, AOR
M/S. Mitter & Mitter Co., AOR
Mrs. Rekha Pandey, AOR
Mr. Raghav Pandey, Adv.
Ms. Gauri Pandey, Adv.
Ms. Sharmistha Choudhary, Adv.

Mr. Mohd. Irshad Hanif, AOR
Ms. Rifat Ara Butt, Adv.

Mr. Sudhir Kumar Gupta, AOR
Mr. A. N. Arora, AOR
Mr. Irshad Ahmad, AOR
Ms. C. K. Sucharita, AOR
Ms. Binu Tamta, AOR
Ms. Hemantika Wahi, AOR
Mr. Pradeep Kumar Bakshi, AOR
Mr. P. V. Yogeswaran, AOR
Mr. Jitendra Mohan Sharma, AOR
Ms. Malini Poduval, AOR
Mr. Jai Prakash Pandey, AOR
Mrs. Anjani Aiyagari, AOR

Attested
21.8.20

ASSISTANT EXECUTIVE ENGINEER, WRD
SATHANUR DAM SUB-DIVISION
SATHANUR DAM

ABSTRACT

Tamil Nadu Water Resources Department – Dam Rehabilitation and Improvement Project (DRIP)- Phase II and III –Administrative Sanction for the work of Rehabilitation and Improvement to Sathanur dam in Thandarampattu Taluk of Tiruvannamalai District for an amount of Rs.9000.00 Lakhs under DRIP Phase II- Accorded- Orders- Issued.

Public Works (WR1) Department

G.O.(Ms) No.187 **Dated:10.8.2020**
சார்வரி, ஆடி 26
திருவள்ளுவர் ஆண்டு 2051

Read:-

1. Government Letter No.4629/WR1/2018-15, Public Works Department, Dated 14.9.2018.
2. Government Letter No.4629/WR1/2018-24, Public Works Department, dated 13.4.2020.
3. From the Chief Engineer, Water Resources Department, Operation and Maintenance, Chennai Letter No.DS/0832 (DRIP-II)/2017, dated 9.6.2020.

Order:-

In the Government letter first read above, sanction has been accorded for implementing the works of Rehabilitation and Improvements to 37 TNWRD Dams under DRIP phase–II with the World Bank loan assistance at a project cost of Rs.610.26 Crore, within a period of 5 years from April 2020 and to appraise the Central Project Management Unit , Dam Rehabilitation and Improvement Project, Central Water Commission for including the cost of Tamil Nadu Water Resources Department and Agricultural Engineering Department in the DRIP-II project.

2. In the Government Letter second read above, concurrence has been given for the Implementation of DRIP - Phase II & III in Tamil Nadu with the funding pattern of 70:30 and also willingness to take part in DRIP loan.

3. In the letter third read above, the Chief Engineer, Water Resources Department, Operation and Maintenance has stated that the Government of India in its letter dated 2.1.2020 have informed that to become a part of Loan Negotiation meeting, one of the conditions of Department of Economic Affairs (DEA), Ministry of Finance is 30% readiness criteria (ie.) Tamil Nadu must invite tenders and complete the technical and financial evaluation of 30% civil works which is approximately to Rs.159.00 crore to participate in the Loan Negotiation with World Bank. The Government of Tamil Nadu has provided an amount of Rs. 150.00 crore in the BE 2020-21 for the works under DRIP II, wherein Rs.40.21 crore have been allotted for Pennaiyar Basin dams and Sathanur dam is one among the dams in Pennaiyar Basin.

4. He has also stated that the Dam Safety Review Panel (DSRP) constituted for DRIP II have inspected Sathanur dam and offered their recommendations. Based on the DSRP report, Project Screening Template (PST) prepared for the Rehabilitation and Improvements of Sathanur dam under DRIP – II for an amount of Rs. 9000.00 lakhs was submitted to the Central Project Management Unit, Central Water Commission for obtaining the approval from World Bank. The World Bank has given approval (No objection) for the above PST. Based on the "No objection" issued by the World Bank, the Superintending Engineer, WRD, PWD, Pennaiyar Basin Circle, Thiruvannamalai has submitted the draft bid document for the work of "Rehabilitation and Improvements to Sathanur dam in Thandarampattu Taluk of Tiruvannamalai District under DRIP Phase II (Package – 1, Civil Works). The CPMU, CWC, New Delhi has issued the "No Objection" for the draft bid document of the Sathanur dam. It has also stated that the discussions regarding the date of "Loan Negotiation Meeting" for the ongoing DRIP Phase II and III, are going on between Department of Water Resources, River Development and Ganga Rejuvenation and Department of Economic Affairs. The Department of Economic Affairs has required the publication of Notice Inviting Tender (NIT) amounting to 30% of the budget outlay under DRIP Phase II. Also it has been affirmed that this criteria has to be fulfilled in order to carry out the Loan Negotiation meeting with World Bank.

5. He has further stated that the estimate proposal for "Rehabilitation and Improvement to Sathanur dam in Thandarampattu Taluk of Tiruvannamalai District under DRIP Phase II" for Rs. 9000.00 Lakhs is submitted by the Chief Engineer, Water Resources Department, Chennai Region for obtaining the Administrative Sanction of the Government. The estimate comprises of Civil, Hydro mechanical and Electrical and Tourism development works as detailed below:-

Civil Works:

i) Repairs and Renovation in the hillock portion by providing anchoring rods with rich mix of concrete to avoid the earth sliding in that portion and consolidation grouting in the interface between the rock and dam structure.

ii) Providing Fuse Plug of length 425m to accommodate the revised Probable Maximum flood.

iii) Cleaning/ Reaming of the drainage hole in the dam body which is clogged with lime leaching and also foundation grout holes.

iv) Removal of coffer dam, a natural mount in the upstream portion of the additional saddle spillway which obstructs the spillway discharge.

v) In the dam site, there are asbestos roofed temporary sheds with mud mortar which were constructed during the inception of the dam construction for the purpose of accommodating the workers involved during the construction work. After the completion, these quarters were allotted to the staffs who were working in the department. As about 60 years have been passed since the construction, now the quarters are in dilapidated condition and unfit for accommodation. All the doors, windows, floors and rafters are in dilapidated condition. Hence it is now essential to construct quarters for the occupation of present dam workers.

7. The Government after careful examination, have decided to accept the proposal of the Chief Engineer, Water Resources Department, Operation and Maintenance and hereby accord Administrative Sanction for the work of Rehabilitation and Improvement to Sathanur dam in Thandarampattu Taluk of Tiruvannamalai District for an amount of Rs. 9000.00 Lakhs (Rupees Ninety crore only) under DRIP Phase II.

8. The expenditure sanctioned at para 7 above shall be debited to the following head of account:-

"4700- Capital Outlay on Major Irrigation- 02- Pennaiyar Basin- 800 Other Expenditure- Externally Aided Project – PB Dam and Appurtenant Works- 416 Major Works – 01 Major Works."

(DPC: 4700- 02- 800- PB-41601)

9. This order issues with the concurrence of the Finance Department vide its U.O. No.24461/Fin(PW-II)/2020 dated 7.8.2020.

(By order of the Governor)

K. Manivasan,
Principal Secretary to Government

To
The Engineer-in-Chief, Water Resources Department and
Chief Engineer (General), Public Works Department,
Chennai-5.
The Chief Engineer, Water Resources Department,
Operation and Maintenance, Chennai-5.
The Chief Engineer, Water Resources Department,
Chennai Region, Chepauk, Chennai-5.
The Project Director, SPMU, DRIP, Chennai-5.
The Principal Accountant General (Audit/ A&E), Chennai-18.
The District Treasury Officer, Thiruvannamalai District.
The Pay and Accounts Officer (EAST), Chennai-8.

copy to
The Office of the Hon'ble Chief Minister, Channai-9.
The Finance (PW-II/BG-I/BG-II/EAP) Department, Chennai-9.
The Resident Audit Officer,
Office of the Principal Accountant General
(General and Social Sector Audit),
Secretariat, Chennai – 9.
Stock File / Spare Copy

//Forwarded by Order//

Attested

ASSISTANT EXECUTIVE ENGINEER, WRD
SATHANUR DAM SUB-DIVISION
SATHANUR DAM

ITEM NO.11+12 COURT NO.3 SECTION PIL-W

S U P R E M E C O U R T O F I N D I A
RECORD OF PROCEEDINGS

Writ Petition(s)(Civil) No(s). 202/1995

IN RE : T.N. GODAVARMAN THIRUMULPAD Petitioner(s)

VERSUS

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Date : 18-09-2024 This petition was called on for hearing today.

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HON'BLE MR. JUSTICE ARAVIND KUMAR
HON'BLE MR. JUSTICE K.V. VISWANATHAN

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Mr. Deepayan Dutta, Adv.

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Mr. Krishnanand Pandeya, AOR
Mr. Neeraj Shekhar, AOR
Mr. Sudhir Kulshreshtha, AOR

Mr. Himanshu Shekhar, AOR
Mr. Parth Shekhar, Adv.
Mr. Shubham Singh, Adv.
Ms. Moni Tomar, Adv.
Mr. Mukesh Kumar Verma, Adv.
Mr. Nikhil Kumar, Adv.

Mr. B V Deepak, AOR
Mr. Gopal Singh, AOR
Mr. Punit Dutt Tyagi, AOR
Mr. Rathin Das, AOR
Mr. Ratan Kumar Choudhuri, AOR
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UPON hearing the counsel the Court made the following

O R D E R

[1] IA Nos. 149950 and 149951 of 2024

As prayed, list these applications on 11.11.2024.

[2] IA Nos. 138800 of 2024

1. By way of present application, the applicant seeks following relief:

> (a) Issue appropriate orders/directions and permit the Applicant for diversion of 0.90 ha of forest land in Pennaiyar RF in Tiruvannamalai forest division area for Construction of Fuse plug pertaining to Thandarampattu Taluk of Tiruvannamali district for discharge of heavy floods from Sathanur reservoir in Tiruvannamali district in favour of Assistant Executive Engineer, PWD, Sathanur Dam, Tiruvannamali District."

2. The total number of trees to be felled for the said project is

71.

3. This Court has passed the following order on 11.01.2023:

> "We are, therefore, of the considered view that in order to ensure that delay in projects is avoided and at the same time the environment concerns are addressed, the order dated 12.12.1996 passed by this Court needs to be modified so far as it concerns the State of Tamil Nadu.
>
> We, therefore, direct that the order requiring permission of this Court for felling of trees in all forest areas in respect of any road projects initiated by the State Government, National Highway Authority of India or any other instrumentality of the State, which involves cutting of up to 500 trees is recalled, however, subject to the following conditions:-
>
> 1. Such felling shall be done only after necessary approval under the Forest Conservation Act, 1980, Forest Conservation Rules, 2022, Compensatory Afforestation Fund Act, 2016 and Compensatory Afforestation Fund Rules, 2018 are obtained from the Competent Authority under the said enactments.

2. The projects would be permitted only after the concurrence of the Integrated Regional Office (IRO), Chennai.
3. While granting such permissions, the authorities also should provide for necessary mitigation measures for ensuring free flow of the wildlife from one part of the forest to the other whenever such forest is divided by roads."

4. Since in the present case the number of trees to be felled is less than 500, the permission of the Court is not necessary.

5. The State, however, will have to follow the direction as issued in paragraph 1 of the said order.

6. Though, Shri K. Radhakrishanan, learned senior counsel appearing for the State of Tamil Nadu submits that, in principle, the approval has been granted by the Central Government, we find that the entire formalities as directed under clause (1) of the said order, will have to be followed by the State Government.

7. With the above observations, the application is disposed of.

[3] IA Nos. 172422, 172425, 172427, 172429 of 2024 WITH IA NO. 179359 OF 2024

List these applications on 21.10.2024.

[4] IA No. 172781 of 2024 with IA NO. 172375 OF 2024 IN W.P.(C) NO. 171 OF 1996

List these applications on 21.10.2024.

[5] IA NOS. 36847 AND 36852 OF 2024

1. As request by Ms. Aishwarya Bhati, learned Additional Solicitor General, list these applications on 21.10.2024.

2. In the meantime, rejoinder, if any, be filed.

[6] IA NOS. 66542, 66546, 66548 OF 2024

1. Vide order dated 27th January, 2021, learned single judge of the Gauhati High Court, Bench at Aizawl in a series of

petitions being W.P.(C) No. 130 of 2013 alongwith connected matters has held that the notification issued in the Assam Gazette dated 19.05.1965 notifying the order passed by the Chief Executive Officer, Mizo District Council, declaring forests located within half a mile on either side of the river Tuirial and 15 others rivers to be the Council Reserved Forest, is not sustainable in law.

2. Being aggrieved thereby, the State had preferred a Writ Appeal No. 6 of 2021 before the Division Bench of the Gauhati High Court.

3. Initially, vide order dated 21st July, 2022, the Court had issued notice and also stayed the operation of the order passed by the learned Single Judge of the Gauhati High Court.

4. However, it appears that subsequently on 09.11.2022, the State of Mizoram sought liberty to withdraw the appeal with liberty to file a fresh appeal, if required.

5. Vide the said order, the Court has disposed of the writ appeal with liberty as prayed for.

6. It is submitted on behalf of the different parties appearing before this Court, including the State of Mizoram as well as the National Highways and Infrastructure Development Corporation Limited (for short "NHIDCL") that the judgment passed by the learned Single Judge of the Gauhati High Court is posing various problems and it is, therefore, appropriate

that the appeal should be restored and decided on merits in accordance with law.

7. Taking into consideration the huge ramification of the order passed by the learned Single Judge of the Gauhati High Court and also the cascading effect that it may have on various issues, including the construction of highways or rights of the citizens, we find that it will be appropriate that the said writ appeal alongwith connected matters are restored to the original file and directed to be decided on their own merits.

8. We find that this is a fit case wherein this Court should exercise its extraordinary powers under Article 142 of the Constitution of India and restore the appeal(s) to the file of the Division Bench.

9. We, therefore, restore the Writ Appeal No. 6 of 2021 alongwith connected matters to the file of the Division Bench of the Gauhati High Court.

10. Taking into consideration the importance of the matter, we request the High Court to decide the said appeal as expeditiously as possible and, in any case, within a period of three months from today.

11. Vide order dated 24.07.2024, we had already stayed the judgment and order dated 27.01.2021 passed by the learned Single Judge of the Gauhati High Court. The said order shall

continue to operate till disposal of the appeal(s).

12. It further appears that there have been some *inter se* disputes between the forest department and the revenue department of the Government of Mizoram.

13. We have reiterated, time and again, that for the courts, the State is a single litigant and the State should come with a unified stand after taking on board all the concerned departments.

14. We are, therefore of the considered view that it will be appropriate that the Chief Secretary of the State of Mizoram holds a meeting with the Secretary of the Revenue Department as well as the Secretary of the Forest Department in order to resolve the issue.

15. We request the same to be done as expeditiously as possible so that the important projects necessary for the development of the area are not stalled.

16. The applications are, accordingly, disposed of.

[7]+ [13] IA NO. 156703 OF 2024 AND IA NOS. 156707 & 156710 OF 2024 WITH IA NOS. 18249 AND 182432 OF 2024 WITH IA NO. 211846 OF 2024 AND IA NOS. 212089, 212084 AND 212086 OF 2024, AND C.A. D. NO. 12516 OF 2019, SUO-MOTU WRIT PETITION(C) NO. 1 OF 2023 AND IA NO. 211378 OF 2024

List these applications/matters on 21.10.2024.

[8] I.A.NO. 42944 OF 2019 WITH I.A. NOS. 146755 AND 146756 OF 2021 AND I.A. NOS. 158973, 158975 AND 159054 OF 2021 AND I.A.NOS. 28731, 28732 AND 28905 OF 2022 AND I.A. NOS.41069, 41070 & 51917 OF 2022

List on 11.11.2024.

[9] I.A. NOS. 99457 AND 99462 OF 2024 WITH Interlocutory Application No. 211469 of 2024

List on 11.11.2024.

[10] I.A. NO. 263809 /2023 WITH I.A. NOS. 263810, 263811 AND 263812/2023 AND I.A. NO. 92980/2024 IN I.A. NO. 263809/2023 AND I.A. NO. 141598/2024

List on 11.11.2024.

[11] I.A. NO. 108587 OF 2024 WITH I.A. NO. 108243 OF 2024

List on 11.11.2024.

[12] I.A. NOS. 153500 & 153501 OF 2024 WITH I. A. NO. 153502 OF 2024

List on 21.10.2024.

[14] I. A. Nos. 118236 AND 129623 OF 2020 WITH I.A. No. 179389/2018 IN I. A. NO. 502] AND I.A. No. 69399/2021 AND I.A. No. 144539/2021 AND I.A. No. 13413/2023 [CEC REPORT NO. 2/2023

List on 11.11.2024.

[15] I.A. NO. 117204 OF 2024 (CEC REPORT NO. 5 OF 2024-Status Report in Delhi Ridge)

List on 11.11.2024.

[16] [i] I.A. NO. 19010 OF 2019 WITH [ii] I.A. NO. 75982 OF 2019 [iii] I.A. NO. 86706 OF 2019 WITH [iv] I.A. NO. 90640 OF 2019 WITH [v] I.A. NO. 122128 AND 122130 OF 2019 WITH [vi] I.A. NO. 129260 AND 129264 OF 2019 AND [vii] I.A. NO. 129279 OF 2019 AND [viii] I.A. NOS. 150901 AND 150915 OF 2019 AND Interlocutory Application No. 211801 of 2024

List on 21.10.2024.

(DEEPAK SINGH)
ASTT. REGISTRAR-cum-PS

(ANJU KAPOOR)
COURT MASTER (NSH)