

*done for*  
Assam State Disaster Management Authority

## REPORT

### Flood of North Lakhimpur vis-a-vis Ranganadi Hydropower Project



**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI**  
**North Guwahati, Guwahati – 781 039**  
**ASSAM, INDIA**



**Feb 2018**

REPORT

ON

**Flood of North Lakhimpur  
vis-a-vis Ranganadi Hydropower Project**



**Principal Investigator**

*Prof. A.K.Sarma*

**Civil Engineering Department  
Indian Institute of Technology Guwahati  
Guwahati -781039**

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## STUDY TEAM

1. Prof. Arup Kumar Sarma, Principal Investigator
2. Mr. Anupal J Baruah, PhD Research Scholar
3. Ms.Dipshikha Devi, PhD Research Scholar
4. Ms. Dipima Sarma, Senior Research Fellow
5. Mr. Rishov Barua, Assistant Project Engineer
6. Ms. Khyati Manjuri Chaudhury, Assistant Project Engineer
7. Mr. Raktim Choudhury, Office Support

## ACKNOWLEDGEMENT

*The Study Team Acknowledges support of Deputy Commissioner Mr. Barun Bhuyan and his team from North Lakhimpur; Executive Engineer Mr. P.M.Das, Er. Balin Kalita and their team from WR Department; Executive Engineer Mr. Tarun C. Taid and his team from Irrigation Department; Mr.Bijit Goswami,DGM and his team from NEEPCO; and Mr. K.K.Chatradhara of AJYCP, and President and Secretary of AJYCP and their team for extending support and cooperation during field investigation and for sharing some important documents, which has made the analysis easier.*

## **1. INTRODUCTION**

This report presents the findings, analysis and possible solutions under five sections; *Background of the study, Incidence at a glance, Action taken after flood, Analysis of technical aspects and possible improvement, and Recommendation.*

## **2. BACKGROUND OF THE STUDY**

- 2.1 Following devastating flood of North Lakhimpur in July 2017, as per resolution taken in a meeting held under the chairmanship of Chief Secretary, Govt. of Assam, State Disaster Management Authority requested Prof. A.K.Sarma of IIT Guwahati to investigate the flood and to suggest measures that can be taken up to avoid such disaster in future.
- 2.2 Meeting also requested Mr. Barun Bhuyan, D.C., North Lakhimpur, Mr. Rnendra Sarma (NEEPCO), Mr. K.K.Chatradhara (A.J.Y.C.P.) and Executive Engineer of WR Department, North Lakhimpur to extend all possible help to Prof. Sarma in carrying out the study.
- 2.3 Accordingly, Prof. Sarma started collecting preliminary information from all concerns and after receiving official communications from Assam State Disaster Management Authority (ASDMA) field investigation (Annexure-1) was completed on 11th and 12th Feb, immediately after registration of the project at IIT Guwahati on 8<sup>th</sup> Feb 2018.
- 2.4 Based on the critical review of the primary information collected during field visit, secondary information collected from different sources, image analysis and applying state of the art knowledge and modelling tools, this report is prepared.

## **3. INCIDENCE AT A GLANCE**

- 3.1 Following release of spill from Ranganadi reservoir through gates and subsequent breach of Ranganadi embankment in two locations; a) Joinpur on right [time: 10:00pm, date: 9th July 2017]; b) Bogolijan on left (time:10:45pm, date: 10th July 2017), and overtopping of the Road on right bank between the NH 15 and the rail bridge, people of North Lakhimpur suffered severe flood havoc losing lives and property.
- 3.2 As reported by the DC, North Lakhimpur, information about gate opening (number and height of opening) was received through sms from NEEPCO (Dam Authority) about 2:00 to 2:30 hours before actual occurrence of flood.
- 3.3 Discharge due to gate opening is computed using standard relationship developed for this reservoir between Q (discharge in cumec) and H (total height of gate opening in m). The discharge was reported as 1412.57cumec.
- 3.4 Release on the previous day, i.e., on 8th July was quite nominal; as reported, it was in the order of 200 to 300cumec and a high release, exceeding 1400cumec, was made on 9th July.
- 3.5 The observed water level at the time of first breach, as reported, was 95.95m, which is above the danger level (95.02m). A per report of WR department, the river Subansiri, to which Ranganadi flows, was also at spate at that time and therefore water level at

downstream of NH 15 reached 95.95m causing failure of embankment at Joinpur due to seepage associate with boiling. That the high water level was partially because of afflux caused by high water elevation at Ranganadi- Subansiri confluence point needs farther verification, as this is somewhat contradictory to high flow velocity of 3.9m/s to 4.1m/s reported in the same report in Ranganadi during that time. The failure may therefore be because of combined effect of high water-level and direct impact of high water velocity immerging through the bridge opening.

- 3.6 So far breach of Bogolijan is concerned, the high water level at upstream of NH 15 is of course because of afflux due to contraction in the bridge waterway. Existence of a landmass at upstream of this breach point has also helped in changing flow direction towards the left bank.
- 3.7 In the portion not jacketed by embankment, i.e., between NH-15 and Railway track, flood water overtopped the road (Pohumara-Yajuli road) passing on the right side and scoured the downstream slope of the road leaving it in a precarious condition.
- 3.8 There is habitation very close to the embankment (Annexure-1) and also within the embankment as well. In response to our queries, members of AJYCP responded that some of them were staying there even before construction of the embankment. Moreover, Ranganadi Hydel project being an inter-basin-transfer project, Ranganadi remain almost dry in most of the time, and therefore, it has become a grazing ground for the domestic animals of people residing both inside outside the embankment.
- 3.9 People reported that they never had any early warning about this flood. Though it is reported in different documents that 8 numbers of Sirens are installed in different locations in North Lakhimpur District, they did not hear any siren and so the flood was a sudden occurrence for them.

#### **4. ACTION TAKEN BY WR DEPARTMENT AFTER THE FLOOD**

- 4.1 After promoting sedimentation using porcupine screen, the Bogolijan breach point was closed by WR department using Mega Geo Container in the month of August 2017 to stop farther release of flood water (photo in Annexure-1). However, the work needs to be completed by covering it with compacted soils so as to bring the top to the formation level with proper dimensions.
- 4.2 The Bogolijan embank was appearing to be of inadequate size and responding to a query, Engineers of WR department informed that raising and strengthening of this embankment was taken up under FMP scheme and though raising was almost completed maintaining proposed gradient (1:2 in the river side and 1:3 in the country side) and covering it by geo-mattress was not possible in some portion because of paucity of fund.

## **5. ANALYSIS OF TECHNICAL ASPECTS AND POSSIBLE IMPROVEMENT**

5.1 Following technical aspects have been analysed

- a) How correct information about possibility of flood can be transmitted downstream, so that needed action can be taken, and what kind of coordination will be required for that.
- b) What are scopes of improving inflow forecasting in to the Ranganadi reservoir, its maintenance and in the policy of reservoir operation so that release can never even have a scope of exceeding natural inflow and things become transparent.
- c) What kind of improvement is possible at downstream, so that released water moves safely to its outfall at Subansiri.

### **On Flood Forecasting at Downstream and Early Warning System**

5.2 Ranganadi Hydropower project is of inter-basin transfer type as the powerhouse is located on the bank of Dikrong River. 160.00cumec of water is diverted from Ranganadi to Dikrong through a tunnel to produce power. From that point, it can reduce the natural flood wave of Ranganadi and can increase natural flood wave of Dikrong if the flood wave comes during power production hour. It is important to note that the river Dikrong flows to Subansiri and meet at a point downstream of the Ranganadi-Subansiri confluence point.

5.3 The reservoir is however not a flood control reservoir and therefore, does not have a provision of flood cushioning as such. Spill from this reservoir therefore can causes sudden flooding at the downstream if the released water cannot be carried safely till its confluence with Subansiri at downstream.

5.4 To know about level of flood wave to be generated at downstream due to release of certain amount of water from the dam, it is important to know the following:

- 5.4.1 Time required by the released water to reach a specified section at downstream.
- 5.4.2 Scope of flood peak attenuation while propagating from the reservoir to a downstream section.
- 5.4.3 Existing water level at downstream due to rain in the downstream and by contribution of water from downstream tributaries.
- 5.4.4 Level of Subansiri at Ranganadi-Subansiri confluence point during that period, as water level of Ranganadi will be influenced by the water level of Subansiri at downstream, if it is higher than the normal flow depth of Ranganadi at that point for the expected flood peak.

5.5 In the plains, with deposition of sediment in the central part, the river gets divided into two channels, one of which moves along the right side near the Diju Tea Estate and the other moves along the left side near college of Veterinary Science. A geo-grid and geo-fabric reinforced earth filled weir was constructed over the right side channel in 2015 to reduce

flow in that channel and hence to prevent erosion of the right bank by the flowing water. This has increased the flow on the left channel. To protect the left bank from erosion, a deflecting spur with similar technique was recently constructed. More over the bridges located within 10:00Km downstream of foothill also constricts the flow width. Thus the water released from the dam after moving through a steep gradient (more than 400m drop in 40Km) narrow channel continue to move in the plains, in true sense, through a narrow path and thus scope of much flood attenuation is not there.

- 5.6 Hydrodynamic component of BRAHMA (Braided River Aid Hydro-Morphological Analyser) model was applied using approximate bathymetry to have an idea about the flood attenuation possibility till the released peak flow reaches the downstream. Model study with approximate bathymetry has shown peak flow attenuation in the order of just 80cumec for a hypothetical hydrograph increasing from 700cumec to 1200cumec in 12 hours. The peak movement time is found to be in the order of 4:00hours and it moves with very high velocity in order of 6.00 to 7.00m/s in the hilly terrain and in the plains it is in the order of 2.4 m/s. The flow depth crosses the natural bank to touch the embankment. It is worth mentioning that this exercise is done with approximate bathymetry and with approximate outflow hydrograph and is used to understand the hydrodynamic characteristic and the trend and therefore, may not be considered as exact values (Model Study Results in Annexure-2). Detail bathymetric survey is necessary for accurate result.
- 5.7 It was found that as of now there is no provision of information exchange from downstream to upstream and therefore, what is informed by NEEPCO is the amount of water released by them. As such depending on the pre-released water level condition of downstream, a release from Dam may or may not cause flood. Thus, NEEPCO provides an early warning of release and not flood.
- 5.8 There is a need of developing coordination among WR department, NEEPCO, District Authority and ASDMA, so that actual flood forecasting mechanism can be developed. Information of water level in the river in pre dam released condition remains available with WR department. Level of Subansiri can also be provided by WR department. A model can be developed to forecast flood at downstream combining all these information with the release information. For better result discharge/water level of the streams located downstream of rangnadi dam can also be installed and maintained.
- 5.9 As per document received, 9 sirens are installed in Arunachal Pradesh and 8 sirens are installed in Assam (Annexure 3A, 3B). These were installed by NEEPCO. While Sirens of Arunachal Pradesh are operated by NEEPCO, as per record, sirens of Assam should be operated as per instruction of District Authority of North Lakhimpur/ ADC, Disaster Management. Out of these 8 Sierens, 2 could not be made operational because of not having power supply and man power. This need to be looked into. So far community early warning system is concerned the necessary fund for installation was supposed to be

transferred by NEEPCO to District Authority of North Lakhimpur. Though NEEPCO has produced a document showing sanction of fund, the exact status may be reconfirmed from and recipient's side (documents received are enclosed in Annexure 4).

- 5.10 The system of Sirens and the community warning systems should be operationalize with defined responsibility and of course taking utmost care not to create unnecessary panic. Severity of the possible flood event may be indicated by changing siren blowing pattern and conducting training for the same among the villagers. This should be taken seriously, as several villages suffer from flooding. This warning is important for safety of human being and other livestock that may be within the embankment for various purposes, as the Ranganadi in normal condition flows with low water even in monsoon. This will also facilitate disaster management authority to prepare for the same in case of any major disaster.

#### **On Reservoir Release and Inflow Forecasting**

- 5.11 Decision regarding reservoir release (spill) at present is taken based on the rule that water level should not exceed the maximum level of 567m. Like any other single purpose hydropower project, in this project also the preference is to keep the reservoir always at maximum to achieve committed power production.
- 5.12 Inflow into the reservoir is basically measured by observing rate of change in the reservoir level and is recorded on hourly basis. Thus the hourly averaged flow rate is the maximum precision that one can have from the present system of recording.
- 5.13 Uploading of this observation into the system is made on 3:00 hourly basis, thus for practical purpose, decision makers can have information of 3:00 hourly averaged inflow. Looking into the fact that while release made on 8<sup>th</sup> July was just 200cumec (as communicated by WR department during field visit), the release in the early morning of 9<sup>th</sup> July reached very high to reach a range of 1400cumec in the evening hours, it is understood that this is a flashy river.
- 5.14 During discussion with NEEPCO officials in the dam site in presence of officers from WR department, Irrigation department and members from AJYCP, flashy characteristic of the river at upstream of the reservoir was discussed and NEEPCO officials confirmed that inflow to the reservoir can increase from 300cumec to 1500cumec within a day itself.
- 5.15 The point 5.13 and 5.14 confirms that the inflow can increase at a very fast rate. As the water level in the reservoir during flood time generally remain at its maximum (567.00m) more frequent observation of inflow, at least in the monsoon, can help better operation, as a high inflow rate may go unrecorded/unnoticed causing water level to cross the 567.00m and needing a release at higher rate later as compared to the natural inflow.

- 5.16 Chance of a situation mentioned in the point 5.15 increases when, for some reasons, the power release, i.e., 160cumec to Power House near Dikrong need to be stopped. Responding to a question that was there any chance of negative suction in the tunnel on 8<sup>th</sup> or 9<sup>th</sup> July, NEEPCO officials informed that due to partial blockage of the Intake trash rack by wet logs and debris, a risk of developing negative suction came and though they run the turbine with risk for some time, had to shut down the power plant for safety of the tunnel. They had to bring diver to clean the trash rack. In presence of a Mechanised trash rack cleaner, this situation could have been avoided thus flow of 160cumec would have continued to Dikrong reducing flood risk at Ranganadi downstream.
- 5.17 Though there are limited number of rain gauges and one stream gauging site at 10.00Km upstream of the reservoir, the present inflow forecasting system is not adequate. As spatiotemporal variation of precipitation in the upper catchment is quite high, installation of more numbers of automatic rain-gauges with at least 15minute recording interval is essential to have a reliable operational forecasting. With availability of such data sophisticated forecasting models with combination of rainfall-runoff model and hydrodynamic channel routing model can be developed to forecast inflow. In absence of detail subsurface data ANN model can also be developed to forecast inflow. With such reliable forecasting it will be possible to release water beforehand in non-operating hours of a day without compromising with power production. To enhance forecasting, stream gauging system should also be installed at upstream with provision of annual calibration.

#### **On Safe Passage of Water to Subansiri**

- 5.18 Deposition of sediment in the plains has forced the water to move by two channels on both sides and thus risk of embankment failure increases, as they get subjected to direct current of flowing water. Dredging of these materials can help the river flowing centrally and away from the bank except for the time when the river crosses the normal bank level.
- 5.19 As the section of this embankment is now remaining narrow with inadequate gradient both on country side and river side, chance of its failure in the coming monsoon cannot be ruled out. The country side slope for earthen embankment should be sufficient enough to cover the HG line and therefore the HG line coverage is generally laid at much flatter slope. In this case, as the embankment is designed for soil covered with geo mattresses, the slope of 1:3 is used. If the embankment is not completed with full specification, this existing narrow section will not be able to withstand the water pressure and may fail in the coming monsoon again.

## **6. RECOMMENDATIONS**

- 6.1 Reliable inflow forecasting to the reservoir will help better release strategy without compromising with power. This will ensure that release will never be higher than the natural inflow and will rather less than it during the operating hours. To achieve this, an improved inflow forecasting model along with adequate infrastructure for capturing spatiotemporal variation of precipitation in the upper catchment is necessary. NEEPCO should take up this matter as suggested in more details in this report.
- 6.2 Apart from having a reliable inflow forecasting NEEPCO should make arrangement for increasing frequency of recording reservoir level/storage to know what flow actually has reached the reservoir. Frequency of observation can be 15minutes to 30minutes during flood time depending on the rate of increase in level. Automated system can be introduced to have record of water level in a data logger after every 15 minutes, so that actual inflow and release can be seen by any one at any time if needed for any purpose. This will enable better operation and will make the system transparent.
- 6.3 As there is a time gap of about 45minute between the decision taken for gate opening and actual execution, gate opening information should be transferred to the downstream prior to the actual execution with a indication of tentative opening time in the message. This will increase the lead time for warning. This information should be combined with the information of water level at downstream, inflow from downstream tributaries and level of Subansiri at confluence to understand severity of possible flood. A model can be developed for this estimation. This will enable actual flood forecasting. State Disaster Management Authority can take the responsibility of coordinating this activity.
- 6.4 To avoid blockage of release of water for power house by debris and wet log, a mechanised Trash Rack cleaner should be installed by NEEPCO. This will help ensuring diversion of 160cumec of flow for power production and will reduce natural peak flow of Ranganadi during the production hour and will have at least that additional storage to absorb more water.
- 6.5 Operation of already installed siren should be ensured, so that lives and property damage can be reduced. Authority and responsibility of operating these sirens should be clarified to avoid confusion.
- 6.6 The channel improvement work should be taken up by de-silting the central part of Ranganadi as elaborated in this report.
- 6.7 Embankments, which are incomplete at this stage, should be completed with full specification to avoid failure in the coming flood season.
- 6.8 Road on the right side of Ranganadi can be raised to have a road come embankment in the portion where embankment is not there.
- 6.9 A multipurpose storage reservoir can be planned at upstream of the existing dam with flood cushioning provision, i.e., with a storage specifically assigned for flood control

storage. That storage capacity of such reservoir will have to be high does not necessarily mean that the dam will have to be a big dam. Depending of the terrain shape, it may be possible to have significant storage even with a low height dam. To have such ideal location one need to carry out survey in several potential alternative locations, and for all these locations a study on the relationship between dam height and storage volume needs to be carried out. Along with that loss due to submergence also need to be computed. Having all these information, one can find the best location providing large storage with an optimal height and low submergence loss. Such upstream reservoir will have the capacity of reducing flood peak by storing water in the flood storage space during flood and releasing it later. This will ensure reducing natural flood at Lakhimpur District from Ranganadi River.

6.10 Steps should be taken for reducing sediment loss from the basin through implementation of Ecological Management Practices (EMPs) in the catchment area of reservoir. This will ensure minimum sediment loss from the basin and thus life of reservoir will also increase, as sediment deposition rate in the existing dam as well as in the upstream flood control reservoir will reduce and storage capacity will be maintained. NEEPCO should regularly observe the bathymetry of the reservoir to have an understanding about the current status of sediment deposition rate in the reservoir. Accordingly catchment management through EMP can be enhanced in association with forest department and other relevant department of the concerned state, so that need of sediment flashing can be minimised. With such regular monitoring, it will also be possible to identify need of minimal sediment flashing, if any, beforehand and can be planned in a way that it would not cause any damage to the downstream. For example without having a regular monitoring of the reservoir bathymetry, a situation may arise, where the dam authority may have to release large sediment volume to downstream to maintain its capacity and to keep the entry to the penstock clear. However, with regular monitoring, it will be possible to release sediment in a small discrete volumes, rather than waiting for an alarming situation.

6.11 The scope of this study was to explore what kind of measures NEEPCO, State Government and other relevant organization can take, so that flood hazard/havoc in the downstream of the dam can be avoided. Government and power developers may jointly come forward to take some academic study in collaboration with academic institutes and NGOs to understand socio-economic conditions of both upstream and downstream people with special emphasis on their livelihood and ecology. Such study will help in deciding some adaptation strategies that will reduce the disaster risk due to flood with people's participation.

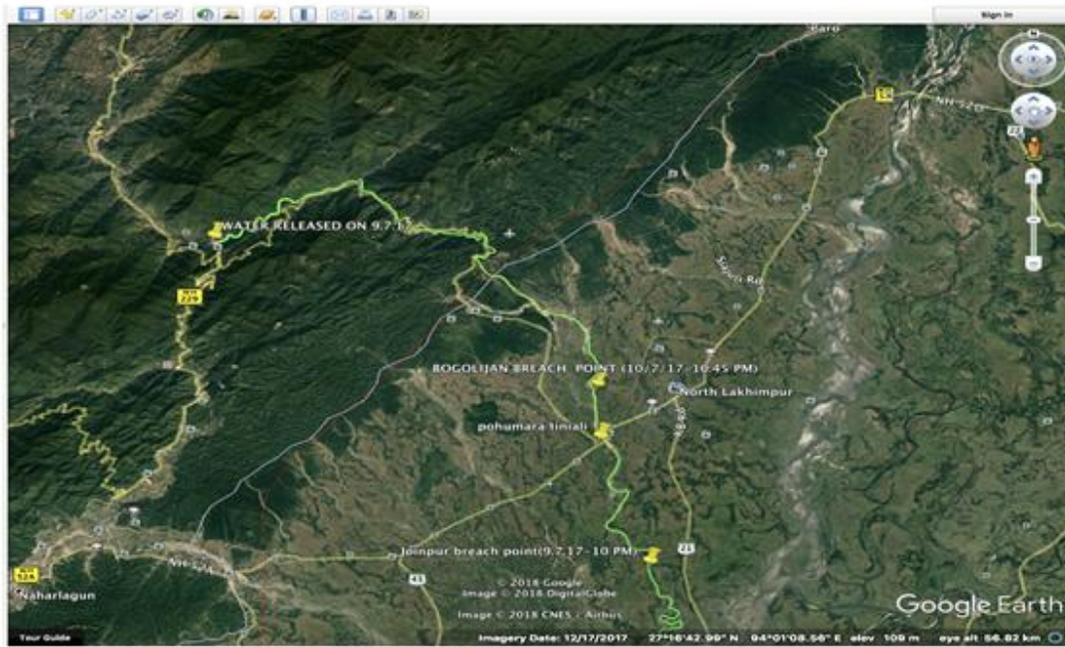
# **ANNEXURE 1**

**ANNEXURE 1: Photograph Taken During Field Visit**

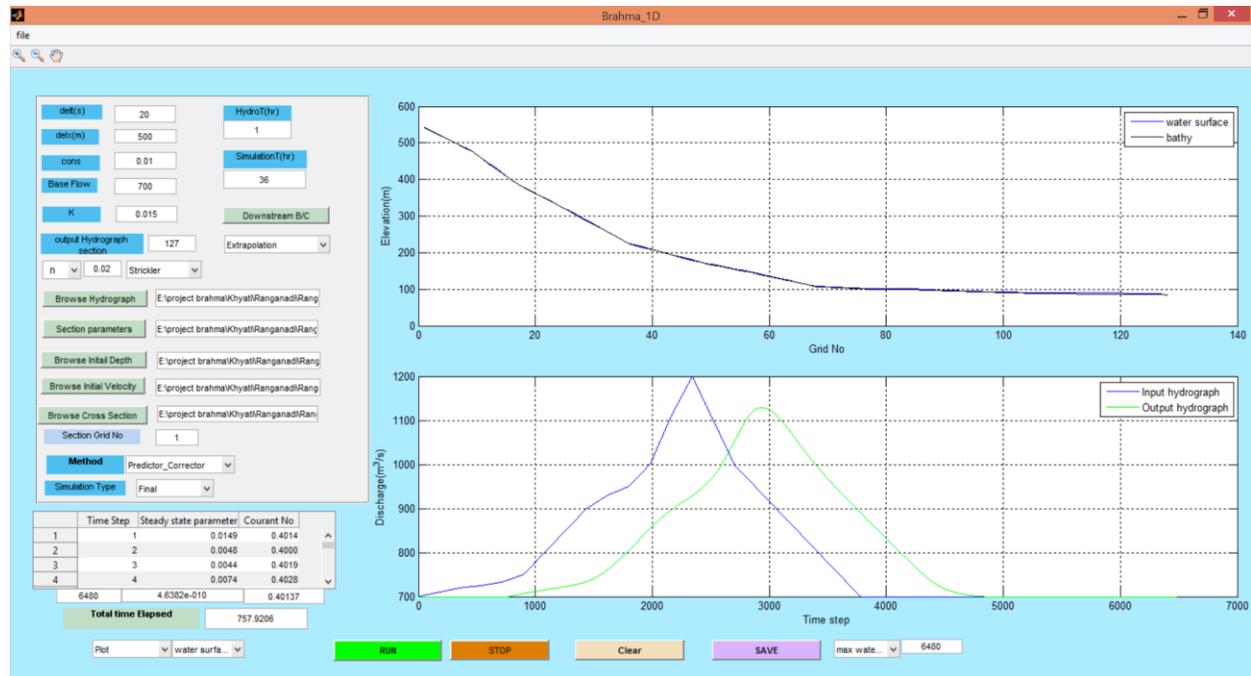


## **ANNEXURE 2**

## ANNEXURE2: Images of Ranganadi and Some Results of BRAHMA MODEL

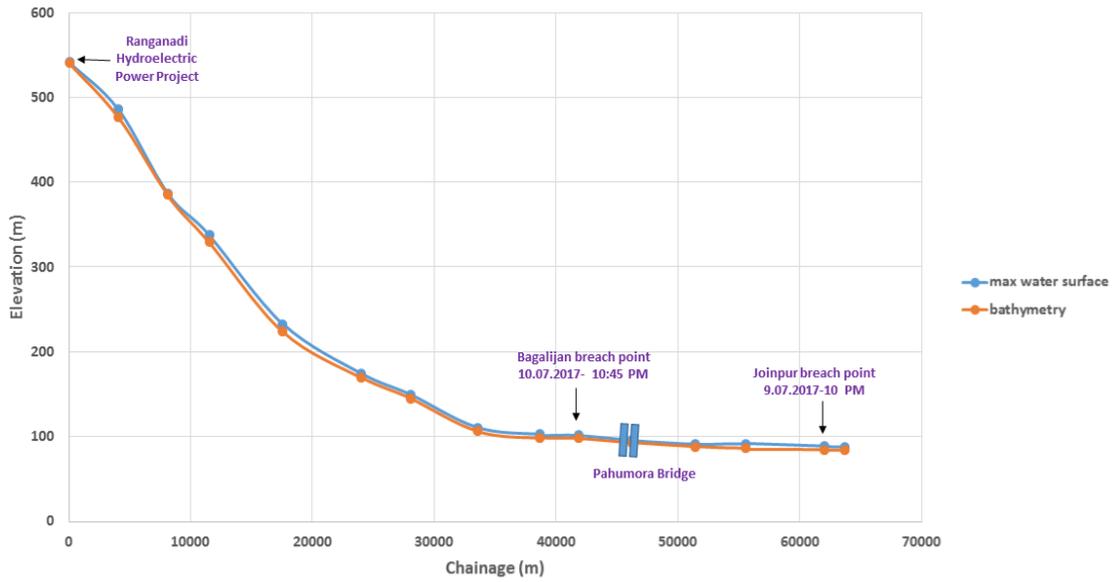


Salient Locations on Ranganadi

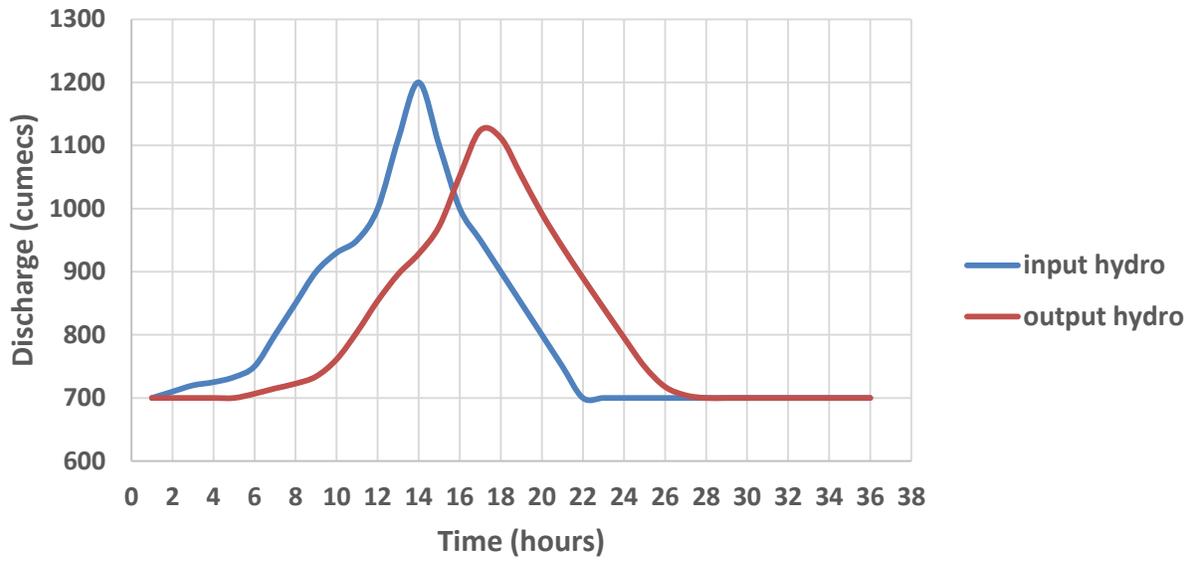


Flood Attenuation Results from BRAHMA Model

### Max-Water Surface Profile



### Discharge Hydrograph



## ANNEXURE-3A

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.

( A Govt. of India Enterprise )

Ranganadi Hydro Electric Plant

P.O. Ranganadi Project, Dist. Lower Subansiri

Pin - 791 119, Arunachal Pradesh



ISO 9001, 14001,  
OHSAS 18001

Tel : 03809 - 222221(O)/222265(R)

Fax : 03809 - 222212 / 222242

NO. RHEP/DGM(E/M)/T-125/Loc. FR-2/V/2010-11/ 94

Dtd. 02.7.10.

To,

The Deputy Commissioner,  
Lakhimpur,  
North Lakhimpur, Assam.

445  
317110

SUB: INSTALLATION OF OUTDOOR WARNING SYSTEM (SIREN).

- REF: 1. Our L. No. RHEP/SR.M(C)/HS(M)/T-13/09-10/10 Dtd. 03.4.09.  
2. Our L. No. NEEPCO/RHEP/HOP/96/2009-10/158 Dtd. 23.4.09.  
3. Your L. No. RR2/DRM/Control Room/08-09 Dtd. 29<sup>th</sup> April, 09 of District Project Officer, Disaster Management, Lakhimpur, NLP.  
4. Our L. No. RHEP/SR.M(C)/HS(M)/T-18/09-10/141 Dt. 29.5.09.  
5. Our L. No. RHEP/SR.M(C)/HS(M)/T-8/09-10/1656 Dt. 26.3.10.  
6. Our L. No. RHEP/DGM(E/M)/T-125/FR-2/V/10-11/06 Dtd. 6.4.10.

Sir,

Kindly refer to our earlier correspondences regarding installation of outdoor warning system (Siren) in different locations of Lakhimpur District. In this connection it may kindly be noted that we have installed & commissioned 8 (eight) Nos. siren in the following locations as demarcated by your concerned officer.

Sl. No.	Location of siren installed	Date of installation
1.	North Lakhimpur Sadar Police Station	23.03.2009
2.	Silonibari, Police Outpost	25.03.2009
3.	Naoboicha Police Station	21.04.2009
4.	Bihpuria Police Station	05.05.2009
5.	Bihpuria Ahom Gaon	08.08.2009
6.	80 No. Solmari, Dikrong G.P., Bihpuria	08.08.2009
7.	Bangalmara Police Outpost (Laluk)	03.06.2010
8.	Badati Miri Gaon (Near Water Supply Scheme), Shri Birendra Saharia, Badati Janajati High School (09957175651)	14.06.2010

This is for your kind information and further needful please.

Thanking you.

Yours faithfully,

Dy. General Manager (E/M)  
RHEP, NEEPCO Ltd., Yazali.

Contd.....P/2



## **ANNEXURE-3B**

GOVT. OF ASSAM  
OFFICE OF THE DEPUTY COMMISSIONER, LAKHIMPUR, N. LAKHIMPUR  
(DISASTER MANAGEMENT CELL)

No-LRR2/DRM/Control-Room/08-09/

Dated 9<sup>th</sup> June, 09.

To  
The Manager,  
Hydro Structure (Maintenance)  
RHEP, NEEPCO Ltd,  
Yazuli, A.P.

Sub-Submission of additional proposal for Installation of outdoor warning system  
under Bihpuria Revenue Circle.

Sir,

With reference to your letter mentioned above, I would like to inform you that Circle Officer, Bihpuria of Lakhimpur district has made an additional proposal for installation of outdoor warning system at flood prone areas under the Bihpuria Revenue Circle. The locations are as follows:

Sl. No	Revenue Circle	Location	Contact Address
	Bihpuria	i) Parbatipur No-1, (Laluk Mouza)	Sri Padmaswar Doley, Member of Harmuty G.P. Ph. No-9954336636 ✓
		ii) 80 No. Solmari, Dikrong GP	Sri Manuhar Kanyari S/O- Lt. Kain Kanyari President Mandol ( Cong) Dikrong GP Ph. No-9854631320 ✓
		iii) Bihpuria Ahom Gann Bihpuria	Sri Jadumoni Borah S/O-Lt. Tankeawar Borah Ph. No-9678282670 ✓
		iv) Badati Miri	Sri Niren Doley S/O-Lt. Babu Doley Goonburah Ph. No-9859168986

*Not installed due to electricity free power*  
*Installed*  
*R.C. Nagar Chandmani*  
*Installed*

No, you are requested to take up the matter and installation is to be made on your field base need assessment study of the flood affected areas for the Dikrong river water.  
Thanking you for your kind cooperation and necessary action.

Yours faithfully,

Addl. Deputy Commissioner (R)  
Lakhimpur, N. Lakhimpur.

Dated 9<sup>th</sup> June, 09.

No-LRR2/DRM/Control-Room/08-09/

Copy to-

- The Superintendent of Police, NL for kind information.
- The CA to the DC (L) for kind perusal to the Deputy Commissioner, Lakhimpur.

Addl. Deputy Commissioner (R)  
Lakhimpur, N. Lakhimpur.

*1-8*  
*Sp. Wadw, Eng (C)*  
*check total requirement and put up*  
*12 GEMT*

which is inclusive of all Taxes. Applicable 12.5% A.P entry tax will be paid by Corporation departmentally.

Put up for his kind perusal and approval of competent authority to place the order with M/s O.M Electricals, Guwahati on offer basis.

Enclosure: - As stated above.

*30/06/09*

## **ANNEXURE-4**

GOVT. OF ASSAM  
OFFICE OF THE DEPUTY COMMISSIONER, LAKHIMPUR::NORTH LAKHIMPUR  
DISASTER MANAGEMENT BRANCH

No LDM(R) 16/NC/2010/217

Date:- 29/03/2016

To.

The Head of Project,  
Ranganadi Hydro Electric Project, NEEPCO,  
Yazali, Arunachal Pradesh

Sub : Fund Utilisation statement.

Sir,

This is to certify that a sum of ₹ 5,91,900.00 ( Rupees Five Lakhs Ninety One Thousand Nine Hundred only) was sanctioned by the DDMA, Lakhimpur to Aaranyak, Guwahati which was received from NEEPCO Authorities as sponsorship amount (letter no. NEEPCO/RHEP/HOP/T-57/2015-16/703, dated. 24-08-2015) for implementing the project "Reducing community's flood risk by providing flood early warning and capacity building for proactive flood preparedness in Lakhimpur" (A Project being carried by Aaranyak (Guwahati) in collaboration with the District Disaster Management Authority, Lakhimpur). Out of this amount a sum of ₹ 2,25,000.00 (Rupees Two Lakhs Twenty Five Thousand only) was received by Aaranyak from the office of the Deputy Commissioner, Lakhimpur District in September, 2015 for purchasing CB-FEWS instruments. The UC provided by Aaranyak of this purchase is attached herewith.

As indicated, a sum of ₹ 2,25,000/- has been already released for procurement of the CB-FEWS instruments and the remaining amount is being processed for release to the Agency involved and subsequent utilization in the other activities are reflected in the statement below-

Head/Item	Activity	Amount Allocated (Rs.)
(A) Instrument Supply	Purchase of CB-FEWS Instruments & Mobile Phones including sales tax)	₹ 2,76,850.00
	Installation and maintenance of instruments	₹ 50,000.00
(B) Service Provision	Community sensitization and network creation (including travel, food, & lodging)	₹ 1,50,000.00
	Honorarium to caretaker (for the whole period of the project)	₹ 10,000.00
	Service Charge @14%	₹ 29,400.00
(C) Honorarium	Honorarium to Project Team	₹ 50,000.00
(D) Miscellaneous		₹ 7,500.00
(E) Transportation charge		₹ 18,150.00
Total: (A+B+C+D+E)		₹ 5,91,900.00

On completion of the entire project work, all the related documents pertaining to the utilization of the total fund received will be submitted accordingly by April, 2016. It is further added that the implementation of the work of installation and commissioning of the second equipment is being carried out and the intimation of the expenditure against the remaining amount shall be made subsequent to the successful installation and commissioning of the remaining equipments.

Thanking you.

Memo No. LDM(R) 16/NC/2010/217

Copy to:

CA to DC for kind appraisal of the Deputy Commissioner, Lakhimpur.

District Development Commissioner  
& CEO, DDMA  
Lakhimpur, North Lakhimpur  
Date:- 29/03/2016

District Development Commissioner  
& CEO, DDMA  
Lakhimpur, North Lakhimpur

*K.S.*  
File with  
o/c of the  
advtment  
note submitted  
to finance  
*[Signature]*  
29/3/16

*[Signature]*  
29/3

## **ANNEXURE-5**

GOVT. OF ASSAM  
OFFICE OF THE DEPUTY COMMISSIONER  
LAKHIMPUR :: NORTH LAKHIMPUR

No. LDM (R) 14/DDMA/2017/67

Dated North Lakhimpur the 18<sup>th</sup> Dec/2017

To,

Dr. Arup K. Sarma  
Professor  
B.P Chaliha Chair Professor for Water Resources  
Indian Institute of Technology, Guwahati

Sub: - Investigation into the causes of flooding in Lakhimpur district vis-à-vis Ranganadi Power Project- submission of required information thereon.

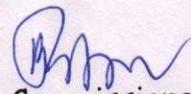
Sir,

With reference to the subject cited above, I would like forward herewith a report received from the Superintending Engineer, Lakhimpur Water Resource Circle furnishing information as required by you vide your letter dtd. 10-12-2017. From point no. 3 to 6. The information required by you at point 1 & 2 is as follows.

1. Yes.
2. (a) The NEEPCO Authority sent only information regarding the total gates of the dam through SMS to District Administration/ District Emergency Operation Centre.  
(b) The lead time was 2.00 to 2.30 hrs. before actual occurrence of flood.

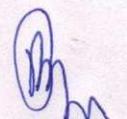
In this regard you are requested to kindly visit this district to jointly inspect the situation physically along with District Administration and Water Resource.

Yours faithfully,

  
Deputy Commissioner  
Lakhimpur

Memo No. LDM (R) 14/DDMA/2017/67-A- Dated North Lakhimpur the 18<sup>th</sup> Dec/2017

1. The Staff Officer to the Chief Secretary for kind appraisal of the Chief Secretary, to the Govt. of Assam, Dispur, Guwahati-6.
2. The President/ Secretary, Asom Jatiyatabadi Yuva Chatra Parishad, Lakhimpur dist. Unit for information.

  
Deputy Commissioner  
Lakhimpur

GOVT. OF ASSAM  
OFFICE OF THE EXECUTIVE ENGINEER, NORTH LAKHIMPUR W.R. DIVISION  
NORTH LAKHIMPUR

No. **SFC(L)/W-48/49**

Date: **14/11/2017**

To,

The Deputy Commissioner,  
Lakhimpur District,  
North Lakhimpur

*M. M. M. M.*  
*18/11/17*

Sub: Investigating causes of flooding in North Lakhimpur vis-à-vis Ranganadi power project

Ref: The letter from Dr. Arup Kumar Sarmah, Professor IIT Guwahati No. Nil dtd.10/11/2017  
Forwarded by the D.C. Lakhimpur.

Sir,

With reference to the above, I have the honour to submit herewith para wise replies as sought by Sri Arup Kr. Sarma, Professor, Indian Institute of Technology, Guwahati-39 vide letter No.Nil dtd.10.11.2017 for favour of your kind onward disposal.

Para 1 & 2 relates to the District Administrative

3. The flood occurred in an area protected by embankment.

4. a. On 9.07.2017 the Ranganadi NEEPCO Dam Authority has been releasing huge quantity of flood water by lifting Dam Gates from 500mm to 10500mm means 1412.57 Cumec (Appx). with observed velocity of 3.90m/second to 4.10 m/second (abnormal velocity for river Ranganadi) causing extensive erosion in the following locations: -

1. From CH:6800 m to 6900 m of left bank at Bogolijan.in left bank dyke.
2. From CH:18600 m to 18800 m of right bank embankment at Joinpur.

Since then the water level had been rising rapidly and both banks embankments were threatened and as a result seepage, boiling, pecculation etc. occurred at various reaches of both banks embankments. Necessary preventive measures have been taken up round the clock to save the dykes. But it is observed that the flood water got affluxed in the entire D/S of NH-15 due to high spate of flood water of river Subansiri where Ranganadi outfalls & for this reason the flood water exerted and tremendous flood pressure in many reaches of the embankments causing severe seepage, boiling, leakage, pecculation etc. Suddenly the countryside slope of the R/B embankment slumped down in between ch.18800m to 18815m at Joinpur area at around 10.00pm on 9.07.2017 and breached the embankment. The water level at 10.00pm was attained 95.95m against the D/L of 95.02m.

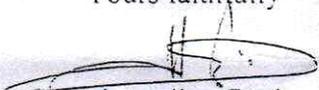
Again, due to sudden change of river configuration the flood water was directly hitting the embankment at Bogolijan area in between chainage 6800m to 6975m. The executed Geo bag apron slumped down and PSC porcupine screens were also outflanked due to tremendous flood pressure. The half of R/S slope eroded away within a short period due to severe erosion. The Geo bag in Gabion Boxes and PSC porcupines launched to check erosion round the clock but it was not controlled and resulted in occurrence of breach of the embankment in-between CH: 6800m to 6975m at 10.45 PM on 10/07/2017 at the Ranganadi left bank embankment due to direct hit of flood water released by the Ranganadi NEPCO dam authority and severe erosion thereof.

5. The Joinpur was breached on 9.07.2017 at 10.00pm and on 10.07.2017 at 10.45pm at Bogolijan.

6. Regarding data on population effected due to flooding may perhaps be supplied by the Circle Officer concerned.

Yours faithfully

*copy to E.E. N.L.W.R. Division*

  
Superintending Engineer  
Lakhimpur W.R. Circle  
North Lakhimpur