Minutes of the 2nd meeting of the Expert Appraisal Committee for River Valley and Hydroelectric Projects held during 30-31January, 2017 at Teesta Meeting Hall, Vayu Wing, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi – 3.

The 2nd meeting of the EAC for River Valley & Hydroelectric Projects was held with the Chairmanship of Dr. Sharad Kumar Jain during 30-31 January, 2017 in the Ministry of Environment, Forest & Climate Change at Teesta Meeting Hall, Vayu Wing, 1st Floor, Indira Paryavaran Bhawan, Jorbagh Road, New Delhi. The following members were present:

1.	Dr. Sharad Kumar Jain	-	Chairman
2.	Prof. Pradeep P. Mujumdar	-	Member
3.	Shri Sharvan Kumar	-	Representative of CEA
4.	Shri N.N. Rai	-	Representative of CWC
5.	Dr. J.A. Johnson	-	Representative of WII
6.	Dr. A.K. Sahoo	-	Representative of CIFRI
7.	Dr. Vijay Kumar	-	Representative of Ministry of Earth Sciences
8.	Prof. Govind Chakrapani	-	Member
9.	Shri Chetan Pandit	-	Member
10.	Dr. Dinakar Madhavrao More	-	Member
11.	Dr. R. Vasudeva	-	Member
12.	Dr. S.R.Yadav	-	Member
13.	Dr. S. Kerketta	-	Member Secretary

Dr. Jai Prakash Shukla could not be present.

Agenda Item No. 2.1 Confirmation of minutes of 1stEAC Meeting.

The Minutes of the 1stEAC (River Valley & Hydroelectric Projects) Meeting,held on 30th December, 2016 were confirmed with the following corrections:

1. *Replace "Dr. Vijay Kumar*" in place of Dr. Vijay Das, Expert Member (Para 1 of page No. 1).

2. Replace Para 6 of page No. 7 (Ken Betwa Link Project Phase I) "As the submergence area is very large (about 9,000 ha), micro-climatic change conditions in the project area during construction/post-construction period to be brought-out/reported at regular intervals."

   with

   "As the submergence area is about 9,000 ha, micro-climatic change conditions in the project area during construction/post-construction period to be brought-out/reported at regular intervals."

3. Replace Para 10 of page No. 11 (Kwar HEP) "The project-affected population should be resettled and rehabilitated with land-to-land and house-to-house to

compensate the losses. The affected families should be provided with employment."

with

"The project-affected population should be resettled and rehabilitated as per the Jammu & Kashmir state R & R Policy"

4. Replace Para 13 of page No. 13

"The Project Proponent (PP) and the Consultant, M/s WAPCOS Limited, Gurgaon, made a detailed presentation of the project and *inter-alia* provided the following information."

With

"*The Project Proponent (PP) and the Consultant, M/s R.S. Envirolink Technologies Private Ltd., Gurgaon, made a detailed presentation of the project and inter-alia provided the following information."*

Agenda Item No. 2.2 Morand-Ganjal Irrigation Project in Hosangabad District of Madhya Pradesh by M/s Narmada Valley Development Authority - For reconsideration of EC.

The Project Proponent (PP) and the Consultant, M/s R.S. Environlink Technologies Pvt. Ltd, Gurgaon, made a detailed presentation of the project and *inter-alia*, provided the following information:

The project envisages construction of two dams, one earthen dam of 47.28 m high across Morand River and another composite dam of 38.43 m across Ganjal River to provide irrigation facility to 52,205 ha in Hoshangabad, Harda and Khandwa Districts of Madhya Pradesh. The project also aims to provide drinking water facility to villages in the command area and Seoni-Malwa Town. The gross command area (GCA) is 67,270 ha, culturable command area is 58,052 ha and Irrigable Command Area (ICA) is 52,205 ha. Annual irrigation of 70,476 ha land is proposed with an irrigation intensity of 135%. Total land requirement for the project is 4,100.74 ha, out of which 2,438.50 ha is forest land, 288.75 ha is government land and 1,375.12 ha is private land. Total submergence area is3,033.92 ha, which includes 8villages (3 - fully submerged and 5 - partially submerged) and 2,370.89 ha of forest area will also be submerged due to this project. The total estimated cost of the project is Rs. 2,585.76 Crores which includes land development cost (Rs. 20,000/- per ha) of Rs. 104.41 crores.

The Scoping clearance for this project was accorded on 17.10.2012. ThePublic Hearing was conducted on 3.11.2015.The project was earlier considered by the then EAC in its meeting held during 11-12thAugust, 2016. During this meeting, the committee observed that the presentation made on EIA/EMP was not totally in agreement with the contents of the EIA/EMP report. Thus, the EAC suggested that the EIA/EMP report should be modified with the following observations:

i. As the total land acquired for the project comprises 90% land belonging to the tribals, thus, the R & R plan is to be modified which should include a long term livelihood plan for the tribals. The plan should conform to the provisions of National Tribal Policy of Government of India.
ii. Skill mapping inventorization of the human resources available around the project area is to be undertaken and on the basis of the data base generated, various provisions of their livelihood be prepared on the basis of the need based market.
iii. The database on the status of wildlife species and their habitats of the project area and adjoining tiger habitats generated under the All India Tiger Monitoring Programme for the years 2006, 2010, and 2014 by the State Forest/Wildlife Department should be incorporated in the report.
iv. The documents pertaining to the Narmada Water Tribunal Award regarding sharing of water with the concerned States should be also included in the report.
v. The E-flow recommendation for the project should be site specific to the area.
vi. Water quality data mentioned in the report requires recheck.

The project proponent submitted the above compliance andthese were presented before the EAC. The PP informed that the Public Hearings were conducted in the four Districts i.e. at Bothi village, Harda District on 3.11.2015; Jhiryadoh village, Betul District on 5.11.2015; Morghat village, Hoshangabad District on 18.11.2015 & Dagarkhedi village, Khandwa District on 27.11.2015. The main issued raised during the Public Hearings were on submergence area, religious places of tribals, facing drought for many years and for which this project should be implemented, rehabilitation and employment, water for irrigation, villages which are coming under submergence, drinking water facility to the affected population, loss of forestland, overall development of farmers and local area, declaration of compensation details, etc. The point-wise issues raised by general public were addressed and compiled by the project proponents.

The R& R plan is as per the provision of "The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation & Resettlement Act, 2013".It has been submitted to the Ministry of Tribal Affairs (MoTA) on 22.11.2016 and is under examination in MoTA. A grant of Rs. 1,500 lakhs has been proposed for special Livelihood Plan. The Local Area Development Plan (LADP) has been prepared and provisions under Education, Training, Scholarships & Social Welfare Activities to promote Local Skills with an allocated budget of Rs. 9.19 Crores has been earmarkedtowards implementation of Tribal Development in the project area.

The committee was also informed that as per theNarmada Water Tribunal Award regarding sharing, of water, the quantum of utilisablewatersat 75 percent dependability is 28 MAF (34,537.44 MCM) in a water year.This amount shall be shared by the riparian States as under:

Sl. No.	Name of the Riparian State	Share of water	
		in MAF	in MCM
1.	Madhya Pradesh	18.25	22,511.01
2.	Gujarat	9.00	11,101.32
3.	Rajasthan	0.50	616.74
4.	Maharashtra	0.25	308.37

The E-flow requirement for the project is 52.08 MCM for Morand and 21.64 MCM for Ganjal dam. A provision of 52.51 MCM for Morand and 29.68 MCM for Ganjal covering discharges and spills in 75% dependable year is made in the DPR, which are adequate to meet the requirements of environmental flow.

After detailed deliberations and considering all the facts of the project as presented by the PP, the EAC ***deferred*** the proposal. It shall be considered again after getting the updated report on the following observations:

i. Detailed list of plant diversity including herbaceous flora and total number of trees species in the submergence area.
ii. The steps to be taken to conserve endemic and endangered species and their conservation plan is to be provided.
iii. Total ecological services and their values provided by biodiversity of the area under submergence and steps for mitigating their losses.
iv. List of fish species and their migratory nature at the upstream/downstream of damincluding their period of migration to be indicated.
v. Status of these Fish species as per IUCN/NBFGR listed under Wildlife Conservation Act/Biodiversity Act.
vi. Justification for e-flow requirement,supporting the Umbrella Fish Spices Diversityand their migration period.
vii. The information on wildlife population density in the project area is not provided. As this project area is surrounded by number of protected areas (Ratapani Sanctuary, Melghat Tiger Reserve, etc.), inventorization is to be made on prey density (herbaceous animals) around the project area from secondary sources.

Agenda Item No. 2.3 Bursar HEP (800 MW) Project in Kishtwar District of Jammu & Kashmir by M/s. NHPC- For extension of validity of ToR

The Project Proponent (PP) made a presentation for the extension of the validity of ToR of the project supported with the reason of not submitting the EIA/EMP report within 4 years and *inter-alia*, provided the following information.

The project is proposed on Marusudar River (a tributary of Chenab river) near village Pakal in Kishtwar District of Jammu & Kashmirand will to be implemented by NHPC. The Project envisages construction of concrete Gravity Dam of 265 m height from the river bed level with one HRT of 8 km length. This is a storage scheme. An underground power house with installed capacity of 1200 MW (6x200 MW)is proposed near Drangdhuran village. Land requirement for this project is 1665 ha out of which 1077 ha is forest land involving 500 ha inside Kishtwar High Altitude National Park

(KHANP) and 577 ha outside KHANP. Total submergence area shall be 1563 ha and total affected families shall be 495 ha. Forest clearance for forest land of 577 ha which is outside KHANP has been accorded by J&K Government on 16.06.2005 under J&K Forest (Conservation) Act, 1997.

The ToR for this project was accorded on 5.10.2012 for a period of 2 years and thereafter, the PP requested for downward revision of the capacity from 1200 MW to 800 MW and extension of the validity of ToR. The same was considered by EAC in its meeting held on 3-4thJune, 2015. The EAC noted that in order to keep a minimum 1 km distance between upstream/ downstream projects and adhering to E-flow norms of the Ministry, the project capacity was reduced from 1200 MW to 800 MW. The committee also observed that the project parameters (dam height, design flood, live storage, etc.) remain unchanged except shifting of powerhouse and providing dam-toe-powerhouse for maintaining environmental flow at the downstream. Therefore, the EAC recommended 2 years (i.e. from 5.10.2014 to 5.10.2016)extension of validity of ToR with 800 MW(680 MW + 120 MW) capacity for this project. The extension expired on 5.10.2016.

The committee observed that request made by PP appears to be reasonable and therefore, ***recommends*** extension of the validity of ToR for one more year, i.e. from 6.10.2016 to 5.10.2017.It was mentioned that this is the last and final extension for the project and is the maximum limit of validity of ToR. The PP assured that all the works including public hearing shallbe completed including submission of EIA/EMP before the expiry of the validity of ToR.

Agenda Item No. 2.4 Dikhu HEP (186 MW) in Longleng District of Nagaland by M/s. Manu Energy Systems Pvt. Ltd - For extension of validity of ToR

The Project Proponent (PP) made a detailed presentation for the extension of the validity of ToR of the project supported with reason of not submitting the EIA/EMP report within 4 years and *inter-alia*, provided the following information.

The project envisages construction of 112 m high rock-fill dam about 380 m downstream of the confluence of Dikhu and Yangnyu rivers to generate 186 MW of hydropower. The catchment area of the project is 2845 sq.km. The total land requirement for the project is 2440 ha. Out of which, 950 ha is forest land and the submergence area is 2320 ha. A surface power house is proposed near toe of the dam with 3 units of 62 MW each. The Scoping/ToR clearance to this project was accorded on 26.2.2013 for a period of 2 years which expired on 26.2.2015. Thereafter, the Ministry granted 2 years extension to validity of TOR from 26.2.2015 to 26.2.2017.

The request made by the project proponent for extension of validity of TOR was considered by EAC. The project proponent informed that the land survey by Government of Nagaland is under progress and land is yet to be handed over to PP. The delay is due to nomenclature issue. Now the matter has been resolved and land

survey and acquisition work is likely to be resumed after monsoon. The project proponent mentioned that in order to complete remaining works to prepare EIA/EMP reports, conduct public hearing& submit draft EIA/EMP reports to Pollution Control Board, Nagaland State and submit final EIA/EMP report to MoEF for EC, at least 1 year is required. The PP informed that all the works including public hearing shallbe completed including submission of EIA/EMP before the expiry of the validity of ToR.

The committee observed that request made by PP appears to be reasonable and therefore,***recommends***extension of the validity of ToR for one more year, i.e. from 27.2.2017 to 26.2.2018. It is also mentioned that this is the last and final extension for the project.

Agenda Item No. 2.5 Dugar HEP (449 MW) in Chamba District of Himachal Pradesh – For extension of validity of ToR

The Project Proponent (PP) made a detailed presentation for the extension of the validity of ToR of the project supported with reasons of not submitting the EIA/EMP report within 4 years and *inter-alia*, provided the following information.

The project envisages construction of a 128 m high concrete gravity dam (from the deepest foundation) on river Chenab near Killar town in Chamba District of Himachal Pradesh to generate 380 MW of hydropower. This is a run-of-the-river scheme. The total land requirement for the project is about 269 ha and total submergence area is190 ha. The catchment area of the project is about 7823 Sq.km. An underground powerhouse is proposed on the right bank of the river with 4 units of 95 MW capacities each.The total estimated cost of the project is reported to be Rs. 2250.99 Crores.

The ToR for this project was accorded approval on 31.12.2012 for a period of 2 years.Thereafter,the PP requested for extension of validity of ToR with capacity enhancement from 380 MW to 449 MW. The parameters like FRL (2,105 m to 2,114 m), TWL (2,006 m to 2,015 m), submergence area (160 ha to 190 ha), Forest land for non-forest use (330 ha to 269 ha), etc. have been changed due to change in the Installed Capacity. The project was examined by the then EAC for River Valley and Hydroelectric Projects in its meeting held on 11-12thDecember, 2014. Accordingly, MoEF&CC granted an extension for 2 yearsi.e. upto 31.12.2016 for 449 MW capacity with some change in domain level and associated changes in the project.

The request made by the project proponent for 5thyear extension was considered by EAC. The project proponent mentioned that in order to complete remaining works, i.e. prepare EIA/EMP reports, conduct public hearing & submit draft EIA/EMP reports to Pollution Control Board, Himachal Pradesh and submit final EIA/EMP report to MoEF for EC, at least 1 year is required. The PP informed that all the works including public hearing shallbe completed including submission of EIA/EMP before the expiry of the validity of ToR.

The committee observed that request made by PP appears to be reasonable and therefore,***recommends***extension of the validity of ToR for one more year, i.e. from 01.01.2017 to 31.12.2017. It is also mentioned that this is the last and final extension for the project.

Agenda Item No. 2.6 Pemashelpu Hydroelectric Project (81 MW) in West Siang District of Arunachal Pradesh by M/s Mechuka Hydro Power Pvt Ltd - For reconsideration of EC

The Project Proponent (PP) and the Consultant, M/s R.S. Environlink Technologies Pvt. Ltd, Gurgaon, made a detailed presentation of the project and *inter-alia*, provided the following information.

The project envisages construction of 25 m high barrage upstream of Mechuka town across river Yargyap Chu (tributary of Siyom River) to generate 81 MW of hydropower. The catchment area of the project is 366 Sq. km. Total land requirement is 32.09 ha which isforestland. Total submergence area is 2.87 ha. A surface powerhouse is proposed on the right bank of the river with 3 units of 27 MW capacity each. Twenty six (26) families are likelyto be affected due to this project by losing their land. No family is to lose homestead. There is no National Park/Wildlife Sanctuary/ Historical Monument within 10 km radius of the project area. Total cost of the project is Rs. 708.75 Crores and it is proposed to be completed in 4 years.

The Ministry initially accorded scoping clearance for this project for 96 MW on 25.8.2009. After, power potential studies, the capacity of the project has comedown to 90 MW. The MoEF accorded NOC for 90 MW capacity on 12.12.2011. The Ministry, while giving the extension of ToR for 1 year on 6.8.2013, stipulated a condition for environment flow norms, which resulted in reduction of installed capacity from 90 MW to 81 MW. The CEA also approved the installed capacity of 81 MW on 2.12.2013.

The project was earlier considered by EAC in its meeting held on 3-4thJune, 2015. The environmental aspects covering catchment area, submergence area and project influence area, i.e., area within 10 km radius from main project components have been considered. The baseline data has been collected covering Physico-chemical aspects, biological aspects and socio-economic aspects. Base line data for three seasons have been collected for air, noise, water, soil and ecological aspects. Impacts during construction and operation phases have been assessed and mitigation measures suggested minimizing the anticipated impacts.

The EAC was also informed that this project is in Siang River Basin for which cumulative impact assessment study has been completed and accepted by the Ministry. The outcome and recommendations of the river basin study will be abided by the project proponent.

The EAC while considering the project for environmental clearance in its meeting held on 3-4thJune, 2015, observed that a clarification is to be obtained from the State Forest/Wildlife Departmentabout wildlife sanctuary/protected area, if

any,present in the project area; required downstream releases during different seasons & as per the Siang river basin study recommendations; Public Hearing needs to be conducted at identified Compensatory Afforestation Programme; comprehensive plan for identification/mapping of skills in the project area & budgetary provisions for LADA, etc.

The PP submitted the compliance report and the same has been presented before the EAC. The EAC observed the following:

i. The Office of the PCCF, Wildlife & Biodiversity Department, Government of Arunachal Pradesh has issued a letter on 4.12.2014 mentioning that the project area is beyond 10 km radius from any protected area and outside of Eco-sensitive Zone.

ii. Regarding Public Hearing near identified Compensatory Afforestation Programme (about the query raised by Shri S.H. Kingra, the then EAC Member), it was clarified that there is no such provision in EIA Notification, 2006 and conducting of Public Hearing is not required as it is not the part of the project affected areas.

iii. The skill development plan to be taken up in the project area has been prepared and submitted. It was also noted that a grant of Rs. 208.56 lakhs has been earmarked towards implementation of the various Skill Development programmes.

iv. The R&R plan to be taken up during development of the project has been explained in detailed and budgetary provisions has been revised from Rs. 632.26 to Rs. 682.26 lakhs.

v. The project is in Siang River Basin. The Siang River Basin (SRB) study has recommended the following E-flowsfor this project:

"Environment flow release should be based on average of four months discharge in 90% dependable year. The study has recommended 25% release (1.48 cumec) in lean season as environment flow, 30% release in monsoon season & for other months i.e. average of 12 - ten daily values in those four non-monsoon months. The report has also recommended 25% release in other months as environment flow."

The EAC was informed that the Carrying Capacity Studies & Cumulative Impact Assessment (CCS & CIA) of Siang River basin Study has been completed and the report has beenapproved by the Competent Authority in the Ministry. The outcome and recommendations have been circulated to all the Concerned Authorities. Therefore, this project should also abide by the recommendation of Siang River Basin Study. Regarding, environmental flow requirement and downstream release of water, the recommendation in Siang RBS for Pemashelpu HEP (81 MW) project in Arunachal Pradesh is as follows:

Table – Environmental flow release for Pemashelpu HEP

Project	Lean Season	Monsoon Season	Non-monsoon/ Non-lean Seasons
Pemashelpu HEP (81 MW)	1.48 cumec (25%)	12.75 cumec (30%)	4.67 cumec (25%)

The Environment Management Plan is prepared as per the recommendations of EAC and revised budget is tabulated below:

SI. No.	Proposed EMP	Original Outlay (Rs.Lakhs)	Revised Outlay (Rs. Lakhs)
1	Biodiversity Conservation & Management Plan	275.30	275.30
2	Catchment Area Treatment	468.00	468.00
3	Fishery Conservation & Management Plan	69.68	69.68
4	Solid Waste Management Plan	100.80	100.80
5	Public Health Delivery System	208.06	208.06
6	Energy Conservation Measures/Fuel Management measures	107.00	107.00
7	Muck Disposal Plan	457.25	457.25
8	Landscaping and Restoration Plan	114.78	114.78
9	Air & Water Environment Management	87.00	87.00
10	Dam Break Modelling	138.00	138.00
11	Reservoir Rim Treatment	55.71	55.71
12	R& R Plan (Including LADP)	632.26	682.26
13	Skill Development Plan under LADA	--	208.56
14	Environmental Monitoring Programme	119.55	119.55
15	Compensatory Afforestation	88.21	88.21
16	NPV	297.60	297.60
	Total	**3219.20**	**3545.36**

After detailed deliberations and considering all aspects of the project, the EAC***recommends*** the project for grant of environmental clearance (EC) with the condition that the PP will have to fully abide by the outcome and recommendations of Siang River Basin Study.

Agenda Item No. 2.7 Kaleswaram Project in Karimnagar District, Telangana by Irrigation and CAD Department, Government of Telangana for consideration of ToR.

The project proponent made a detailed presentation on the project and *inter-alia,* provided the following information.

The project envisages construction of a barrage across River Godavari near Medigadda village in Karimnagar District of Telangana for diversion of 180 TMC of water for providing irrigation facility in 7,38,851 ha covering 7 Districts namely Adilabad, Karimnagar, Nizamabad, Warangal, Medak, Nalgonda and Rangareddy Districts. The project also proposes to provide drinking water facility for Hyderabad

and Secunderabad cities. Alternate Sites, i.e Alignment-II for Medigadda Barrage, Alignment-II for Annaram Barrage and Alignment–III for Sundilla Barrage have been preferred over other alignment/s andmay be better due to no submergence of forestland; lesser pumping canal length& less land acquisition, respectively. The boundary of the project is near Maharashtra state and as per the information, about 302 ha of area is likelyto be submerged in the state of Maharashtra. Total land requirement is about 32,000 ha, out of which 2,866 ha is forest land. The total submergence area is about 13,706 ha. In addition to Medigadda barrage, 2 more barrages between Medigadda and Sripada Yellampally Project are to be constructed, one at Annaram and the other at Sundilla. The total length of water canal system is about 1,832 km. Total estimated cost of the project is about Rs. 80,499.1 Crores and it is proposed to be completed in 3 years.

The EAC after detailed discussions felt that the observations of CWC and Techno-economic Feasibility of the project are to be obtained and produced by the PP. Hence the EAC **does not *recommend*** the project for scoping clearance and suggests that in-principle clearance of CWC be submitted before the project is considered for scoping/ToR clearance.

Agenda Item No. 2.8 Sawalkote HEP (1856 MW) in Ramban District of J&K by M/s J&K State Power Development Corporation - For reconsideration of EC

The Project Proponent (PP) M/s Jammu & Kashmir State Power Development Corporation Limited (JKSPDC) and the Consultant, M/s R.S.Environlink Technologies Pvt. Ltd, Gurgaon, made a detailed presentation of the project and *inter-alia,* provided the following information.

The Sawalkote Hydroelectric Project envisages construction of a 192.5 m high concrete gravity dam toutilise water of Chenab River. The top level of the dam is at El 697.5 m. The riverbed level at the dam site is El 534 m.The reservoir to be created by the dam will operate between FRL 695 m & MDDL 692.8 m with rated head of 154.4m. Three Headrace Tunnels (HRT) of 200 m length each with design discharge of 519.16 m^3/s and 479.19m^3/s for Stage - I and 319.46 m^3/s for Stage- II shall be constructed.Eight (8) steel lined pressure shafts/Penstock (6 for Stage 1 and 2 for Stage 2), each of 6m dia. except Penstock-6 with 6.7 m dia. and 2.75 m diameterfor the penstock for 56 MW unit are envisaged.An underground Powerhouse is proposed with Vertical Francis turbines at axis level of El. 525m. The installed capacity of the power house will be 1,856 MW (6x225 MW & 1x56MW for Stage-I and for 2x225 MW for Stage-II). The design energy is 8,004 MU.Tail Race Tunnel: three for Stage-I and one for Stage-II (TRT1-1,733m, TRT2-1,710 m, TRT3-150m and TRT for Stage 2-1,904m) and 10.5 m dia. for all.

The project envisages utilization of flow of Chenab River for generation of electrical power in a run-of-the-river scheme. The diversion site is located near Tangar village, around 40 km from Ramban town. A 192.5mhigh concrete gravity dam (from deepest foundation) and underground powerhouse site will be located at Latitude 33º

11'N and Longitude 75°06'. Chenab river has a catchment area of about 19,475 km^2 at the proposed dam site**.**The Full Reservoir Level (FRL) and minimum draw down level (MDDL) of the reservoir are El 695 m and El 692.8 m, respectively, with storage capacity of 23.84 MCM for diurnal peaking capabilities. The total area of submergence is 1030.55 ha.

Scoping Clearance:

The MoEF&CC had approved the ToR for a capacity of 1,200 MW vide letter No. J-12011/19/2010-IA-I dated 13.10.2011. In April 2012, CEA approved an aggregate installed capacity of 1,856 MW to be developed in two Stages, i.e 1,406 MW in Stage-I (1,350 MW in the main and 56 MW in auxiliary powerhouse) and 450 MW in Stage-II.

MoEF&CC then modified the installed capacity and accorded the revised ToR for 1,856 MW installed capacity vide letter No. J-12011/19/2011-IA-I dt. 12.06.2013 with a validity period of 2 years. Then an extension was granted for the same ToR for further period of one more year, i.e. till 11.06.2016, vide letter No. J-12011/19/2011-IA-I dated 01.10.2015. The PP completed all formalities before the expiry of the validity of ToR.

Land Requirement:

Total land requirement for various project activities is about 1401.35 ha. Total land required for the project is spread over in 3 districts, i.e. Ramban, Udhampur and Reasi. Out of 1401.35 ha of total land requirement, 175.65 ha is proposed as private land to be acquired for the project which falls in Ramban district only, 541.55 ha is Govt. Land and 648.15 ha is Forestland.*Total project cost (estimate) shall be Rs 22,190.66 crore.*

Public Consultation:

Public hearing meetings were conducted at the following 3locations by JKPCB:

1. Pancheri, Udhampuron 18.01.2016.
2. Mahore, Reasion 21.01.2016.
3. Tanger, Rambanon 28.01.2016

It was informed by the PP that all the concerns of the General Public were explained and duly addressed during Public Hearing including R&R activities to be undertaken for the project oustees.

Submission of Final EIA, EMP reports, etc:

Final EIA and EMP Report after addressing issues and observations made during Public Consultation process was submitted to Ministryon 16.04.2016.

Status of Forest Clearance

The total forest land involved in the execution of the project is 684.15 ha, and it is comingunder four Forest Divisions, i.e. Ramban & Batote Forest Divisions in

Ramban district, Udhampur Forest Division in Udhampur district and Mahore Forest Division in Reasi district. As conveyed by the PP, the indent for the diversion of forestland has been submitted to PCCF by the PP, joint survey of forest cover (land and trees) has been completed and the diversion of forestland for non-forest use is on active consideration of State Government.

Appraisal by the EAC:

The project was appraised before the EAC in its first meeting held on 30.12.2016, wherein the EAC deliberated on the different aspects of the project and felt that it needs to be further deliberated.

The project was again deliberated in detail in the meeting of the EAC held during 30-31 January, 2017.

E-Flow Studies:

Study on minimum environmental flow requirement for three seasons, viz., lean, non-lean &non-monsoon and monsoon seasons have been conducted based on habitat simulation and hydraulic modeling using Mike 11. 10-daily discharge data for 90% dependability (2004-05) from the long term discharge series prepared for the project has been considered as the basis for the study. Average discharge values for monsoon (June-sept), Lean (Nov-Feb) and remaining four months (Oct, Mar, Apr, May) are worked out as 1,394.32 cumec, 199.83 cumec and 606.96 cumec respectively. River cross sections are taken for immediate downstream stretch and simulation modeling was carried out for each period separately for different percentages of average values and corresponding values of water depth, flow top width and flow velocity are studied in comparison to pre-project or natural river conditions.

For lean season, 20% of average lean season flow in 90% dependable year, i.e. 39.97 cumec, giving an average depth of about 61 cm is recommended to be released through an auxiliary turbine of 56 MW with tail water release point immediately downstream of plunge pool. Two turbines of 225 MW with tail water release point immediately downstream of the plunge pool along with auxiliary turbine of 56 MW releasing water in the same TRT; has been proposed to operate continuously during monsoon. Each turbine of 225 MW will have a design discharge of 159.73 cumec and one turbine of 56 MW will have a design discharge of 39.97 MW.With these three turbines running together, a release of 359.43 cumec (25.77%) will be available immediately downstream of plunge pool giving a water depth of more than 2 m. This along with spillway discharge will increase to an average value of 571.89 cumec (41.02%) based on 90% - dependable year data. For remaining four months, one turbine with shorter tailrace tunnel is proposed for continuous operation, making a release of 159.73 cumec giving a water depth of 1.35 m.

Free Flow Stretch

The projectis located between Baglihar and Salal HEPs. Baglihar HEP (900 MW stage I & II) is the upstream project, Salal HEP (690 MW) is the downstream project

and both are in operation. These three projects have covered a total stretch of about 104 km of river Chenab with adequate free flow river stretch between adjacent projects. Reservoir lengths are 24 km, 30 km and 28 km for Salal, Sawalkote and Baglihar, respectively. Free stretch of 17.68 km and 4.42 km shall be maintained between Salal-Sawalkote and Sawalkote-Baglihar, respectively.

Environment Management Plans:

Biodiversity conservation and management plan has been prepared with a total budget of Rs. 3.40 crore to focus on certain specific actions such as *In-situ* and *ex-situ* conservation of genetic resources, especially of threatened flora and fauna; Creation of biodiversity registers (at National, District, and Local Levels) for documenting genetic diversity and the associated traditional knowledge; The plan also broadly covered and budgeted for Non Timber Forest Produce (NTFP) Plantations, Habitat improvement programme, Wildlife management, conducting awareness programmes and monitoring.

Catchment Area Treatment Plan (CAT) has been prepared for the free draining catchment area, i.e. upstream of diversion structure of Sawalkote HEP up to diversion structure of Baglihar HEP, which works out to be 1307.85 sq. km. and falls under 20 sub-watersheds. Areas falling under severe and very-severe erosion categories are proposed for treatment, which works out to be 9,700.44 ha and 264.26 ha, respectively. Various engineering and biological treatment measures have been suggested under CAT Plan at a budget of Rs. 59.29 crore.

Fisheries Development Plan include a proposal for a well-equipped hatchery for stocking of reservoir. The plan shall be implemented by Department of Fisheries including training of local fisherman. Proposed budget for fisheries development plan is Rs. 4.88 crore.

Solid Waste Management plan has been prepared at a budget of Rs. 10.88 crore to ensure that the PP, within the territorial area of the project complex/ colony, be responsible for the Solid Waste Management by creating adequate facilities for collection, conveyance and disposal of solid waste. Plan covers the waste collection, segregation, transporting the recyclable waste to authorized vendors, composting of biodegradable waste and dumping of remaining waste in designated land fill site to be identified in consultation with local authorities.

Public health delivery system has been envisaged for ensuring improvement in local health care system in project area especially for the project workers and includes the provision of ambulances, strengthening of local medical facilities and awareness programs with a budget of Rs. 9.62 crore.

Energy conservation measures at a budget of Rs. 8.70 crore have been proposed to mitigate the biotic pressure on the forests for fuelwood and space heating by construction workers by providing subsidized LPG connections and Kerosene

supply, Distribution of Pressure Cookers and solar lanterns, community kitchen and canteen for workers and awareness programs.

Excavation work for underground activities will generate muck in the form of soil and rock of about 2.95 lakh cum and 74.35 lakh cum, respectively. After utilization of muck for construction work, net quantity for disposal is estimated to be 34.07 lakh cum for which two dumping sites viz. MDS-1 and MDS-2 with a capacity of 5.56 lakh cum and 42.64 lakh cum, respectively have been identified. After disposal, these sites will be rehabilitated by engineering and biological measures to restore the land to near natural condition. A budgetary provision of Rs. 51.28 crore has been made for these activities in the project cost.

In addition, an amount of Rs.3.22 crore is budgeted for landscape and restoration work to restore the land disturbed due to quarrying, construction of roads and infrastructure facilities.

Pollution control during construction activities will be carried out by taking appropriate measures by the PP and a budgetary provision of Rs. 2.82 crore is made for air and water pollution control. Stabilization of landslides along the periphery of reservoir is planned under Reservoir Rim Treatment at a budget cost of Rs. 12.34 crore. Compensatory afforestation and payment of Net Present Value (NPV) for forestland to be acquired for the project is budgeted as Rs. 39.90 crore. Dam break modeling has been done and an outline of Disaster Management Plan is suggested and a budget of Rs. 3.10 crore is proposed to include provisions for communication and warning systems, setting up of emergency response system and public information system, training and awareness programs, etc. Also, to monitor the various physico-chemical and biological parameters during project construction, a program is proposed and budgetary provision of Rs. 3.31 crore is made.

Out of 1,401.35 ha of total land for the proposed project, 175.65 ha of private land shall be acquired from the project Oustees. A total of 13 villages will be affected having 1,477 Project Affected Families (PAFs)belonging to 575 households with a total project affected population of 3,977. Detailed R&R Plan has been prepared to ensure resettlement and rehabilitation of project affected families. Project also includes the development of resettlement area with adequate infrastructure for displaced families and also local area development plan to benefit the local population. The plan will be implemented at a total budget cost of Rs. 220 crore.

Total EMP Budget is Rs. 432.75 crore as per the breakup given below:

Sl. No.	**Management Plans**	**Amount** (Rs. in lakh)
1	Biodiversity Conservation & Management Plan	340.00
2	Catchment Area Treatment Plan	5,929.00
3	Fisheries Development Plan	488.00
4	Solid Waste Management Plan	1,088.00

5	Public Health Delivery System	962.00
6	Energy Conservation Measures	870.00
7	Muck Disposal Plan	5,128.00
8	Landscaping and Restoration Plan	322.18
9	Air & Water Management Plan	282.50
10	Reservoir Rim TreatmentPlan	1,234.00
11	Compensatory Afforestation Plan &NPV	3,990.37
12	Rehabilitation & Resettlement Plan	22,000.00
13	Environmental Monitoring Programme	331.00
14	Dam Break and Disaster Management Plan	310.50
	Total	**43,275.55**

After detailed deliberations and considering all the facts of the project as presented by the PP, the EAC ***recommends for grant of Environmental Clearance*** for the project with the following conditions:

i. *On-line monitoring system for the E-flow releases will be installed.*
ii. *The plastic waste shall be disposed of by recycling and not by land filling.*
iii. *Local indigenous varieties of plants to be grown and maintained till their full growth including gap filling.*
iv. *Skill mapping be undertaken for the youths of the affected project area and based on the skill mapping, the trainings to the youths be incorporated for their appropriate engagements in the Project.*
v. *Land acquired for the project shall be suitably compensated with the prevailing guidelines and all commitments made during the Public Hearing shall be fulfilled.*
vi. *The project-affected population should be resettled and rehabilitated as per the Jammu & Kashmir state R & R Policy.*
vii. *Six monthly compliance reports shall be submitted by the project proponent to Regional Office, MoEF& CC, Chandigarh without fail until completion of the works.*
viii. *All the recommendations based on the CIA &CCS of the Chenab River Basin for SawalkoteHEP shall be followed in toto during the development of this project.*

Agenda Item No. 2.9 Etalin (3097 MW) in Dibang Valley District of Arunachal Pradesh by M/s Etalin Hydro Electric Power Company Limited - Reconsideration for EC

The Project Proponent (PP) and the Consultant, M/s R.S. Environlink Technologies Pvt. Ltd, Gurgaon, made a detailed presentation of the project and *inter-alia*, provided the following information.

The project (3097 MW) is located in Dibang Valley District of Arunachal Pradesh. The project envisages construction of 2 dams namely (i)a 101.5 m high dam on Dir river near Yuron village about 22 km from Etalin and (ii)a 80 m high dam on

Tangon river about 800 m downstream of Anon Pani confluence with Tangon river (from the deepest foundation) with an Installed Capacity of 3,097 MW HEP. The Dri & Tangon Rivers are tributaries of Dibang River. The total land requirement for the project is 1,155.11 ha. The submergence area is 119.44 ha. An underground powerhouse is proposed with 10 units of 307 MW each. In order to utilize the releases of flow for sustenance of aquatic life, a dam-toe powerhouse with 19.62 MW capacity on Dri diversion and dam-toe powerhouse with 7.40 MW capacity on Tangon diversion have been proposed. A totalof 18 villages consisting of 285 project affected families (PAFs) are to be affected by the proposed project. The estimated cost of the project is Rs. 25,296.95 crores and it is proposed to be completed in 7 years.

The project was earlier considered 4 times by the EAC in its meetings held on 26-27th February, 2015; 23-24th April, 2015; 3-4th June, 2015; 24-25th August, 2015 and 30th December, 2016. It was also briefed by the PP that all the technical issues, clarification and compliance raised in the representation were clarified to EAC in its meeting held in August, 2016.

EAC was informed that vide Ministry's OM dated 28.5.2013, it has been mandated that the river basin study is compulsory for development of any project in that particular river basin. The EAC was also informed that the Carrying Capacity Studies & Cumulative Impact Assessment (CCS & CIA) of Dibang River Basin Study (RBS) in Arunachal Pradesh have been completed and the report has been accepted by the Ministry. The outcome and recommendations have been circulated to all authorities concerned. Therefore, this project should also abide by the recommendation of Dibang River Basin Study.

The proposal was last considered by the EAC in its meetings held on 24-25th August, 2015 and 30th December, 2016. It was informed that the Central Electricity Authority has given TEC clearance. The hydrological studies have been presented in detail and the PP committed that adequate free flow of river stretch will be maintained with upstream/downstream projects in both the cases with the provisions of environmental flow recommendation.This is designated as run-of-the-river (ROR) scheme and water is diverted through 2 HRTs to utilize the available heads in a common underground powerhouse at the confluence of the rivers near Etalin village. It was also informed that flood studies have been carried-out using probabilistic (flood frequency analysis) as well as deterministic (hydro-meteorological) approach and the results are mentioned below.

Table – Diversion flood for Dri River &Tangon River

Details	Diversion Flood Dri River	Diversion Flood Tangon River
25 years return period non-monsoon flood	3,744 m^3/sec	2,860 m^3/sec
25 years return period monsoon flood	5,627 m^3/sec	4,298 m^3/sec

Table - Probable Maximum Flood (PMF) & Glacial Outburst (GLOF) values concurred by CEA/CWC

Details	Dri River	Tangon River
Probable Maximum Flood (PMF)	11,811 m^3/sec	10,218 m^3/sec
Glacial Outburst (GLOF)	1,170 m^3/sec	2,143 m^3/sec
Design Discharge of the Turbine	480.30 cumec	320.20 cumec

The EAC was informed that theCCS & CIA of Dibang River basin Study has been completed and the report has been accepted by the Ministry. The outcome and recommendations have been circulated to all authorities concerned. Therefore, this project should also abide by the recommendation of Dibang River Basin Study. Regarding environmental flow requirement and downstream release of water, as recommended in DibangRBS for Etalin HEP (3,097 MW) project in Arunachal Pradesh is as follows:

Table – E-flow release for Dri Limb & Tangon Limb

Etalin HEP (3097 MW)	LeanSeason	Monsoon Season	Non-monsoon/ Non-lean Seasons
Dri Limb	30.64 cumec(20%)	50 cumec(12.20%)	30.64 cumec(13.30%)
Tangon Limb	19.52 cumec(20%)	26.17 cumec(10%)	19.52 cumec(13.30%)

After detailed deliberations and considering all the facts of the project as presented by the PP, the EAC ***recommends*** for grant of Environmental Clearance for the project with the following conditions:

i. *On-line monitoring system for the e-flow releases to be installed.*
ii. *The plastic waste shall be disposed of by recycling and not by land filling.*
iii. *Local indigenous varieties of plants to be grown and maintained till their full growth including gap filling.*
iv. *Skill mapping be undertaken for the youths of the affected project area and based on the skill mapping, the trainings to the youths be incorporated for their appropriate engagements in the Project.*
v. *Land acquired for the project shall be suitably compensated with the prevailing guidelines and all commitments made during the Public Hearing shall be fulfilled.*
vi. *The project-affected population should be resettled and rehabilitated as per the latest R & R Policy.*

vii. Six monthly compliance reports shall be submitted by the PP to Regional Office, MoEF& CC, Shillong without fail until completion of theworks.

viii. The outcome and recommendations of Dibang River Basin Study will have to be fully abided by the project proponent.

Agenda Item No. 2.10 Par HEP (52 MW) in Papumpare District of Arunachal Pradesh by M/s KVK-ECI Hydro Energy Pvt. Ltd - For Extension of validity of TOR

The Project Proponent (PP) made a detailed presentation for the extension of the validity of ToR of the project supported with strong reason of not submitting the EIA/EMP report within 4 years and *inter-alia*, provided the following information.

The project is located on Pare river in Papumpare district of Arunachal Pradesh. The Scoping/ToR Clearance for this project was accorded by Ministry 17.10.2012 for 60 MW capacity. Due to E-flow provisions, the capacity got revised to 52 MW and ToR for revised capacity with extension of validity by another 1 year was accorded on 12.2.2014 (i.e. up to 17.10.2015).

The committee noted that the matterof further extension of ToR was considered by the EAC in its meeting held during 23-24th September, 2015. After detailed deliberations and EAC *inter alia*, recommended for extension of validity of ToR from 3 years to 4 years. Further, the then EAC noted that name of the company has been changed to KVK Par Power Pvt. Ltd. In this regard the Developer explained that Government of Arunachal Pradesh originally allotted this project to KVK Energy &Infrastructure Pvt. Ltd., who has formed a SPV to execute this project in the name of KVK Par Power Pvt. Ltd.

The SPV made by KVK Energy & Infrastructure Pvt. Ltd. or the PP for implementation of the Par HEP, was requested to submit all the documents in this regard including change of ownership, etc. But, PP could not submit the same. Therefore, the letter of extension could not be issued due to want of Certificate of Registration. The same was submitted on 13.12.2016 and by that time the validity of ToR had expired. The PP has submitted application for extension of validity upto 17.10.2016 from 4th to 5th year.

The EAC considered the project for extension of the validity of ToR for the 5th year.After detailed deliberation, the EAC ***recommends*** the extension of the validity of ToR from 4th to 5th year. Since, the ToR was not issued earlier, the extension shall now be granted from 17.10.2015 to 16.10.2016 (vide Ministry's OM dated 08.10.2014) and 17.10.16 to 16.10.2017 after recommendation of EAC and this is the last and final extension for the project. However, the committee mentioned that all the works including Public Hearing should complete timely and EIA/EMP should be submitted before the expiry of the validity of ToR. No case for further extension will be considered by the EAC.

Agenda Item No. 2.11 Turu HEP (60 MW) in Papumpare District of Arunachal Pradesh by M/s KVK-ECI Hydro Energy Pvt. Ltd - For Extension of validity of ToR

The Project Proponent (PP) made a detailed presentation for the extension of the validity of ToR of the project supported with strong reason of not submitting the EIA/EMP report within 4 years and *inter-alia*, provided the following information.

It was noted that the project is located on Pare River in Papumpare District of Arunachal Pradesh. The Scoping/ToR Clearance for this project was accorded by the Ministry 18.10.2012 for 66 MW. Due to E-flow provisions, the capacity got revised to 60 MW and ToR for revised capacity with extension of validity by another 1 year was accorded on 12.2.2015 (i.e. upto 17.10.2015).

The committee noted that the matter of further extension of ToR was considered by EAC, in its meeting held during 23-24th September, 2015. After detailed deliberations and EAC *inter alia*, recommended for extension of validity of ToR from 3 years to 4 years. Further, EAC noted that name of the company has changed to Turu hydro Power Pvt. Ltd. In this regard theDeveloper explained that Government of Arunachal Pradesh originally allotted these projects to ECL Engineering & Construction Company Ltd., who have formed a SPV to execute this project in the name of Turu Hydro Energy Pvt. Ltd.

The SPV made by ECL Engineering & Construction Company Ltd. for implementation of the Turu HEP(PP) was requested to submit all the documents in this regard including change of ownership, etc. But, PP did not submit the same. Therefore, the letter of extension could not be issued due to want of certificate of registration. The same was submitted on 13.12.2016 and by that time the validity of TOR was expired. The PP has now submitted application for extension of validity up-to 17.10.2016 from 4th to 5th year.

The EAC considered the project for extension of the validity of ToR for the 5th year.After detailed deliberation, the EAC ***recommends*** the extension of the validity of TOR from 4th to 5th year. Since, the ToR was not issued earlier, the extension shall now be granted from 18.10.2015 to 17.10.2016 (vide Ministry's OM dated 08.10.2014) and 18.10.16 to 17.10.2017 after recommendation of EAC and this is the last and final extension for the project.However, the committee mentioned that all the works including public hearing should complete timely and EIA/EMP should be submitted before the expiry of the validity of ToR. No case for further extension will be considered by the EAC.

Agenda Item No. 2.12 Dardu HEP (49 MW) in Papumpare District of Arunachal Pradesh by M/s. KVK Dardu Hydro Energy Private Limited - For extension of validity of ToR

The Project Proponent (PP) made a detailed presentation for the extension of the validity of ToR of the project supported withreasons of not submitting the EIA/EMP report within 4 years and *inter-alia*, provided the following information.

It was noted that the Project is located on Pare river in Papumpare district of Arunachal Pradesh. Scoping/ToR Clearance for this project was accorded by Ministry 18.10.2012 for 60 MW. Due to E-flow provisions, the capacity got revised to 49 MW and TOR for revised capacity with extension of validity by another 1 year was accorded on 12.2.2014 (i.e. up-to 17.10.2015).

This committee noted that the matter of further extension of ToR was considered by the then EAC, in its held during 23-24thSeptember, 2015. After detailed deliberations and the then EAC *inter alia*, recommended for extension of validity of ToR from 3 years to 4 years. Further, the then EAC noted that name of the company has changed to KVK Dardu Hydro Energy Pvt. Ltd. In this regard, developer explained that Government of Arunachal Pradesh originally allotted these projects to KVK Energy & Infrastructure Pvt. Ltd., who has formed an SPV to execute this project in the name of KVK Dardu Hydro Energy Pvt. Ltd.

The SPV made by KVK Energy & Infrastructure Pvt. Ltd. for implementation the Dardu HEP,(PP) was requested to submit all correspondence in this regard. But, PP did not submit the same. Therefore, the letter for extension could not be issued to want of certificate of registration. The same was submitted on 13.12.2016 and by that time the validity of TOR was expired. The PP has now submitted application for extension of validity up-to 17.10.2016 from 4th to 5th year.

The EAC considered the project for extension of the validity of TOR for the 5th year. After detailed deliberation, the EAC **recommends** the extension of the validity of TOR from 4th to 5th year. Since, the ToR was not issued earlier, the extension shall now be granted from 18.10.2015 to 17.10.2016 (vide Ministry's OM dated 08.10.2014) and 18.10.16 to 17.10.2017 after recommendation of EAC and this is the last and final extension for the project.However, the committee mentioned that all the works including public hearing should complete timely and EIA/EMP should be submitted before the expiry of the validity of ToR. No case for further extension will be considered by the committee.

Agenda Item No. 2.13 Conducting of Cumulative Impact Assessment and Carrying Capacity Study of River Basins- For Consideration of Standard ToR

A presentation on draft proposal for Standard Terms of Reference for conducting of River Basin Studies has been given by the IA.1 Division (River Valley and HEP) and *inter-alia*, provided the following information.

For ensuring environmental, ecological and Bio-diversity sustainability, Cumulative Impact Assessment & Carrying Capacity Study (CIA &CCS) must precede consideration of individual HEP in a river basin for granting EC and FC.These studies has been used as a road map and for taking scientific decision making tool. MoEF&CC, vide its OM dated 28.05.2013, has made these studies mandatory for a HEP to be eligible for granting EC.

Further, it was informed that initially, vide OM, it was mandated that State Governments concerned shall conduct such studies and submit the report to this Ministry. Later on, for a meaningful outcome of these studies by way of factoring into environmental concerns in a dispassionate and unbiased manner, it was proposed that it would be appropriate, if MoEF&CC take over these studies. Accordingly, this Ministry decided to take over all such studies from the State Government &CWC on as is where is basis as conducting of such study falls primarily in the domain of the MoEF&CC.

The Consultant made a detailed presentation of Standard ToR prepared by the Ministry and has also been earlier used as Standards ToR for preparation twelve River Basin Studies:

Standards TOR for conducting of River Basin Studies

Objectives of the Study:

The study envisages providing optimum support for various natural processes and allowing sustainable activities undertaken by its inhabitants. The same is determined in terms of the following:

a) Inventorization and analysis of the existing resource base and its production, consumption and conservation levels.
b) Determination of regional ecological fragility/ sensitivity based on geo-physical, biological, socio-economic and cultural attributes.
c) Review of existing and planned developments as per various developmental plans.
d) Evaluation of impacts on various facets of environment due to existing and planned development.
e) Water sharing agreements between the riparian States be part of e-flow assessment downstream of a project.
f) Water availability from CWC may be taken for respective RBS so that CIA & CCS can be done effectively.
g) Scenario to be developed for cumulative impacts of HEPs in the basin.

Study Area:

The study area to be covered as a part of the River Basin Study (RBS) includes all the HEPs i.e. completed, under developmental stage and proposed whichis falling in the respective River Basin.

Collection of Data:

The study should be based on collection of primary data for at least threeseasons. Emphasis should be laid on Terrestrial and Aquatic Biodiversity. The estimation of supportive capacity of the basin should involve the preparation of the existing

scenario i.e. the preparation of detailed database of the study area. This should be accomplished through the steps outlined in following section:

1. **Meteorology:** The information on various meteorological aspects is to be collected from India Meteorological Department (IMD) for meteorological stations located within the study area on the vicinity to the study boundary. The information on various aspects such as rainfall, temperature, wind, humidity, radiation and cloud cover, etc. should be part of data collection for preparation RBS.

2. **Water Resources:**

   - Review of drainage characteristics of the study area, including various surface water bodies like rivers and lakes.
   - Data collection and review of past studies/reports/data, etc.
   - Review of existing water sharing agreements for meeting various need-based existing and future demands viz. municipal, irrigation, power generation and industrial.
   - Analysis of all, past assessment of the water availability and assessing the water availability, as per updated data for the system as a whole and at existing ongoing / proposed project locations on annual / monsoon / non – monsoon and monthly basis.
   - Estimation of sediment load at various points in the study based on available secondary data.
   - Identification of perennial sources of water and their designated usages.

3. **Water Quality**

   - Secondary data/Primary data is to be collected for water quality in the study area. In addition to above, information on human settlement, sewage generated and mode of collection, conveyance treatment and disposal of sewage should also be collected.
   - The water quality monitoring should be conducted at different locations in the study area. The frequency of sampling should be once in a month for 3 months. The various parameters which include pH, Dissolved Oxygen (DO), Electrical Conductivity (EC), Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Total Alkalinity, Total Hardness, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Nitrates, Chlorides, Sulphates, Phosphates, Sodium, Calcium, Magnesium, Potassium, Iron, Manganese, Zinc, Cadmium, Lead, Copper, Mercury, Total Chromium and Total Coliform. *Fluoride ratio to be calculated to assess the water quality.*
   - Ground Water Utilization can be assessed as a part of study, if possible depending on the basin to basin.

4. **Flora**

   - Characterization of forest types in the study area and extent of each forest type.

- Information on vegetation pattern and floral diversity.
- Presence of economically important species in the study area.
- Presence of endemic floral species found in the study area, if any should be assessed as a part of additional study.
- Location of wildlife sanctuaries, national parks, biosphere reserves, if any, in the study area.
- Listing of Eco-sensitive zone area in the basin.

5. Terrestrial Biodiversity

One season primary data to be collected and cover the following:

- Identification of forest type and density, bio-diversity in the study area.
- Preparation of comprehensive checklist of flora (Angiosperms, Gymnosperms, Lichens, Pteridophytes, Bryophytes, Fungi, Algae etc.) with Botanical and local name.
- Importance Value Index of the dominant vegetation at various sampling locations.
- Frequency, Abundance and density of each species of Trees, Shrubs and Herbs at representative sampling sites should be estimated.
- Identification and listing of plants genetically, biologically, economical and medicinal importance.
- Major forest produce, if any, and dependence of locals on the same in the forests observed in the study area.

6. Fauna from the Secondary/Primary Sources

- Inventory of avifauna and its impact assessment in the study area.
- Inventory of Birds (resident, migratory), land animals including mammals, reptiles, amphibians, fishes etc. reported & surveyed in the study area should be prepared.
- Presence of RET faunal species as per the categorization of IUCN Red Data list as per different schedules of Indian Wildlife Protection Act, 1972 in the study area.
- Presence of endemic faunal species found in the study area, if any should be assessed as a part of the additional Study.
- Existence of barriers and corridors for wild animals, if any in the study area should be covered as a part of the study.
- Identification of threats to wildlife in the region.
- Presence of National Park, Sanctuary, Biosphere and Reserve Forest etc. in the study area should be assessed.
- Migratory path of the Wild life animals to be identified.
- Biodiversity studies and wildlife data to be conducted using latest tools such as line transect for herbivorous mammals, camera traps for carnivores (tiger, leopard, jungle cat, etc.) and point counts for bird species.

7. Aquatic Flora and Fauna:

- Presence of major fish species,

- Inventory of migratory fish species, migratory routes and period of migrations of various fish species.
- Presence of major breeding and spawning sites in the study area.
- To augment the existing data, a fisheries survey should be conducted at different locations in the study area. The survey should be conducted once per month for three months. The details of the monitoring work should be carried out as per the following:
    - ✓ Assessment of biotic resources with special reference to primary productivity, zooplanktons, phytoplankton, benthos, macrophytes, macro-invertebrates, especially % of clean water species (Ephemeroptera, Plecoptera and trichoptera) and fishes in the study area.
    - ✓ Short term and long term impacts on fish diversity and their recruitment to be studied as a part of study.
    - ✓ Breeding season with flow requirement for fishes to be assessed.
    - ✓ Flow requirement for the fish migration needs to be assessed.
    - ✓ Live load Analysis to be adopted for conducting of study on fishes.
    - ✓ Fish composition and their conservational status needs to be assessed.
    - ✓ Migratory route of migratory fishes
    - ✓ Spawning & breeding grounds of fish species, if any, should be identified.

8. Impact due to HEP Development:

- Modification in hydrologic regime due to diversion of water for hydropower generation.
- Depth of water available in river stretches during lean season and its assessment of its adequacy vis-à-vis various fish species.
- Length of river stretches with normal flow due to commissioning of various hydroelectric projects due to diversion of flow for hydropower generation.
- Impacts on discharge in river stretches during monsoon and lean seasons due to diversion of flow for hydropower generation.
- Impacts on water users in terms of water availability and quality.
- Impacts on aquatic ecology including riverine fisheries (fish diversity, breeding, recruitment and livelihood of fisherfolk)as a result of diversion of flow for hydropower generation.
- Assessment of maintaining minimum releases of water during lean season, non-lean non-monsoon (NLNM) and monsoon seasons to sustain riverine ecology, maintain water quality and meet water requirement of downstream users.
- Impact due to loss of forests ecology.
- Impact on RET species & impacts on economically important plant species.
- Impacts due to increased human interferences
- Impacts due to agricultural practices.

9. Additional Information:

- Industrial Development, Irrigation and Urban development may be included in the Standards ToR. Further, Tourism and fisheries development can be part of ToR.
- Due to development of HEPs, the urban area is getting stressed for which study may be included as a part of ToR.
- Study on flood and drought to be included as a part of study due to development of HEPs in respective basin.
- Irrigation Projects should also be included in the RBS, if any.
- List of maps should be included viz.,Forest Cover, land use and land cover, etc.
- Flood moderation should also bestudiedas a part of RBS.
- RBS should be completed in a set Time frame. Due to delay in completion of study, there will be delays in granting of EC and this causes becomes cost overrun and time overrun.

10. Cumulative impacts of commissioned, under construction and proposed projects in the basin to be assessed by integrating biodiversity profile of the projects sites. Different scenario models to be used to assess the cumulative impacts.

There were many suggestions by EAC members on the above ToR. This matter requires further discussion.

Agenda Item No. 2.14 Kameng River Basin Study in Arunachal Pradesh- For reconsideration of Appraisal of the Final Report

A presentation on draft report of Kameng River Basin Studies has been made by the Consultant, M/s WAPCOS, Gurgaon once again and *inter-alia*, provided the following information.

The study of Kameng sub-basin in Arunachal Pradesh was initiated at the instance of Ministry of Environment & Forests, Government of India. The Expert Appraisal Committee had recommended the TOR for conducting Cumulative Impact & Carrying Capacity Study for Kameng Basin (excluding Bichom Basin) in Arunachal Pradesh, for development of Hydro Electric projects in Kameng basin in 68thEAC meeting for River Valley and Hydroelectric Projects and 23rd – 24th September, 2013. Subsequently, Basin Study for Kameng sub basin was awarded to WAPCOS Limited. The scope of this study covered hydroelectric projects for entire Kameng Basin (excluding Bichom Basin). The scope of the basin study was further revised in the 86thEAC meeting held on 24th -25th, August, 2015.

The findings of the Kameng Basin Study were also considered in 1stEACmeeting held on 30th, December, 2016. In continuation, consultant made the presentation and the key issues covered are described in following paragraphs:

A total 44 HEP have been considered for study out of which16 projects come under category A and 14 projects are listed Category B and C .The detailsand current status category A & B are given in Table-1 to 2 respectively.

Table-1: Current Status of Projects in the Study Area (Category-A)

Sl.No.	Name of Project	' River	Allotted capacity (MW)	Revised/ Proposed capacity (MW)	Status
1	Kameng-II	Kameng	600.00	600.00	-
2	Khuitam	Digen	29.00	66.00	• EC granted in December 2010.
3	Talong Londa	Kameng	160.00	225.00	• EC approved in 2014. Stage-I FC is awaited for issuance of EC.
4	Kameng Dam	Kameng	600.00	480.00	• ToR for 480 MW was considered in 57thEAC meeting in 27-28th April, 2012 • Committee did not accept the proposal
5	Papu	Papu	90.00	90.00	• ToR was accorded on 22 March 2013
6	Pachuk-I	Pachuk	60.00	84.00	• ToR was accorded on 26thDecember 2011
7	Pachuk-II	Pachuk	60.00	60.00	• ToR was accorded on 26th December 2011
8	Pachuk-II Lower	Pakke Bung	45.00	51.00	-
9	Badao	Kameng	70.00	70.00	• TOR accorded on 7th October 2010
10	Kameng-I		1120.00	1120.00	-
11	Bichom ST-I			190.00	Project falls in Gongri/Dogri river, the tributary of Bichom river at downstream of Khuitam HEP (66 MW) & upstream of Dinchang HEP (252MW). The TWL of Khuitam 1173m and FRL of Dinchang HEP is 1138m. Thus, there is a level difference of

Sl.No.	Name of Project	' River	Allotted capacity (MW)	Revised/ Proposed capacity (MW)	Status
					35m only in between these projects. Therefore, the project location as proposed may not be viable.
12	Bichom-II			205.00	Project is located at longitude 92^{0}37'00"E & latitude 27^{0}18'00"N. As such the project falls in Bichom river and located at downstream of Nafra HEP (120 MW) & upstream of Bichom Dam of Kameng HEP(600 MW). The TWL of Nafra HEP is 796.20m and FRL of Bichom Dam is 770m. Thus, there is a level difference of 26.2m only in between these projects. Thus, the location as proposed may not be viable.
13	Chanda			110.00	-
14	Kimi			535.00	Conceptual Stage
15	Pakke			110.00	Conceptual Stage
16	Seba			80.00	Conceptual Stage

Table-2: **Status of Environmental Clearance of Category B Hydroelectric projects in Kameng Basin**

Sl.No.	Name of Project	' River	Allotted capacity (MW)	Revised/ Proposed capacity (MW)	Status
1	Saskangrong	Saskangrong	7.00	45.00	• TOR accorded by SEAC and ToR extended in SEAC meeting Feb, 2014.

Sl.No.	Name of Project	' River	Allotted capacity (MW)	Revised/ Proposed capacity (MW)	Status
2	Digin	Sangti	46.00	46.00	• TOR accorded by SEAC and ToR extended in SEAC meeting Feb, 2014
3	Meyong	Tim Kong Rong	38.00	38.00	• TOR accorded by SEAC in SEAC meeting September, 2014
4	Phanchung	Pachi	60.00	45.00	• Granted for EC by SEAC on the basis of MOM on 19-21st March,2016
5	TarangWarang	Pacha	30.00	36.00	-
6	Marijingla	Kameng	60.00	46.00	• Applied for ToR on 15th July 2011 but EAC did not considered.
7	Pakke Bung-I	Pakke Bung	15.00	40.00	• TOR accorded on 18th -20th September2014 by SEAC on MOM
8	Marjingla Lower	Kameng	48.00	48.00	• TOR accorded on 18th -20th September2014 by SEAC on MOM
9	Para	Para	55.00	45.00	• TOR accorded on 7th October 2010
10	Rebby	Para	31.00	31.00	-
11	Lachung	Pachi	41.00	41.00	-
12	Papu Valley	Papu	35.00	48.00	• EC accorded from SEIAA on 23.07.2013
13	Pasar			32.00	Conceptual Stage
14	Satuk			47.00	Conceptual Stage

The list of hydroelectric projects proposed on Kameng river and its tributaries is given in Table-3.

Table-3: **Number of Hydroelectric projects proposed on Kameng river and its tributaries**

S. No	Name of the river	Name of the Hydroelectric projects	Total no. of Hydroelectric projects
1.	Kameng	Kameng-II, TalongLonda, Kameng Dam,Marjingla, Marjingla Lower, Badao, Kameng-I, Chanda	8
2.	TimkongRong	Saskangrong,Meyong	2
3.	Phudung	Phudung, Dikshi	2
4.	Sangti	Digin	1
5.	Gang	Khuitam	1
6.	Tenga	Tenga	1
7.	Nargum	Denzi, Lower Ngorgun, Upper Ngorgun, Ankaling	4
8.	Pachi	Pachung, Lachung	2
9.	Papu	Papu, Papu valley, Pasar	3
10.	Kaya	Pichang	1
11.	Pacha	Sepla , TarangWarang, Pacha	3
12.	Pachuk	Pachuk-I, pachuk-II, Satuk, , Pachuk Lower	4
13.	Pakke Bung	Pakke Bung-I, Pakke Bung-II, Pakke Bung-III, Pakke Bung-IV,	4
14.	Para	Para, Rebby	2
15	Bishum	Debra, Dipre,Ditchi,Dibri	1
16	Gongri	Bichom ST-I	1
17	Bichom	Kimi &Bichom-II	2
18	Pakke	Sebu, Pakke	2
	Total		**44**

Three sanctuaries, viz. Eagle Nest, Sesa Orchid and Pakhui are situated in the Kameng river basin area.

The findings of HEC-RAS model studies for various scenarios were also covered during the presentation. The scenarios covered are given in Table-4.

Table-4: various scenarios covered as a part of HEC-RAS modelling

S. No.	Season	Flow Release(average of months)	Months
1	Monsoon Season	100%	June-September
2	Monsoon Season	30% to 15% at 1% interval	June-September
3	Non-Monsoon non lean season-1	100%	October-November
4	Non-Monsoon non lean	30% to 15% at 1%	October-November

S. No.	Season	Flow Release(average of months)	Months
	season-1	interval	
5	Lean Season	100%	December-March
6	Lean Season	30% to 15% at 1% interval	December-March
7	Non-Monsoon non lean season-2	100%	April-May
8	Non-Monsoon non lean season-2	30% to 15% at 1% interval	April-May

The recommendations along with recommended Environmental Flows for HEPs in various sub-basins of Kameng river basin were also discussed in the EAC meeting.

Apart from major recommendations of the report, the State Government of Arunachal has dropped 2 nos. of projects namely Bichom Storage-I HEP (190 MW) and Bichom-II HEP (205 MW) for which detailed discussions was done in the EAC meeting held on 30.12.2016.

After detailed deliberations, EAC decided that in some of the projects based on the approved hydrology, the months considered for assessment for Environmental Flow for various season needs to be relooked. A site specific study shall be carried out for Pakke Bung-I & Pakke Bung-II HEPs.

Integrated operation of the whole system should be studied. Further, the data of limited sites have been used to estimate flows at a number of sites and its implications needs to be understood. The consultant also needs to clearly indicate how each point in TOR has been addressed. This will help in proper appreciation and use of the study in decision making.

As no agenda item was left, the meeting ended with a vote of thanks to the Chair. The next meeting is scheduled for 2-3 March, 2017.

***

Inbox **Minutes of 2nd...**

Reply Forward Move Print Delete

Subject: **Minutes of 2nd EAC meeting of RV & HEP**
To: Dr S Kerketta

Minutes_2nd_EAC_Meet... (138kB) Minutes_2nd_EAC_Meet... (520kB)

Dear Dr Kerketta,

I am sending herewith the approved minutes of the 2nd EAC r
& 31.01.2017.

Regards,

Sharad Jain
NIH Roorkee
Tel (Office): +91 1332 249202

LIST OF MEMBERS

2nd MEETING OF RE-CONSTITUTED EXPERT APPRAISAL COMMITTEE (EAC) FOR RIVER VALLEY AND HYDROELECTRIC PROJECTS

DATE & TIME : 30-31st JANUARY 2017

VENUE : TEESTA MEETING HALL, VAYU WING, GROUND FLOOR, INDIRA PARYAVARAN BHAWAN, NEW DELHI

Sl.No.	Name of Member	Signature
1.	Prof. Sharad Kumar Jain, Chairman Department of Water Resources Dev. & Mgmt., Indian Institute of Technology Roorkee, Roorkee - 247 667, India.	
2.	Dr. P. Pradeep Mujumdar, Member Professor, Deptt. Of Civil Engg., Indian Institute of Science, Bangalore, Karnataka	
3.	Shri. Sharvan Kumar, Director Member, Central Electricity Authority (CEA) Sewa Bhawan, R. K. Puram, Sector-1, New Delhi - 110 066	30.1.17
4.	Shri N. N. Rai, Member Director, Central Water Commission (CWC) Sewa Bhawan, R. K. Puram New Delhi -110 066	30.1.17
5.	Dr. J.A.Johnson, Member Scientist -D, Wildlife Institute of India (WII) Post Box No. 18 Chandrbani, Dehradun - 248 001	9410992211
6.	Dr. B. K. Das, Member Director, Central Inland Fisheries Research Institute (CIFRI)	8420229567 (Aksahay) 9674301441

7.	Dr. Vijay Kumar, Member ~~Dr. AK Sahu~~ Scientist -F, Ministry of Earth Sciences, Prithvi Bhavan, IMD Campus, Opp. Indian Habitat Centre Lodhi Road, New Delhi - 110 003	Vijay Kumar 30/1/17
8.	Prof. Govind Chakrapani, Member Department of Earth Sciences, Indian Institute of Technology Roorkee, Roorkee - 247 667, Uttarakhand.	Please change address to: G. J. Chakrapani 30/1/17 Dean, School of Ecology & Environment Studies Nalanda University, Rajgir, Bihar
9.	Dr. Chetan Pandit, Member Bunglow 119, Satantara Society, DSK Vishwa, Puna - 411 04, Maharashtra.	
10.	Dr. Dinkar Madhavrao More, Member 1/7, Pritam Nagar, Karve Raod Kothrud Pune - 411 038, Maharashtra.	30/1/2017
11.	Dr. R. Vasudeva, Member Department of Forest Biology and Tree Improvement, College of Forestry, Sirsi - 581 401, Karnataka	30/1/2017
12.	Prof. S.R. Yadav, Member Department of Botany, Shivaji University, Kolhapur 416004	30/01/2017
13.	Dr. Jai Prakash Shukla, Member Principal Scientist Water Resources Management and Rural Technology CSIR - Advanced Materials and Processes Research Institute, (Formerly Regional Research Laboratory)	
14.	Dr. Kerketta, Member Secretary Director (IA-1) 3rd Floor, Vayu Wing, IP Bhawan Jor Bagh, New Delhi	

15. Dr. A. K. Sahoo
Scientist
ICAR-CIFRI
Kolkata

30.01.2017

LIST OF MEMBERS

2nd MEETING OF RE-CONSTITUTED EXPERT APPRAISAL COMMITTEE (EAC) FOR RIVER VALLEY AND HYDROELECTRIC PROJECTS

DATE & TIME : **30-31st JANUARY 2017**

VENUE : **TEESTA MEETING HALL, VAYU WING, GROUND FLOOR, INDIRA PARYAVARAN BHAWAN, NEW DELHI**

Sl.No.	Name of Member	Signature
1.	Prof. Sharad Kumar Jain, Chairman Department of Water Resources Dev. & Mgmt., Indian Institute of Technology Roorkee, Roorkee - 247 667, India.	
2.	Dr. P. Pradeep Mujumdar, Member Professor, Deptt. Of Civil Engg., Indian Institute of Science, Bangalore, Karnataka	
3.	Shri. Sharvan Kumar, Director Member, Central Electricity Authority (CEA) Sewa Bhawan, R. K. Puram, Sector-1, New Delhi - 110 066	31.1.17
4.	Shri N. N. Rai, Member Director, Central Water Commission (CWC) Sewa Bhawan, R. K. Puram New Delhi -110 066	31-1-17
5.	Dr. J.A.Johnson, Member Scientist -D, Wildlife Institute of India (WII) Post Box No. 18 Chandrbani, Dehradun - 248 001	9410992211
6.	Dr. B. K. Das, Member / Dr. A.K. Sahoo Director, Central Inland Fisheries Research Institute (CIFRI)	31.01.17 (A K Sahoo)

7.	Dr. Vijay Kumar, Member/~~Dr. AK Sahu~~ Scientist -F, Ministry of Earth Sciences, Prithvi Bhavan, IMD Campus, Opp. Indian Habitat Centre Lodhi Road, New Delhi - 110 003	31/1/17
8.	Prof. Govind Chakrapani, Member Department of Earth Sciences, Indian Institute of Technology Roorkee, Roorkee - 247 667, Uttarakhand.	
9.	Dr. Chetan Pandit, Member Bunglow 119, Satantara Society, DSK Vishwa, Puna - 411 04, Maharashtra.	31/1/2017
10.	Dr. Dinkar Madhavrao More, Member 1/7, Pritam Nagar, Karve Raod Kothrud Pune - 411 038, Maharashtra.	31-1-2017
11.	Dr. R. Vasudeva, Member Department of Forest Biology and Tree Improvement, College of Forestry, Sirsi - 581 401, Karnataka	31/01/2017
12.	Prof. S.R. Yadav, Member Department of Botany, Shivaji University, Kolhapur 416004	31-01-2017
13.	Dr. Jai Prakash Shukla, Member Principal Scientist Water Resources Management and Rural Technology CSIR - Advanced Materials and Processes Research Institute, (Formerly Regional Research Laboratory)	
14.	Dr. Kerketta, Member Secretary Director (IA-1) 3rd Floor, Vayu Wing, IP Bhawan Jor Bagh, New Delhi	