Minutes of the 65th Meeting of the Expert Appraisal Committee for River Valley and Hydroelectric Projects constituted under the provisions of EIA Notification 2006, held on 22nd -23rd March, 2013 at SCOPE Complex, New Delhi.

The 65th Meeting of the Expert Appraisal Committee (EAC) for River Valley and Hydropower Projects was held during 22nd- 23rd March, 2013 at SCOPE Convention Centre, Opposite Jawaharlal Nehru Stadium, New Delhi. The meeting was chaired by Shri. Rakesh Nath, Chairman. Shri G. L. Bansal, and Dr. S. K. Mishra, Members, EAC could not attend the meeting due to pre-occupation. The list of EAC Members and officials/consultants associated with various projects who attended the meeting is annexed.

The following Agenda items were taken-up in that order for discussions:-

1st Day (23.3.2013)

1. Agenda Item No.1**: Welcome by Chairman and Confirmation of Minutes of the 64th EAC Meeting held on 1-2nd February, 2013.**

The Chairman welcomed the members. The minutes of the 64th EAC meeting were confirmed with the following amendment:

Agenda Item No. 2.11**: Revision of capacity from 4000 MW to 3097 MW for Etalin HEP in Dibang Valley District of Arunachal Pradesh by M/s. Etalin Hydro Power Company Ltd – For reconsideration.**

Conditions contained vide sub-para-4 under last para to be replaced and to be read as under:

"The site specific study on minimum environmental flow will be conducted by the project proponent. The study should include assessment of minimum environmental flow requirement for three seasons i.e. lean, non-lean & non-monsoon and monsoon seasons."

2. Consideration of Project proposals for Scoping and Environmental Clearance.

The following project proposals were considered

Agenda Item No. 2.1 Papu HEP (90 MW) Project in East Kameng District of Arunachal Pradesh by M/s Papu Hydropower Projects Ltd – for Consideration TOR.

The project proponent made a detailed presentation. The project is located in East Kameng District of Arunachal Pradesh. It envisages utilization of flow of Papu River, a tributary of Kameng River, for generation of electrical power through a run-of-the-river scheme. The following features of salience emerged from the presentation:

The Project is on Papu River, just upstream of the confluence of River Pasa. The project is envisaged as a run-of-the-river scheme with adequate capacity to provide 3 hours continuous peaking at full installed capacity. The diversion site and Power House are proposed to be located at longitude 93°02'11.05'' E, latitude 27°13'47.9'' N and at longitude 93°0'27'' E , latitude 27°18'33'' N respectively. There is only one more H E project proposed on Papu river known as Papu Valley HE project located in the upstream, and is in advanced stages of investigation. Tailrace of this project is at 23 km distance from the tip of Papu HEP reservoir. The distance from Papu HEP diversion site till confluence of Papu river with Kameng river is about 17.5 km. Power house is proposed on left bank of Kameng river and water is to be discharged into Kameng River through tailrace.

Papu river has a catchment area of about 444 sq.km at the proposed barrage site. The submergence area at pond level is estimated as 6.01 Ha having a live pondage of 0.3 MCM and gross storage of 0.311 MCM.

The proposed project is in proximity of **Pakke Tiger Reserve** (PTR) but, all project components fall outside protected area boundary. The nearest point of protected area is approximately at a distance of about 500 m for the project. Project proponents have already submitted proposals for forest diversion and wildlife clearance.

The project envisages construction of a 16.5 m high barrage from foundation level with FRL at 698 m and MDDL at 690 m elevation. The spillway consists of 5 bays, with crest at El 685 m. Two underground De-silting chambers of size 170m (L) x 10.5m (B) x 7m (H) have been proposed, to eliminate particles of size larger than 0.2 mm and flush out through silt flushing tunnel, discharging back to Papu River. The project involves head race tunnel, 3.5m (W) x 4.25m (H) modified D-shaped, about 9.28 km long and terminating in a open to the sky surface Surge Shaft; 12.0m dia with top level at El 715m & bottom level at 660.25m. One 2.9 m dia pressure shaft bifurcating into three penstocks of 1.67 m diameter, takes water to a surface power house located on the left bank of river Kameng having three units of 30 MW each Francis type of turbines designed for a gross head of 320 m. A tail race channel with normal TWL at 378 m elevation discharges tail water into Kameng River.

The total land requirement for various project activities is about 77 ha, of which 35.5 ha is forest land. Submergence will be spread for approximately 6.01 ha. The project would yield design energy of 379.6 MU in 90% dependable year flows and 482.3 MU in 50% dependable year flows.

Since there is no discharge data available at the project site, the water availability series has been worked out using the long term available observed flows at Bichom dam site (CA = 2277 sq.km) for the period from 1969 to 1982, which has also been approved by Central Water Commission (CWC). It was proposed to transpose the flow

series at Bichom to the Papu project site on a catchment area proportion basis after considering the variability due to rainfall. The available data indicates that the average rainfall at Bichom catchment is of the order of 1370.6 mm. The rainfall of Bichom basin shows clear inconsistency with the runoff. For site specific observation, G&D site along with rainfall observation station is being installed. The average rainfall in the Papu catchment has been estimated as 2207.6 mm. Based on the above observations, a variation of around 62% of rainfall between the two catchments is noticed. Again this conclusion is based on the scanty data available, therefore, to account for the rainfall variability between the Papu catchment (situated in East Kameng) and Bichom catchment (situated in West Kameng), the flow series of Papu catchment has been increased by only 5% in addition to catchment area proportion (The same criterion was adopted for the DPR preparation of upstream Papu valley HEP (48MW).

In the PFR, it has been mentioned that adequate releases of water at downstream to ensure adequate environmental flow will be maintained in the river in lean season, monsoon season and other months and this has been appreciated by the EAC. However, a site specific requirement and other environmental concerns should be covered in **detailed downstream Study which will be initiated on award of scoping clearance.**

The Committee expressed satisfaction over provision of ecological flows which are proposed as 20% of average of four leanest months of 90% dependable year (1978-79) during lean season, 30% of average of four wettest months of 90% dependable year during monsoon season and 25% of average of four other months of 90% dependable year during rest of months. It was also emphasized that Pasa River's contribution of about 27% is also available in Papu River at about 500 m downstream thus taking the available flows to the tune of more than 40% of existing discharges. Committee asked to include a table clearly highlighting 10 daily flows in Papu River in 90% dependable year, corresponding contribution from Pasa river, environmental releases including spills and percentage releases with respect to combined flows of Papu and Pasa rivers.

After detailed deliberations, the EAC made following observations:

(i) As per Terms of conditions of MOA with Govt. of Arunachal Pradesh the project is to be implemented in a time bound manner by 23.4.2014 for commencement. The EIA needs 3 seasons data covering a calendar year and thereafter conducting Public Hearing and submission of project to MOEF for Environmental Clearance and commencement of project by 23.4.2014 is not possible. Therefore the project proponent at the beginning should take up the issue with State Government for extension of time.

(ii) There is difference in the information given in PFR and Form 1 in respect of total land requirement. In the EIA chapter of PFR total land requirement is projected

as 77 hectare and 6 ha land is shown as submergence; whereas Form 1 states total land requirement is about 100 hectare and about 10.625 ha land (FOREST) likely to be submerged. The factual position in this regard needs to be clarified. Also with the proof of the application submitted to Forest Department for Stage-I FC for diversion of forest land for the project.

(iii) The PFR also discusses about formulation of green belt (p-14-26). But the land requirement for different project component in Table 14-12 does not earmark any land for Green belt! needs to be clarified.

(iv) Form-1 point no. 2.1 should clearly indicate the land-use of 41.5 ha of community/private land. A map indicating the location of the project components and the boundary of Pakke Tiger Reserve (PTR) and other Sanctuaries and National Parks need to be provided. The project would require a clearance from NBWL owing to its proximity with PTR.

(v) For Muck disposal 10 ha land has been included in the total land requirement. It should be identified on a scaled map with details of muck holding capacity of this area while preparing EIA/EMP report

(vi) The project will operate on proportionate transfer of the water availability of Bichom basin. Establish a G&D site to monitor the flow in Papu River. In the EIA/EMP reports, daily discharge record for the period for which data should have been collected.

(vii) Owing to its proximity with PTR, special efforts should be made during EIA studies to evaluate the use of the area by important and migratory faunal species. Also since the area is rich in nocturnal fauna, special methods such as camera traps should be resorted to, to document their presence besides the regular sampling.

(viii) The project is located in one of world's richest biodiversity areas and it should be ensured that the personnel involved in documentation of flora and fauna should be well versed with the biodiversity of the region.

(ix) The faunal lists given in the PFR are very preliminary and also have some glaring mistakes (eg. inclusion of Black billed Magpie Pica hudsonia a bird known only from North America and Yellow crowned woodpecker which is known only from Indian mainland and not from North-east) which should be corrected.

(x) It is to be clearly highlighted whether total land requirement worked out as private or community owned land is under any community forest or any other land use.

(xi) Bamboo, cane, rattans & Musa species should be included in the list as part of biological environment description under environmental baseline. Volume of species getting submerged or affected need to be worked out and quantity along-

with their valuation is required to be carried out so that a proper cost benefit analysis can be undertaken and payment for eco-services can be worked out.

(xii) Sampling data location for vegetation sampling should be shown on a map. Details of equipment used for analysis of various environmental parameters need to be documented as part of methodology in EIA report.

(xiii) Source of secondary information such as fishes or any other environmental parameter should be clearly mentioned in the report.

- The fish diversity recorded from the project area has serious mistakes, wherein the coldwater fish (*Schizothorax richardsonii*) is mentioned along with warm water fish (*Cirrhinus mrigala*). This is not reported from anywhere till date. The video/photographs shown during the presentation indicate that the riverine habitat is suitable for *Schizothorax richardsonii* and not for *Cirrhinus mrigala*. Hence need be looked with great care during the study.

- The fish *Labeo pangusia* has been repeatedly mentioned in the list of fishes need be corrected.

- The habitat seems suitable for mahseer species, therefore need to be sampled and studied thoroughly. If mahseer is available in the system, suitable fish ladder must be constructed to provide migratory path to the fish.

(xiv) Provision of fish ladder for possible presence of fish species like *Tor putitora* may be made in DPR. Fish diversity of Kameng River especially near tailrace discharge point need to be studied as part of EIA.

(xv) Impact of tailrace discharges in Kameng river especially on river morphology need to be studied especially during lean flows.

(xvi) Waterway for the barrage should be provided for SPF of 3166 cumec i.e. SPF in place of 1 in 100 year flood.

The committee further remarked that the project may be awarded scoping clearance, approved the TOR subject to submission of the information/clarification to the MoEF in respect of points at sl (i) to sl (iv) above.

Agenda Item No. 2.2: Revision of Capacity of Sawalkote HEP from 1200 MW to 1856 MW in Ramban District of Jammu & Kashmir by M/S. J&K Power Development Corporation.

The Executive Director, J&K State Power Development Corporation (JKSPDC) made detailed presentation on the project and following emerged:

The Sawalkote HEP project is located on River Chenab in Udhampur & Ramban Districts of Jammu & Kashmir. This Hydro electric project was initially studied to the feasibility level in early eighties. The 1984 Feasibility report prepared for Central Water Commission included a project with an installed capacity of 600 MW in the initial stage with further provision of 600 MW in the later stage and was proposed to be located on the right bank of River Chenab.

In the revised proposal, it was decided to implement both the phases simultaneously and accordingly, a revised DPR was prepared for an installed capacity of 1200 MW in 2006. The HRT of previously planned 8.6 Km was reduced to 200m only and the excavation through the Murree formations was avoided as the whole project was now planned on the left bank of the Chenab River with underground power house. In total, 6 vertical Francis units with installed capacity of 1200 MW with a design discharge of 840 Cumecs. The tail race tunnels in this proposal had their outfall into the Chenab river at a river bend some 2.2 Km downstream from the dam. With this arrangement, the entire power station complex including most of the waterways has been located in the dolomite formations with quite favorable conditions.

The updated water availability study report of 34 years, which included the discharge series from 1975-76 till 2008-09 was submitted to CWC in March 2011 for its review and approval. CWC cleared the same hydrology series vide communication dated 21-04-2011**.** Accordingly, year 2004-05 has been approved as 90% dependable year by CWC. Subsequently, Power Potential Studies taking into account the approved updated hydrology by CWC was submitted to CEA vide JKSPDC letter dated 18-05-2011 for an installed capacity of 1200 MW.

The MOEF had accorded the Environmental Clearance to the 600 MW Sawalkote HEP vide No: J-11016(33)/84 En.5/IA dated 9-05-1989. M/s Norplan was engaged in 2001 as Consultant by JKSPDC for the preparation of Environment Impact Assessment Report and the Consultants had submitted its report in 2006. Meanwhile, vide notification dated 14th September 2006 MoEF issued revised guidelines and advised JKSPDC to seek fresh clearance as per the Notification of 2006. The JKSPDC submitted a fresh application to MoEF for approving the Terms of Reference (TOR) of Sawalkote project for a Capacity of 1200 MW. The TOR was issued by MoEF on 13-10-2011 for 1200 MW capacity.

The EAC has noted that the project is proposed on Chenab River and a 197 m high concrete gravity roller compacted dam from the deepest foundation of the river bed on the left bank of Chenab river to generate 1200 MW of hydropower. This is a run-of-the-river scheme. Total land requirement for the project is 1099 ha, out of which 600 ha is forest land. About 900 ha land is likely to be submerged (cultivable land-160 ha + uncultivable land-140 ha + forest land-600 ha). An underground powerhouse was proposed on the left bank of the river with 6 units **of 200 MW e**ach.

A total of 629 families comprising of 4400 individuals will be affected due to this project. No national park/sanctuary/biosphere reserve/historical monument exists within 10 km radius of the project area. Total cost of the project is reported to be Rs. 10,542 Crores. As indicated, the Ministry has granted TOR for this project on 13-10-2011.

Now, the project proponent has submitted the proposal for revised capacity of 1856 MW and has mentioned that no change in the parameters like dam height and FRL etc of the Sawalkote project. The important parameters of original vis-à-vis revised project giving comparative statement are present in the following table:

S.No	Items	Original capacity	Revised capacity
1	Capacity of the projects	1200 MW	1856 MW
2	Dam height	197 m	193 m
3	Total land requirement	1099 ha	1099 ha
4	Forest land	600 ha	600 ha
5	Total submergence	900 ha	900 ha
6	Powerhouse	Underground	Underground
7	Units	6 x 200 MW	6 x 225 MW + 56 MW & Phase-II 450 MW (2 x 225 MW)
8	Total cost of the project	Rs. 10,542 Crores	Revised cost to be worked-out

The power potential aspects of the project were examined by Central Electricity Authority (CEA) who suggested vide their letter no 2/J&K/19/03-(CEA/PAC/4104-05 dated 3rd June 2011 that "*Installed Capacity of 1200 MW proposed for Sawalkote HE project by M/s JKSPDC is on the lower side. Incremental Energy per unit installed capacity, annual load factor and potential utilization factor for this capacity have been worked out as 2800 Kwh/kw, 51.49% and 59,33 % respectively.* With the above, a good chunk of power potential therefore, remained unexploited.

The issue was discussed in detail by JKSPDC. In order to taking a final decision in the matter and to ensure optimum hydrological utilization, a meeting was held under the Chairmanship of Member, Hydro CEA on 16-04-2012 where in CEA approved an aggregate capacity of 1856 MW to be developed in two stages. The first stage would be for an aggregate capacity of 1406 MW (1350 in the main plant and 56 MW in the Auxiliary plant). The second stage of the project is envisaged for an installed capacity of 450 MW. It is worthwhile to mention here that the enhanced capacity shall not entail change in the vital parameters like dam height and FRL of the Sawalkote project. As the study area remains unaltered, baseline data collected during the year 2012 will hold

good for revised capacity as well. To ensure adequate environmental flow requirements, adequate releases during lean, monsoon and other months, as per the original Scoping Clearance condition will hold good for the revised installed capacity.

Detailed deliberations led to the following observations:

FORM 1:

(II) ***Activity***

(i) 1.1 - Land Use/Land Cover - details of total land required (Agriculture/Horticulture – 325 ha; Private Land – 14 ha) and its land use/land cover are to be provided in hectares rather than in Sq km. The other project activities are to be specified.

(ii) 1.2 – land use/cover of "State land = 325 ha" to be specified; These have to be addressed during EIA/EMP adequately and appropriately.

(III) Environmental Sensitivity

(i) Nos. 2 and 3 should be "YES" since 600 ha of forests will be affected and forests are ecologically sensitive and protected.

A good location map and FCC showing the land use/land cover of the project area to be provided.

(iii) The covering letter mentions that there is no change in quantum of various kinds of land involved. But, information provided in Form-1 on Environmental Sensitivity point no 2 and 3, diversion of 600 ha of forest in the Himalayas, where sensitive species of flora and fauna may exist. This aspect needs to be investigated properly during the EIA and not to be concluded just based on a NOC given by wildlife department.

PFR:

(i) There should have been a Chapter on "Environment & Ecology" giving details of forests, flora and fauna available from secondary information

Proposed TOR:

(i) *Details of Methodology to* Include- Source (s) of secondary information. This should be cited wherever required and citations included in a Reference List;

(ii) ***Biological Environment*** *should* Include –

(a) Valuation of Biodiversity and Ecosystem Services provided by 600 ha of forests should be studied.

(b) Number and species of trees in the submergence area and their basal area to be provided

(c) GPS reading of occurrence of RET species should be recorded for conservation and rehabilitation purpose.

(d) Compensatory afforestation and loss of biodiversity

(e) Collection of primary data on other relevant component
(f) For categorization of sub-catchments & draining catchment, Silt Yield Index methodology should be sued

(iii) *Fauna: H*erpeto-fauna "Amphibians" should also be studied.
(iv) The geological and seismicity of the project area to be described in detail in consulting available literature
(v) A separate social impact assessment report is to be prepared since the displaced families exceed 200.
(vi) The mentioned Environmental flow of 39.97 cumec has to be increased during monsoon. Revise net flow to 30% release during monsoon months
(vii) Due to increase environmental flow, capacity of dam toe powerhouse may be more which needs to be checked during the study
(viii) The type of de-sanding device going to be used in the project to be detailed in the study, since the reservoir is going to be filled up in 7-8 years, coarse sediments will enter the HRT and cause damage. The experience from Baglihar and Salal HEP projects is to be provided in the report
(ix) The dam height is 193 m. Therefore, a detailed dam break analysis (DBA) and disaster management plan has to be prepared

(x) Social Impact Assessment is required, since the number of displaced families exceed 200. In Form I page 4 no. 9, answer should be 'Yes' since sensitive manmade landuses, viz. schools and places of worship are to be demolished.

After detailed deliberations and further scrutiny, the committee recommended the project for awarding scoping clearance and approved the TOR subject to the above additional ToRs/conditions to be accounted for during EIA/EMP.

Agenda Item No. 2.3: New Ganderbal HEP (93 MW) in Ganderbal District of Jammu & Kashmir by M/s. J&K Power Development Corporation – For Reconsideration for Environmental Clearance

This project was first considered in 63rd meeting of EAC held on 26-27th December, 2012. The EAC recommended the Environmental Clearance for the project subject to submission of additional information considering various suggestions made by EAC. The project proponent has accordingly submitted the information which was placed before the committee. The Govt of J&K also clarified these issues.

The NGHEP project is a run-of-the river scheme conceived on river Sindh, a tributary of Jhelum, in District Ganderbal, Jammu & Kashmir, with its head works upstream of the existing weir of old Ganderbal HEP (15MW) which caters for drinking water supply of Srinagar town and irrigation demand of 1578 ha command area through sindh power canal. New Ganderbal HEP (93MW) is thus, conceived as replacement of

existing 15MW Ganderbal HEP, commissioned in 1951 Stage–1st (9MW) and 1956 Stage-2nd (6MW), as the erstwhile project is giving recurring trouble due to damages / slides in highly dilapidated water conductor system, de-rated machinery, which remain under regular outage due to O& M problems. About 750m u/s of the proposed project, the tail race of the existing USHEP-II (105MW) discharges into river Sindh. The Full pond level has been fixed at EL 1746m so that the normal tail water of EL 1746.8m of USHEP-II is not interfered. The scheme has been conceived with its head works 140m up stream of the existing weir so that power generation and water requirement of irrigation of drinking water supply are not adversely affected during the construction phase. The head works shall comprise of 72.03 m long barrage with 7 bays, under sluice portion with crest level at EL1736.5 masl and spill way bays with crest level at EL 1739.5 masl for passing high flood discharge of 2600 cumec. The Full pond level and dead storage level have been fixed at EL 1746 and 1742 masl respectively. The barrage shall have a very small pondage of 0.29 MCM.

The total land requirement is 63.70 ha of which forest, private and revenue land is 27.2 ha, 24 ha and 12.5 ha, respectively. Sanction for diversion of 27.20 ha Forest land accorded by Govt. Vide G.O. No. 175-FST of 2012 Dated: 2/04/2012. State land stand fully transferred and 11 ha of Private Land already acquired.

The committee appreciated the bio-diversity and Wildlife management plan in its 63rd meeting. The project proponent has further improved the same with incorporation of various suggestions of the committee in the report which includes :

- Indicating sampling sites and its location on area map in the report with elaborated sampling location specific vegetation data.
- Elaborated explanation of the data under phyto-sociology.
- Bifurcation of faunal species (avifauna) into residential and migratory bird species including terrestrial and aquatic species.
- Increase in provision for establishing a hatchery from Rs.65 lakhs to Rs.85 lakhs as suggested by the committee.

The project proponent has submitted copy of its NABET accreditation details of the consultant. An explanation has been given by the consultant for inclusion of aquatic expert from Kashmir University to enhance local ecological knowledge who has worked with EQMS approved FAEs.The suggestion given regarding maintaining 25% of flow in the river has been accepted by the project proponent.

After detailed deliberations, the EAC recommended environmental clearance for the project.

Agenda Item No. 2.4: Lower Kopili HEP (120 MW) project in Karbi Anglong & North Cachar Hill Districts of Assam by M/s. Assam Power Generation Corporation Ltd – for Reconsideration of TOR

The project proponent made a detailed presentation. This project was earlier considered by the EAC in its meeting held on 26-27th December, 2012.

The Lower Kopili HEP is a downstream HEP of existing Kopili HEP. The project envisages utilization of the regulated discharge from Kopili HEP, spills of Khandong and Umrong Dam and the discharge from the intermediate catchment by creation of a reservoir and utilizing a gross head of about 114 m. The live storage in the reservoir will last for a few days only if the power generation is continued at full installed capacity in the power house.

While presenting the project proposal on 26-27th December, 2012, the project proponent explained that as per the PFR, it was envisaged to generate (3 x 50 MW) 150 MW of hydropower. The rated discharge was envisaged as 172 cumec. It was confirmed by the project proponents that the scheme has been revised. The revised proposal envisages construction of a 70.13 m high concrete gravity dam, about 20 km downstream of Kopili HEP Stage-I Power House. The Intake Structure comprises of trash racks located 35 m upstream of Lower Kopili Dam to carry a discharge of 118 cumec. A 7.25 m dia, 3.622 m long Head Race Tunnel is proposed. Surge Shaft of 25.0 m diameter, 52.69 m high with restricted orifice of 1.95 x 5.20 m rectangular shape provided as a riser shaft of 30.21 m height is also proposed. Pressure Tunnel of 5.20 m diameter, 648 m long up-to bifurcation at 75 m upstream of D-line in the power house is also envisaged. 2 penstocks of 3.70 m diameter fully steel lined with lengths varying from 75 to 80 meters from bifurcation point to the power house will be provided. A surface power house with installed capacity of 110 MW, for utilizing the inflow from a catchment area of 2076.62 sq. km with a gross head of 122.63 m is proposed. An Auxiliary Power House of installed capacity of 10 MW is also proposed at the dam toe for generation of Power. The rated discharge in this layout is 118 cumec.

The revised scheme envisages running at full potential in monsoon season and operating as a peaking station in non-monsoon season. The installed capacity of Project has been kept now as 110 MW comprising of 2 units of 55 MW each. As mentioned, an auxiliary Power House having a capacity of 10 MW (2x2.5 MW+1x5 MW) has also been planned at the toe of the dam for utilizing the mandatory releases for ecological purposes.

The design energy in a 90% dependable year with Installed capacity of 110 MW is 437.68 MU at 45.42% load factor and 95% plant availability. However, the plant can operate at 15% over loading in monsoon season and thereby the annual generation can increase up-to 444.20 MU with 100% plant availability. Power generation studies have been similarly carried out for 50% dependable year and the annual generation with

100% plant availability and 15% overloading is 414.23 MU (PLF 42.99%) In addition, there will be generation of energy when the live storage of 77.29 MCM in the reservoir is utilized completely, which is possible once in a year. If this is done just before the monsoons, the reservoir water level will be replenished during the subsequent monsoon period. With the design discharge of 117.98 m^3/s, additional generation at full capacity of 100 MW is possible for 7.58 days. This will enable the plant to generate an additional energy of around 20 MU every year.

It was confirmed by the project proponents that, after accounting for Environmental Flows, installed capacity has been reduced from 150 MW to 110 MW. The project proponent confirmed that Environmental Flow release shall be 20% of the average of the four lean months of 90% dependable year. In non-monsoon non lean season the release should be 20 to 25% of the average flows during the period in 90% dependable year. The environmental releases / spill during the monsoon season shall be 30% of average Monsoon flow for 90% dependable year

It is proposed to construct the project within a period of 4 years including infrastructure development which is proposed to be completed within 9 months. Therefore the main works of the project will have to be completed within 3 years 3 months time.

The EAC noted that the free riverine stretch between FRL of Lower Kopili HEP and TWL of upstream Kopili HEP is about 6 km. There is no project downstream of the proposed Lower Kopili HEP.

After thorough scrutiny and examination of the environmental related issues, the committee sought additional information/clarifications as under:

- In comparison to other HEPs being examined recently, the cost per unit of installed capacity of this project is almost double!
- The concept of the auxiliary power house of a small capacity may please be explained as to whether it is a dam toe power house of 10 MW installed capacity and how much flow it will entail release unhindered.
- Existence or otherwise of any other HEP on Kopili River D/S to the present dam site may please be explained, particularly in view of the unclear statement at Item 2.2 of Form 1. Page 22 of the Executive Summary that mentions of an U/S Kopili HEP. A clear ‘L’ section sketch indicating elevations of FRL to be given, TWL of both U/S Kopili HEP and the D/S Lower Kopili HEP and the clear river flow distance between the two projects also to be provided. Also it may be indicated if any other HEP is planned D/S to the Lower Kopili HEP.

- It is to be clearly indicated on a map, if some tributaries are contributing flow along the water-deprived river stretch of more than 7 km. This has to be explained with estimated quantification of flow during monsoon and lean months.
- The calculations in Table on Page 85 require to be revised in view of the currently adopted norms of season-wise environmental flow release. The installed capacity would depend on that.
- The break-up of the land requirement on the basis of land-use are to be provided. The entire downstream course of the Kopili River should be shown in the map to ascertain that the river does not flow through any protected area.
- The forest of North-East India is rich in nocturnal fauna, special methods such as camera traps should be resorted to, to document their presence besides the regular sampling.
- The project falls in Karbi Angleng & North Cachar hill districts of Assam. The site specific seismic studies have been completed by Dept of Earthquake Engineering, IIT Roorkee. The site specific design parameters for MCE and DBE are considered as 0.36g and 0.18g for horizontal and 0.131g and 0.16g for the vertical motion. It seems to be appropriate for 150 MW project.
- The project specific geo-morphological and neo-tectonic mapping has not been done so far. As the project area falls under the active seismic zone where the Disang-Naga Thrust and Dhauki fault merge which triggers high seismic risk, the proponent is to monitor the MEQ studies by installing a 3-4 seismograph network for a period of one year.
- When PMF is 11030 cumec, how can the average flow be 90,046 cumec as mentioned on p-24. It may be corrected.

FORM 1:

*(I) Basic Information:23 to be informed w*hether any permission has been taken for 523.37 ha of land from the Forest Department/community

(II) Activity

(iv) 1.1 - Land Use/Land Cover - Give details of land use/land cover of total land requirement of 1575.80 ha with separate extent of each land use; provide FCC of the Project area in support of land use pattern.

(v) 1.2 – Specify the land use/cover of “Forest land, agriculture land and barren land, State land = 325 ha”;

(vi) 1.3 The reservoir will be a new land use.

(vii) *Annexure-II.* Land use/land cover of Government, forest private land required/affected to be given.

BASELINE DATA:

(i) *Details of Methodology:*

(a) Source (s) of secondary information should be cited wherever required and citations included in a Reference List; Valuation of Biodiversity and Ecosystem Services provided by 523.37 ha of forests should be studied.

(ii) *Physico-Chemical Environment*: to include a Soil Map

(iii)Biological Environment: Include -

(a) Number and species of trees in the submergence area and their basal area will have to be done.

(e) GPS reading of occurrence of RET species will have to be recorded for conservation and rehabilitation purpose.

(f) Under faunal elements herpeto-fauna "Amphibians" should also be studied.

(viii) *EMP:* Details of **Forest Protection Plan** and Biodiversity Conservation and **Wild Life Management Plan** should be included.

PFR:

(i) 8.7 terrestrial flora: A good description has been provided on forest types.

(a) Rare and Threatened species: It is to be explained as to what type of survey and when was it conducted with what methodology. The information that **there is no rare/ endangered plant species needs verification.** There are over 350 plants belonging to RET category in Assam, including 24 under rare category*. Proponent may consult "Red Data Book Plants of India (Nayar & Sastry 1987-88)"*

(ii) Documentation of lower groups of plants are to be provided

(iii) Table 8.1: Plants should be arranged family-wise not alphabetically!

(iv) Installed capacity (revised) of the project is 120 MW, not 150 MW.

The EAC recommended that the project will be reconsidered after receiving the modified proposal incorporating the above information/clarifications.

Agenda Item No. 2.5: Discussion of Basin Study for Lohit River Basin in Arunachal Pradesh by M/s. WAPCOS.

The study was initiated at the instance of MoEF while according environment clearance to Demwe Lower and Demwe Upper Hydroelectric Power Projects of M/s Athena Demwe Power Limited. The cost of the study has been shared on pro-rata basis by various project developers proposing hydro power projects on Lohit River in Arunachal Pradesh. The TOR for the study was communicated by the Ministry on 26th March, 2009, after discussing the same in four EAC meetings held on 16th – 17th July, 2008, 15th – 16th December, 2008, 22nd January, 2009 and 16th – 17th February, 2009. Interim report of the study was discussed by EAC in its meeting held on 23rd March,

2010. The final report of the study submitted by WAPCOS after incorporating the suggestions of EAC was discussed on 12.11.2011.

The WAPCOS presented that originally when the study was awarded six (6) hydroelectric projects were coming up in the Lohit river basin. The location of these HEPs along the river course is shown on the map. However, as the Demwe Upper 1800 MW HEP of Athena Group involved large submergence, it has now been divided into two separate projects. The capacity of Demwe Upper has been reduced to 1050 MW and a new Barrage toe HEP with 280 MW capacity is proposed in between Hutong-II HEP and Demwe Upper HEP. The new project of 280 MW is called Anjaw 280 MW HEP and is proposed by the Athena Group. MoEF has issued amended TOR for Demwe Upper 1050 MW HE Project on 22-12-2010 and TOR for Anjaw 280 MW HEP on 8th November, 2011. Before this change, the capacity to be generated on this river was 7918 MW and now the same is reduced to 7448 MW and the numbers of projects have now become seven from six. Besides these two projects, the Ministry has issued TOR clearance for Kalai-I, Kalai-II and Hutong-II. The Hutong-I has not yet been awarded by the State Government. So far environmental clearance has been granted to only one project i.e. Demwe Lower 1630 MW HEP. The projects now coming up on the Lohit River is listed below as per their location, starting from the upper most project namely Kalai-I HEP.

S. No.	Project Name	Project Proponent	Capacity (MW) before the revision	Capacity (MW) after the revision
1.	Kalai-I	Mountain Fall India Pvt. Ltd.	1450	1450
2.	Kalai-II	Reliance Power Limited	1200	1200
3.	Hutong-I	Yet to be allotted	588	588
4.	Hutong-II	Mountain Fall India Pvt. Ltd.	1250	1250
5.	Anjaw	Athena Demwe Power Pvt. Ltd.	--	280
6.	Upper Demwe	Athena Demwe Power Pvt. Ltd.	1800	1050
7.	Lower Demwe	Athena Demwe Power Pvt. Ltd.	1630	1630
	Total	**7918 (initial)**	**7448**	

As per the TOR for this Cumulative Impact Assessment Study, the study area covered is the entire Lohit river basin in India up to its emergence in plains i.e up to Brahmakund. The catchment of Lohit Basin is 4000 Sq. km.

During the EAC meeting held on 12.11.2011, various comments were raised. WAPCOS had submitted the replies to those comments, which were discussed during the EAC meeting held on 22.3.2013. The details are given as below:

Comment No-1 It was suggested that WAPCOS should assess the feasibility of gradually increasing the discharges from off peak to Peaking hours by rescheduling of generation.

The feasibility of Gradual Ramping up of the units was studied for Demwe Lower HEP. Gradual Ramping up from 72 MW (unit to be operated to utilize Environmental Flows) to the installed capacity of 1750 MW has been studied duly considering the CEA/CWC approved 10- daily discharge series at Demwe Lower HEP.

The following scenarios were considered

1. When the average river discharge is at the lowest 10-daily approved series of 17 yrs. The lean season minimum discharge for all the 17 years taken together is 263 cumec.
2. Minimum discharge of 90% dependable year (2003-2004) has been considered. For this year, the minimum 10-daily discharge is 325.15 cumec and the same has been considered for considering the effect of ramping up and ramping down.
3. In this case the 4 month consecutive lean month average discharge of 90% dependable yrs (2003-2004); i.e. of November to February has been considered. This works out to 377.87 cumecs

For each of the above scenario, two cases namely when no ramping up is considered and When a 15 min ramping up is allowed were considered.

Based on all the three scenarios, it is seen that during the lean season, there will be a clear peaking loss of 30 minutes each day, irrespective of the discharges in the River during these lean months. If 15 minutes ramping up and down from/to environmental flow to/from the installed capacity is resorted to, this effectively translates into a loss of about 60 hrs of 1750 MW peaking during the four months of lean period of a typical year. Thus, for having a ramping up/down of just 15 minutes, there will be a 9% peaking loss during four lean season months from Demwe Lower HE Project which has got a large Installed capacity of 1750 MW. Further, if the flow goes down to lower values below 270 cumecs i.e. worst possible 10- daily in all 17 year, then even 3 hours of mandatory lean season diurnal peaking cannot be obtained from this project.

EAC was of the opinion that 15 minutes ramping is too low. The EAC, therefore, suggested that WAPCOS should assess the feasibility of ramping in slots of 1 hour, i.e. increasing the discharge from off-peak to peak flows low over a duration of 1 to 2 hours.

Comment No.-2 Depth and width of flows for various discharge scenarios including environmental flows downstream of Demwe Lower Hydroelectric Project also needs to be estimated

It was informed by the consultant that the cross-section of river Lohit at different locations downstream of Demwe Lower Hydroelectric Project, was collected. Stage discharge relationship was not available at this site. Therefore, a synthetic form of normal depth discharge relationship was generated. As a part of the Study, Environmental Flows have been estimated for 90% dependable year (2003-04). The Environmental Flows were taken as 30% in and are listed as below:

Environmental Flows as per Building block Methodology for 90% dependable year (2003-04)

Month	Discharge in 90% Dependable year (cumec)	Percentage of flow recommended as Environmental Flows (%)	Environmental Flows for 90% Dependable year (cumec)
June	1535.7	30	460.7
July	1518.0	30	455.4
August	756.0	30	226.8
September	709.0	30	212.7
October	551.3	25	137.8
November	439.0	20	87.8
December	384.0	20	76.8
January	357.7	20	71.5
February	330.3	20	66.1
March	445.0	20	89.0
April	829.3	25	207.3
May	830.7	30	249.2

The depth for river cross-section downstream of dam site for discharge in 90% dependable year and Environmental Flows for 90% dependable year (2003-04) were estimated and are given in the following tables:

Depth of flows for monthly average flow for 90% dependable year (2003-04) at a distance of 2000 m downstream of dam site

Month	Discharge in 90% Dependable year (cumec)	Average depth of flow for 90% dependable year (m)
June	1535.7	4.68
July	1518.0	4.66
August	756.0	3.60
September	709.0	3.52
October	551.3	3.21
November	439.0	2.95
December	384.0	2.81
January	357.7	2.73
February	330.3	2.66
March	445.0	2.96
April	829.3	3.73
May	830.7	3.73

Depth of flows for Environmental Flows for 90% dependable year (2003-04) at a distance of 2000 m downstream of dam site

Month	Discharge for Environmental Flows in 90% Dependable year (cumec)	Average depth of flow for Environmental Flows in 90% dependable year (m)
June	460.7	3.00
July	455.4	2.99
August	226.8	2.31
September	212.7	2.26
October	137.8	1.92
November	87.8	1.63
December	76.8	1.55
January	71.5	1.51
February	66.1	1.47
March	89.0	1.64
April	207.3	2.24
May	249.2	2.39

The EAC observed that in case of peaking operation there is sudden increase in the depth by 1.3 to 1.5 m, especially in lean season. This could lead to casualties if people are taking bath in or near to Parsuram Kund Area. It was, therefore, suggested that proper precautionary measures in this regard be suggested.

Comment No.-3 Assessment of impact on free flow of river as well as the tributaries also needs to be studied. Any projects coming up on these tributaries may also be studied. Projects with capacity more than 50 MW only may be covered and the Ministry shall facilitate providing the data to WAPCOS for such projects, if required.

The consultants informed that data of projects proposed on tributaries was not available. Even for most of the projects, even PFR is not available. Hence, this comment could not be responded.

Comment No.-4 Since the area coming under submergence in various projects has a very high tree density. The same could be minimized by reducing the dam heights of various projects. WAPCOS may review reduction in dam height vis-à-vis reduction in submergence area and power potential for some projects.

The analysis has been done for the following three hydroelectric projects:

- Kalai hydroelectric project stage-1
- Hutong hydroelectric project stage-2
- Demwe Upper hydroelectric project

I. Kalai hydroelectric project stage-1

S. No.	FRL (m)	Average Dam height above General River Bed level, m	Optimum Installed Capacity (MW)	Submergence Area at FRL (ha)	Incremental submergence Area (ha)
1	1065.25	148.15	1300	668	-
2	1055.25	138.15	1212	587	81
3	1045.25	128.15	1125	527	60
4	1035.25	118.15	1037	462	65
5	1025.25	108.15	949	409	53
6	1015.25	98.15	861	359	50
7	1005.25	88.15	774	301	58

II. Hutong hydroelectric project stage

S. No.	FRL (m)	Average Dam height above General River Bed level, m	Optimum Installed Capacity (MW)	Submergence Area at FRL (ha)	Incremental submergence Area (ha)
1	714.5	115.37	1200	421.36	-
2	704.5	105.37	1096	360.49	60.87
3	694.5	95.37	992	304.58	55.91
4	684.5	85.37	888	256.22	48.36
5	674.5	75.37	784	219.35	36.87
6	664.5	65.37	680	182.69	36.66
7	654.5	55.37	576	150.22	32.47

III. Demwe Upper hydroelectric project

S. No.	FRL (m)	Average Dam height above General River Bed level, m	Optimum Installed Capacity (MW)	Submergence Area at FRL (ha)	Incremental submergence Area (ha)
1	585	145	1930	1460.72	--
2	575	135	1790	1285.04	175.68
3	565	125	1650	1186.36	98.68
4	555	115	1510	1057.4	128.96
5	545	105	1370	925.64	131.76
6	535	95	1230	828.36	97.28
7	525	85	1080	748.47	79.89

Comment No.-5 During the meeting EAC members pointed out that WAPCOS had conducted the downstream studies for Lower Siang HEP.

There are certain discrepancies in impacts on Dibru-Saikowa National Park due to peaking operation of Lower Siang, Demwe Lower and Dibang multipurpose projects. The same may be relooked and make necessary corrections, if required.

A detailed modeling studies considering HECRAS model was used to assess the *impacts on Dibru-Saikowa National Park due to peaking operation of Lower Siang, Demwe Lower and Dibang multipurpose projects*. For studying the effect of variation due to peaking power generation on Dibru Saikhowa national Park the worst case of 3 hours peaking and 21 hours of non peaking is considered. The effect of individual projects has been considered in addition to cumulative effect of all the 3 projects peaking at the same time.

It was assumed that in the worst case scenario, all the 3 projects are peaking for 3 hours in a day (24 hours) and their peaking time is same. For the balance 21 hours of the day, they will release the mandatory releases. So for the 3 hours peaking of individual/combined projects, a hydrograph having its ordinate at design discharge for all these 3 hours will be impinging on the river at the dam site and downstream contributions of the Catchment area below the respective dam site would add to the discharge. Similarly, for the 21 hours non-peak hours of the day, a hydrograph having its ordinate at mandatory environmental release will be impinging on the river channel just downstream of the dam axis. This would be added by downstream catchment area contributions.

Three River cross sections at Dibru-Saikowa have been considered to study the impact of the flow variations. These sections are named Dibru-saikowa cross section –I, Dibru Saikowa cross section – II and Dibru-Saikowa cross section – III.

The lowest elevations of the Dibru-Saikowa Park at these 3 sections are given in the following table:

Name of Section	Dibru - Saikowa cross section no - I	Dibru - Saikowa cross section no - II	Dibru - Saikowa cross section no - III
Lowest Brahamputra River Elevation (masl)	112.09	108.00	107.89
Lowest Lohit River Elevation (masl)	116.13	114.00	111.25
Lowest Bank elevation; Lowest Elevation of the Park (masl)	125.70	117.30	115.50

Before 1998, the flow scenario of Lohit, Dibang and Siang was different as compared to present day. Before year 1998, Lohit River used to meet with Dibang River and then the combined flow of Lohit and Dibang River used to meet with Siang River

before Dibru Saikhowa National Park. But, from the year 1998 to 2003, the transition of flow path has occurred in Lohit River and as consequence to this, the flow path of Lohit has changed. From the year 2003, Dibang river directly meets with Siang River on the northern boundary and before Dibru Saikhowa National Park while Lohit River flows along the Southern boundary of Dibru Saikhowa National Park and then after passing along the southern boundary of Dibru Saikhowa National Park, flow of Lohit River meets with the combined flow of Siang and Dibang River i.e. Brahmaputra River. The two cases i.e. Flow scenario before 1998 and after 2003 have been considered in the present study.

Five scenarios have been considered in the study for each of the 3 Dibru-Saikowa cross sections for above referred two cases. These scenarios are:

1. When only Demwe Lower HEP is constructed and is doing peaking for 3 hours in a day while Dibang and Siang are flowing in their natural regimes.
2. When only Lower Siang HEP is constructed and is doing peaking for 3 hours in a day while Lohit and Dibang are flowing in their natural regimes.
3. When only Dibang Multipurpose HEP is constructed and is doing peaking for 3 hours in a day while Lohit and Siang are flowing in their natural regimes.
4. All three projects are constructed and are peaking for 3 hours.
5. No Project scenario

The study arrived at the following conclusions:

- As compared to the virgin condition, non-monsoon peaking for the three hydroelectric projects working in tandem causes a maximum water level rise of 0.45 m at Dibru-Saikowa National Park.
- Water level variation remains below the lowest elevation of Dibru-Saikowa National park.

The EAC desired to know the impacts of increase in water level rise of 0.45 m at Dibru-Saikhowa National Park. It was confirmed by WAPCOS that Study Area for Lohit Basin Study was upto Parsuram Kund only. The assessment of impacts Dibru-Saikhowa National Park is beyond TOR of the study and hence, baseline data too was not collected. Therefore, this impact could not be assessed under the present scope.

Comment No.-6 Consolidated recommendations of all the studies may be combined by WAPCOS and presented before the Committee.

Various recommendations have been given as below:

ENVIRONMENTAL FLOWS

Four main seasons are identified along the year:

Season-I - This season is considered as high flow season influenced by monsoon. It covers the months from May to September. The minimum flow during this period is assumed as 30% of average flow (10 daily or monthly).

Season II- This season is considered as average flow period. It covers the month of October in which the proposed minimum flow is taken as 25% of average flow. This period is a transitional period between the wet and dry period.

Season III- This season is considered as low or lean or dry flow season. It covers the months from November to March. The proposed minimum flow is taken as 20% of average flow during this period.

Season IV- This season is considered as average flow period and is same as that of season II. It cover the month of April in which the proposed minimum flow is taken as 25% of average flow. This period is a transitional period between the dry and wet period.

The recommended minimum flows (in cumec) were:

Season	**Kalai HEP Stage-1**	**Kalai HEP Stage-2**	**Hutong HEP Stage-1**	**Hutong HEP Stage-2**	**Demwe Upper HEP**	**Demwe Lower HEP**
I (May to Sep.) (30%)	227.1	343.5	345.8	356.1	305.6	321
II (Oct.) (25%)	116.3	114.4	115.2	118.3	131.3	137.8
III (Nov.-March) (20%)	50	56.7	57.2	58.6	74.6	78.2
IV (April) (25%)	109.6	137.4	138.3	142.0	197.5	207.3

PROVISION OF SEPARATE TURBINE FOR ENVIRONMENTAL FLOWS

- It is suggested that for optimal utilization of lean season environmental flow a separate turbine of appropriate capacity be installed in each hydroelectric project.

- Continuous running of this turbine will ensure optimal utilization of Environmental Flows as well as its assured release. The capacity of this turbine can be estimated as a part of DPR preparation of individual hydroelectric projects.

MANAGEMENT PLAN FOR SUSTENANCE OF FISH SPECIES

Based on the field studies, the following migratory fish species are observed in the study area:

- *Schizothorax richardsonii*
- *Acrossocheilus hexagonolepsis*

- *Tor putitora*
- *Tor tor*

It is proposed to stock the reservoirs of all the projects with fingerlings of *Schizothorax richardsonii* , *Tor putitora* and *Acrossocheilus hexagonolepis.* The rate of stocking shall be 500 per ha.

It is proposed to stock the reservoirs of the following projects with fingerlings of *Tor putitora, Tor tor and Acrossocheilus hexagonolepis:*

- Hutong hydroelectric project, stage-1
- Hutong hydroelectric project, stage-2
- Demwe Upper hydroelectric project
- Demwe Lower hydroelectric project

The rate of stocking shall be 500 per hectare.

CONSERVATION OF FLORA OF UNDER THREATENED CATEGORY

The lower elevations of the basin study area are presently degraded due to high human pressure, large scale lopping and removal of fodder and timber species, grazing, construction of road, etc. Nayar and Sastry (1987-1990) have reported 35 species of rare and endangered plant species from Arunachal Pradesh. Of these threatened species *Acer oblongum* var. *microcarpum, Begonia burkillii, Calanthe manii, Dioscorea deltoidea, Paphiopedilum wardii* and *Phoenix rupicola* have been reported from low hills in the altitudinal range of 300-1200 m. There is a possibility that some of these species may be present in the project area though the present surveys were not able to record these in the field. Thus, it is recommended that a study should be conducted as a part of the CEIA study for proposed projects on these aspects. If these species are observed, then an appropriate conservation plan shall be prepared.

OTHER MEASURES

In addition, other measures covering compensatory afforestation, measures to prevent degradation due to increased labour population and anti-poaching measures too have been suggested.

The following are the observations and suggestions of the Committee –

- WAPCOS should assess the feasibility of gradually increasing the discharges from off peak to Peaking hours by rescheduling of generation. The EAC suggested that WAPCOS should assess the feasibility of ramping in slots of 1 hour, i.e. increasing the discharge from off-peak to peak flows low over a duration of 1 to 2 hours.

- During peaking operations there is sudden increase in the depth by 1.3 to 1.5 m, especially in lean season in Parsuram Kund Area. Proper precautionary measures in this regard be suggested by WAPCOS to avoid casualties to people to take bath in or near to Parsuram Kund Area.

- WAPCOS is to furnish detailed reply/clarification to the issues raised by the NGO Pareeneeta Dandekar:

- The variation of water level in lean months at cross section I (taken as an example, situation may be similar at other cross section as well) when all the three projects would be operational is from 118.56 m (at the time of peaking) to 116.22 m (at non-peaking) while in virgin condition (no project) it is 118.01m. This variation would be taking place on a daily basis. The consultant has did not touch upon the issue of the variation and projected this as an increase in the water level by 0.55m (118.56-118.01) and underplayed it as just an increase of 55cm in water level and comparing it with the bank height of the Dibru-Saikhowa island at the cross section I (125.7m) said that the island would not be submerged. WAPCOS to explain/elaborate as to how the bank can be at much higher level than the river level.

- Dibru-Saikhowa National Park (DSNP) is an area dominated by riverine vegetation and is known for its aquatic, wetland and marshy habitat. The water-land edge (shore line) is one of the most productive and biodiversity rich habitats in wetlands with a lot of unique species. Banks and islands of large rivers in India have a dynamic character which gets washed off/flooded every year and then there is a re-growth and succession of vegetation and other components of the habitat which flourishes during the rest of the year. Many of these areas owe their existence to the marginal height difference with the near stable or very slowly changing water level. For example; mudflats (flat islands of mud) emerge out of water surface in winter/spring providing breeding habitats to a multitude of birds such as Terns, Skimmers and Pratincoles. These mudflats are usually a few centimetres above the water surface of the sluggishly flowing rivers in the plains. Its proper safeguard therefore needs special attention and impacts adequately predicted by WAPCOS.

- If the water level keeps fluctuating from 116.22m to 118.56m on a daily basis, it may have adverse effect on all such habitats and associated flora and fauna. It may also lead to increased erosion of the banks with daily surge of increased water-level. It would therefore, be important to assess the extent of such habitats in DSNP and the associated flora and fauna. The approximate area of it can be assessed in the GIS platform while an ecological study can help in assessing the flora and fauna particularly the RET species affected.

- Abrupt peaking discharge is highly devastating for assemblage of biotic communities, fish seed & juveniles hence need suitable mitigation measures to maintain downstream ecology and fisheries.

- Depths of flows are given but corresponding channel widths are not given n-value of 0.04 is taken from Chow. It is to be clarified/explained as to whether it could be found from prototype data or from model study from CWPRS.

Agenda Item No. 2.6: Jelam Tamak HEP (108 MW) Project in Chamoli District of Uttarakhand by M/s. THDC India Ltd – for Environmental Clearance

The project proponent made a detailed presentation on the project and the following emerged:

This is a run-off-the-river scheme. The project is proposed on Dhauliganga river (a tributary of Alaknanda river) for generation of 108 MW of hydropower. The barrage site is near Jelam village (latitude $30^0$37'35.4" N; longitude ($79^0$49'39.5") and powerhouse is located near Tamak village (latitude $30^0$36'45" N; longitude ($79^0$47'15"). The total length of HRT is 4.4 km. Total catchment area at barrage site is 1666 sq. km. Out of which snow bound area is 879 Sq. km & rain-fed area is 787 Sq. km. The total land requirement is 96.27 ha. Out of which 9.8 ha is van panchayat land and 7.98 ha is private naap land. An underground powerhouse is proposed near Tamak village with 3 units of 36 MW each. The distance between TWL of upstream Malari Jelam HEP and tail end of reservoir of Jelam Tamak HEP is 1.0 km while distance between TWL of Jelam Tamak HEP and tail end of reservoir of Tamak Lala HEP is nearly 200 m. A total of 14 villages are likely to be affected by the project. A total of 94 families are directly affected out of which 31 families are displaced. The total cost of the project is about 1290.25. crores and will be completed in 52 months.

The project proponent presented detailed discharge data for Jelam Tamak HEP and was extrapolated from downstream site for 35 years. The average discharge at barrage site ranges from 12.01 cumecs in February to 111.19 cumecs in July. The 10-daily water discharge in 90% dependable year (1971-72) ranges from 12.9 cumecs in February to 64.7 cuemcs in June. Likewise 10-daily water discharge in 50% dependable year (1996-97) ranges from 6.7 cumecs to 135.8 cumecs. Four (4) tributaries namely Dunagiri (LB) unnamed (Lb), Jumma Gad (RB) and Bhosing Gad join Dhauliganga between barrage site and powerhouse site. Dunagiri is largest tributary, join at 0.52 Km downstream. The water discharge in Dunagiri ranges from 1.17 to 10.67 cumecs.

The geology of the catchment area is characterized by Central Crystalline group related to Ragsi, Josjimqath, Pandukeswar and Badrinath formations. The rocks exposed around the project area are regionally metamorphosed high grade metasediments with Paleoproterozoic intrusive granite gneiss and younger granites.

The entire project area lays in Seismic zone-V. Soil association Lithic Cryorthens – Lithic Cryorthens is predominat in the catchment. The soil is shallow, loamy on steep slopes and prone to very severe erosion. In the influence area Typic Cryorthens – Lithic Cryorthens soil association is predominant. The soil is prone to severe erosion.

The land use and land cover in the catchment snow bound area is 37.97%. Dense forest and open forest constitute 20.39% of the total catchment. In influence area snow bound area is 14.25% while open forest is most predominant land use category comprising 31.24% of the total area. Dense forest in influence area is 22.61%.

The forest present in the catchment area comprises moist deodar forest, mixed coniferous forest and sub alpine birch fir forest. There are nearly 196 species (147 genera, 59 families) of angiosperms and 7 species (7 genera, 4 families) of gymnosperms in the free draining catchment area. A total of 113 species of plants (angiosperm and gymnosperm) including trees, shrubs, climber, herbs, etc were recorded during ecological survey. No rare and endangered species were recorded from the project area. However, some threatened and medicinally important species like *Allium stracheyi, Saussurea costus* and *Taxus baccata* were spotted in the influence area. Fauna in the catchment and influence area is represented by 30 mammalian, 64 birds, 5 herpetofauna and 17 butterfly species. The catchment area is inhabited by many high altitude threatened species like musk deer, Himalayan Tahr, Bharal, black bear, snow leopard, Himalayan monal, chir pine etc. In and around the project area Goral, Rhesus macaque, Asian jackal and Kaleej pheasant are common species.

The Jelam Tamak project lies in the buffer zone of Nanda Devi Biosphere reserve. The aerial distance between Project area and core zone (Nanda Devi National Park and Valley of Flower National Park is more than 15 km.

The analysis of physical, chemical and biological characteristics of Dhauliganga river revealed that water quality is good and there is no point source of organic pollution. The water quality stands for the desirable limit as per ISO:10500 except turbidity in monsoon season. River water harbours about 101 species of algae and more than 20 genera of macro-invertebrates. River stretch of Dhauliganga is identified as ‘no fish zone’.

The environmental flow assessment has been carried out to target the biotic communities in the river and other socio-economic aspects in the downstream. The area is considered as ‘no fish zone’, therefore, the target groups in the downstream are algae and macro-invertebrates. The water discharge of 2.97 cumecs has been proposed to release from the barrage site in lean season and non monsoon season, in the monsoon season 5 cumecs water is proposed from the barrage site. The simulation results of proposed flow in the downstream indicated that average current velocity, average surface width and maximum depth in the downstream would range from 0.85 to 1.74 m/s, 20.68 to 41.39 m and 0.15 to 1.02 m, respectively.

Environmental Management Plan (EMP)

Six (6) muck disposal sites have been identified with a total area of 9.94 ha for dumping a total quantity of 751180 m^3 of generated in the project are proposed. The estimated cost for the muck disposal is Rs. 771.44 lakhs.

The Waste Management Plan has been proposed considering the number of migrant workers, technical staff. The solid waste and liquid waste generated will be 4,38,000 Kg/annum and 8,76,00,000 liters/annum respectively. Various waste management measures to be implemented are proposed to mitigate the potential impacts during and after the project completion with a financial layout of Rs. 249 lakhs.

Fuel wood and energy conservation is another crucial plan considering the number of migrant workers, technical staff. Total financial outlay for this plan is Rs. 50.00 lakhs. The development of public health delivery system is one of the measures of peripheral development taken by project authorities. In order to provide adequate medical facilities in the region a total financial package of Rs. 285.50 lakhs is proposed.

Besides, Landscaping and Restoration is yet another plan proposed in the EMP. After the completion of the construction work, it is required to restore the disturbed area to its original condition. A total area of 13.31 ha of land will treated under this plan with a financial allocation of Rs. 121 lakhs.

The catchment area treatment (CAT) plan has been proposed to minimize the soil erosion in the free draining area and to maintain the reservoir health condition. The CAT plan comprises of various biological and engineering measures to minimize the soil erosion in the free draining and thereby maintaining the reservoir health. A total of 1137.26 ha of land of the free draining area will be treated under CAT Plan with a financial allocation of Rs 773 lakhs. The Biodiversity conservation plan is aimed to conserve the natural resources and to circumvent the stress on biodiversity.

The river is devoid of fish due to adverse climatic conditions. Due to creation of reservoir, it is proposed to develop reservoir fishery with other indigenous Himalayan fish species in the area. Total budget for this purpose is Rs. 15 lakhs.

The major impacts cause in the project area is socio-economic of the people living in the project area. Therefore, Rehabilitation and Resettlement plan has been proposed to resettle the affected persons and restore their livelihood. Ninety-four 94 families will be affected and 31 families will be displaced. A total of Rs 1854 lakhs is proposed for R& R policy. Furthermore, various other plans are proposed for management of Air and Water quality, Restoration of Quarry and Borrow sites, Disaster Management Plan and Good Practices. Total cost for environmental management plan is Rs. 5152.17 lakhs only.

The project has been discussed several times between 2005 and now. The two major contentious issues of leaving a free stretch of at least 1 km between contiguous projects and seasonal releases from environmental considerations had defied solution until the last EAC meeting of April 2012. Reading through the current documents, it is seen that all the conditions stipulated by EAC in these regards could be favourably met, albeit at certain amount of loss in power generation. While this has been stated in the text of the documents, it could not be located in terms of actual data/pertinent information. The details need to be submitted to the EAC for perusal.

After detailed deliberations, the committee observed the following:

(i) The compliance of TOR should be provided.

(i) The effect of Chamoli earthquake and measures undertaking for the design of major project component viz. barrage and powerhouse of the project needs to be examined seismically. Besides change in water level due to dam breach, show also the areas likely to be affected in plan due to dam break and GOLFvb 21.

(ii) The project site is located in the high seismic zone with Main Central Thrust (MCT) in the south dominated with thrust type faulting. It is estimated that a zone factor of 0.36g will be considered for the seismic design. In view of above, the site specific seismic study is quite essential. Since the large numbers of seismic records are being collected, therefore, the depth sections are necessary to understand the past seismicity with their depth and magnitude details. The regional scale seimo-tectonic map (GSI) does not provide the behaviour of seismicity on the project area.

(iii) The impact of upstream project (Malari-Jelam HEP) should be given on the present scheme/project.

(iv) The SPF is mentioned as 1906 cumec whereas the discharge capacity of the barrage is 4358 cumecs. It needs to be clarified.

(v) There is existence of Dry Deodar Forest instead of Moist Deodar Forest. It should be rectified in the EIA report.

(vi) The forest land is mentioned as 65.49 ha whereas it is reported to be 88.29 ha. It is to be rechecked. Forest protection plan needs to be clarified.

(vii) Whether the Populus trees presented in EIA report are native or alien in flora. And certain endemic plants in the project area missed out in the report. It needs to be incorporated. One of the endemic orchid species likely to inhabit the area is also not mentioned. The list of the plant species should be provided family-wise and plant species should be provided component-wise.

(viii) List of cryptograms is provided in the EIA report but the list of Bryophytes is missing and thus list of Bryophytes has to be provided.

(ix) In the chapter of Floristic elements - it was mentioned that there were no threatened/RET species. However, the project is located in NDBR and there should be many RET species. It needs to be brought in EIA report.

(x) The Compensatory Afforestation Plan needs to be appended in EIA report.

(xi) In the chapter of faunal element references are not properly sited in the bibliography. The source of data to be provided in Tables from secondary sources.

- In the Table 9.3 of EIA report, *Vipera russelli* should be replaced with Himalayan Pit Vipera. It should be rechecked
- In Table 11.1 of EIA report, unit of water discharge to be corrected.

(xii) In the EIA report, number of total affected families are 94, whereas at some places it is mentioned as 86. It needs to be corrected.

(xiii) In R&R chapter of EMP report, Rs.10 lakh scholarship is inadequate. It needs to be increased. The adoption of small families under R&R plan needs to be clarified.

(xiv) A separate budget provision needs to be kept under Local Area Development (LADA) in addition to CSR budget.

(xv) The video recording of public hearing held at project site was displayed during the EAC meeting. The issues raised during public hearing and action taken by THDC may be incorporated in the EIA/EMP report.

(xvi) The area is fish less zone. The need of fish ladder in the barrage shall be decided after final view by EAC.

(xvii) The habitat improvement (schedule I) may be elaborated from this zone. The NDBR Management Plan needs to be followed during the implementation of the project.

(xviii) The mechanism for Joint Forest Management may be specified in the forest protection plan/ EIA report.

(xix) In accordance with MOEF's circular dated 04th August, 2009, the EIA consultant has to give TOR compliance certificate, which has not been given. This is to be ensured.

(xx) The copy of minutes of Public hearing is difficult to read, as some of the portions are illegible. As per EIA notification 2006 draft EIA report is to be put up for public hearing. Thereafter based on the discussion in P.H. the EIA report is to be finalized. However, there is no mention about P.H. in the EIA report. This is to be addressed adequately.

Environmental Impact Assessment (EIA)

(i) In section 9.2.2 some information given, needs to be reconfirmed. This relates to sightings of Argali (*Ovis ammon*), Wolf (*Canis lupus*) and Wild Dog (*Cuon alpinus*) which are not usually recorded from the region. Precise locations of the sighting/indirect evidence of these species may be provided if recorded in primary surveys, else proper references should be provided.

(ii) A crucial reference Arora et al. (1995) is not listed in the bibliography of EIA report which may be provided. Management plans of Nandadevi Biosphere

reserve (NDBR) have not been referred to even though the entire study area falls within NDBR.

(iii) The area is a very low rainfall in the trans-Himalayas and is known for dry deodar bearing forests while in the presentation moist deodar forest type was mentioned to be occurring in the area. This needs to be corrected.

(iv) Amongst reptiles, Russell's Viper is mentioned as a species found in the area which needs to be checked and instead presence of Himalayan Pit Viper needs to be checked and the listing revised accordingly.

Environmental Management Plan (EMP)

(i) Section 11.4.2.1 does not make a mention of the *van panchayats* of the area which are managed by the villagers themselves and civil forests. It is not clear whether the JFM programme would be taken up in civil or reserved forests or both. Since there are very few villages involved, more detailed village specific account of the JFM suggestions need to be given.

(ii) In section 11.4.2.5 instead of watchtower which is not effective in mountainous terrain, tubular hut for the camping of forest guard should be erected. A fund @Rs 2 lakh/year should also be provided as a part of forest protection to help in controlling poaching of wild animals.

(iii) Specific suggestions for the conservation of RET species should be made particularly for those which are present in the project area.

I. EIA Report

On the whole EIA Report is well prepared as far as Environment Chapter is concerned. Methodology is adequate. Illustrations are legible and satisfactory.

However the following points should be addressed in the Report.

(i) There is no specific mention of endemic plants, rare orchid, Rhododendrones and Bryophytes found in Chamoli area which is a big lacuna in the Report. This needs to be addressed.

(ii) **8.3 V**egetation Profile in the Influence Zone: Since we are not familiar with the names of the places mentioned four areas for which the vegetation details are given should be with respect to a particular project component with altitudes.

(iii) **Table 8.1a/b, 8.8:** List of Plant species to be provided in a scientific way. Plants should be arranged family-wise and not alphabetically similar to Table 8.7; the plant species belonging to Gymnosperms/Pteridophytes should be given separately. Please correct the spelling of "Popular" as "Poplar".

(iv) **8.4.5.4 Lower Plant Diversity (Cryptogams):** Although a list of Pteridophytes has been provided it is surprising that no Bryophytes have been recorded while the area has a diversity of Bryophytes as evident from studies conducted by NBRI, Lucknow. Without Records of Bryophytes in the influence zone the study is incomplete.

(v) **8.4.5.8 Endemic and Threatened Flora:** The statement that "no rare and endangered species are reported from the Project area appears to be premature as the area is known to be a Part of Nanda Devi National Park (Buffer Zone) and rich in Biodiversity!!! There should be a listing of Endemic Plant species which are found in the project area.

II. **<u>EMP Report</u>**

Though EMP is adequately written there are a few lacunas as given below which need to be addressed.

(i) Why there is no **Compensatory afforestation Plan** in the EMP Report when 88.29 ha of forest will be affected**?** Tree species which will be affected, especially RET and endemic plants should be part of CAP and BMCP.

(ii) Biodiversity Management & Conservation Plan (BMCP):

(a) 11.4.2.2 Peoples Biodiversity Register: Since preparation of PBR is the mandate of State Biodiversity Board this should be done in consultation of the Board.

- There are discrepancies in the number of project affected families, somewhere it is 94, at other places it is 86. Correct and confirmed number should be given.
- The meagre budget (Rs. 15 lakh) allocated for fisheries management plan is inadequate. Hence need be enhanced substantially.
- An amount of Rs. 25.0 lakh should be provided to the nearby fish hatchery owned by state fisheries department for procurement of Hatching Troughs, Hatching Trays, Feeding Troughs and development of rearing facilities for *Schizothorax richardsonii*.
- Further an amount of Rs. 15.0 lakh should be allocated for procurement of a Pick –up Van with required accessories for transportation of fish seed from hatchery to the reservoir site.

- Number of PAF should be correctly enumerated (somewhere it is 94, somewhere 86).

The EAC recommended that the project proponent submits revised EIA/EMP factoring into the above and resubmit for consideration.

Agenda Item No. 2.7 Mawphu HEP (85 MW) Project in East Khasi Hills District of Meghalaya by M/s NEEPCO Ltd – for Consideration TOR.

The Mawphu Hydro Electric Project-Stage II (85 MW) is proposed a location in East Khasi Hills district of Meghalaya state and envisages utilization of the water of the river Umiew for power development on a run-of-river type scheme, harnessing a gross head of about 330.0 m. The project is proposed to be developed by NEEPCO. The proposed dam is located at a river bed level of 499.50 m, 1.25 km downstream of the Surface Power House of proposed Mawphu HEP (85 MW). The diversion site is located at Latitude 25º19'27"N, Longitude 91º38'08"E.

The nearest villages to the dam site are Mawphu village (on the Left Bank) and Thieddieng village (on the Right Bank). The project site is approachable from Shillong by road (via Shillong–Mawsynram State Highway) for a distance of 58.00 km up to Mawsynram and further 11.00 km upto Thieddieng village. From Thieddieng village both dam and power house sites are approachable by foot track. The nearest rail head and Airport is located at Guwahati (100 km from Shillong).

The Mawphu HE Project (Stage-II) envisages construction of a 41.55 m high concrete gravity dam with 150 m length at top, across the River Umiew to provide a live storage of 111.70 ham with FRL at El 540.0 m and MDDL at El 525.00 m. The proposed dam have submergence area of 10.625 ha at FRL and a live storage of 1.12 MCM between FRL and MDDL.

A 4.07 km long and 3.25 m dia head race tunnel terminating in a surge shaft A 75 m high, 8.0 m dia surge shaft, a 960 m long, 3.0 m dia penstock, a surface power house having an installation of 2 Francis Turbine driven generating unit of 42.5 MW each operating under a rated head of 300 m and 45 m long tail race channel to carry the power house releases back to the river are proposed.

The Umiew river origintes at EL 1800 m from the south-western slopes of East Khasi Hills District of the Great Eastern Himalayas. The river after traversing the Sohra diversion near Mawlongshella outflows to Bangladesh. The river Umiew drains a catchment area of about 300.0 sq km at the proposed dam site. The entire catchment is rain fed. The water availability for the project i.e. the dependable flows for both 90% and 50% dependable years have been assessed based on the water availability study

carried out in the DPR of Greater Shillong Water Supply Scheme on catchment area proportionate basis for a stretch of 27 years i.e. from 1979 to 2005. The same series was used in the DPR of Mawphu HEP (90MW). The inflow series thus derived is utilized in the Power Potential Studies. Design flood taken as 4370 cumec is actually PMF and not 1 is 100 year flood as stated in the report.
Sediment data should be collected to find new zero elevation and life of reservoir.

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The proposed Mawphu H. E. Scheme will utilize tail water discharge of Umduna HEP including runoff from the intervening catchment. The available inflow data was analysed on 10 daily basis. The inflow of the 90% dependable year has been utilised for computing the power benefits. An installation of 85 MW comprising 2 generating units of 42.5 MW each has been proposed. The energy availability from the project in a 90% dependable year is 360.07 GWhr.

The cost of the Project is estimated at Rs 382.95 crores at March 2010 price level. The project is proposed to be completed in 4.5 years period in all respect.

In course of the presentation, it was informed by the project developer that two projects are proposed upstream of the Mawphu HEP. These are Umjaut HEP (69 MW) and Umduna HEP (90 MW). The free flow stretch between TWL of Umduna HEP and FRL of Mawphu HEP is only 140 m. **In view of this, the EAC pointed out the inadequacy of free flow stretch and asked the project developer to alter the project layout so that the clear riverine free flow between TWL of Umduna HEP and FRL of Mawphu HEP becomes at least around 1 km.**

The average rainfall considered for water availability studies is 3575 mm. The EAC was of the opinion that annual rainfall considered is on the higher side, as annual rainfall in the nearby meteorological stations is recorded lower than 3000 mm. **The EAC thus, advised the project developer to review the figure of annual rainfall and adopt realistic values in design calculations.**

It was observed by the EAC that water availability for the project has been assessed based on the water availability study carried out for the dam project meant for supplying water to Greater Shillong on catchment area proportionate basis. **The project developer was asked to give a proper justification for using this discharge series for the Mawphu HEP. EAC also asked to review the discharge series of upstream project (Umduna HEP) to derive the series for Mawphu HEP, as this will give discharge data with greater accuracy.**

The Developer was informed that the Environmental Flows to be considered shall be 30% of inflows in monsoon season, 20% of average discharge in lean season and 25% of average discharge in non-monsoon non-lean season.

The land requirement for the project is 100 ha, which includes 89.375 ha of private land and 10.625 ha of forest land. The project developer was asked to submit a copy of the application of stage-I Forestry Clearance to the MOEF.

The EAC thus recommended that the project developer submits the PFR incorporating the above suggestions and observations. Form-I and TOR also have to be revised in line with the revised PFR.

Agenda Item No. 2.8: Tuivawl HEP (42 MW) Project in Aizwal District of Mizoram by M/s SPML Energy Ltd – for Consideration TOR.

The proposed Tuivawl Hydro Electric Project is proposed at a location near East Phaileng village in Aizawl District of Mizoram. The co-ordinates of the proposed dam site and powerhouse site are 23º55'33.17"N, 92º59'29.44"E and 92º59'8.77"E, 23º56'55.60"N respectively. Tuivawl River is a tributary of the Tuivai River and Tuivai River flows into the Barak River. The nearest railway station is Bairabi located in Kolasib district at a distance of about 232 km from dam site. The nearest road is NH-54 up to Seling Point, at a distance of about 79 km from dam site. The capacity of the project is less than 50 MW. But, since State Environmental Impact Assessment Authority (SEIAA) in Mizoram has not yet been constituted, the project developer have approached EAC for River Valley projects of Ministry of Environment and Forests for Prior Environmental Clearance.

The dam site, is located about 28 km from East phaileng village, which is at a distance of about 450 m downstream of the confluence of the river Tuivawl with Tuitual Lul and about 26 km upstream of its confluence with Tuivai River. The catchment area of Tuivawl River at the dam site is 644.98 km^2 and lies between coordinates 23º25'N to 24º0'N and longitudes 92º55'E to 93º05'E. The FRC and MDDL have been fixed as 380 m and 339 m respectively. The Maximum Water Level (MWL)has been fixed at at EL 382.0 m.

New zero elevation after 70 years is 330m and the intake RL is 331.97m. As such substantial amount of sediments will enter the HRT. So provision for either Higher intake or desanding device may be adopted.

The power house of Tuivawl Hydroelectric Project is proposed on the north east Phaileng village and east of Kepran village, at an aerial distance of about 7 km from East Phaileng and about 5 km from Kepran on the left bank of the Tuivawl River.

The project envisages construction of an Earthfill dam to be located 450 m downstream of the confluence of river, Tuivawl and Tuituai Lul. The gross storage capacity is 125 MCM at FRL at EL 380 m. The maximum dam height is 110.60 m above the deepest foundation level. The total length of the dam along the axis is 299.36 m.

The project envisages construction of concrete spillway in the left bank of earth fill dam including a chute spillway with stilling basin, Ogee type overflow section with radial gates and crest elevation overflow section at EL 362 m.

The water conductor system is situated on the left bank comprising of a Modified horse shoe Head Race Tunnel of 3.85 m diameter and 3.165 km length. Two adits of 4.5 m diameter each, having length of 208 m and 113 m respectively are also proposed. An open to air restricted orifice surge shaft of 8.5 m diameter and 72 m height will also be constructed as a part of the project. An underground steel lined pressure shaft of 2.9 m diameter with 102.05 m in the vertical part and total length of 249.96 m (88.61 + 161.35) in the horizontal part.

The surface power house with dimensions of 49.6 m x 15.1 m is proposed to be located on the left bank. Three nos. of Francis type turbine of 14 MW rating with synchronous speed of 600 rpm along with vertical generators of 11 kV, 50Hz. The power station of Tuivawl H.E. Project shall operate as a Storage scheme. The design discharge shall be 30.04 cumec. The net operating head corresponding to the design discharge at FRL 380.0 m shall be 158.10 m. The total annual energy from the project after allowing for 95% machine availability in the 90% dependable year is estimated as 225.30 MU, and the net saleable annual energy, considering 1% for auxiliary consumption and transformation losses and 13%.

During the meeting, it was confirmed by the project developer that rainfall data for the catchment area is not available. The data from IITM website for Aizawal site has been used This was necessary as no data is available for the basin area. In the hydrological studies, the average rainfall was taken as 2776 mm. The EAC advised the project developers to review the figure of annual rainfall.

The discharge series for the project has been derived after extrapolating the discharge series of Tipaimukh dam. The EAC observed that Tipaimukh dam has a much larger catchment and hence, it would be grossly erroneous to use flow series used for Tuivawl project. It was informed by the project proponent that hey have

established the G&D site and rain gauge station near the site. The EAC advised to revise the hydrology of the PFR and compare the IITM rainfall data with the observed data. EAC also asked project developer to compare the derived flow series with the observed data. The observed data of rainfall and daily discharge along with IITM data should also be submitted to EAC.

It was observed that even in the monsoon season, peaking power will be available only for few hours. EAC also recommended reducing the installed capacity of the project, so that peaking operation is available at all times during monsoon season.

The land requirement for the project is 650 ha and the entire land is forest land. EAC recommended to explore the possibility of changing from the present storage scheme to the run of the river scheme. This would reduce the submergence area and the overall land requirement. The EAC also asked the developer to reduce the proposed colony area to be developed, which in the present proposal is 150 ha. It was also suggested to shift the location of colony to non-forest area. This will help reduce requirement of forest land.

. The Environmental Flows to be considered shall be 30% of inflows in monsoon season, 20% of average discharge in lean season and 25% of average discharge in non-monsoon non-lean season

The project developer was asked to submit a copy of the application of stage-I Forestry Clearance to the MOEF.

The EAC recommended that the project developer submits the PFR afresh incorporating above observations and suggestions. Form-I and TOR also have to be revised in line with the revised PFR.

Agenda Item No. 2.9: Ar-Kacheri Larger Minor Irrigation Project in Buldana District of Maharashtra by M/s Minor Irrigation Division, Vidarbha Irrigation Development Corporation, Government of Maharashtra – for Consideration TOR.

The project proponent made a presentation. The committee noted that this is a **Category-B** minor irrigation project. The project is submitted to Central Level because submergence area of 252 ha land is involved. The Ambabarva Sanctuary is within 10 Km radius of the project area. The project envisages construction of 20.08 m high and 4045 m long earthen dam across Kacheri nalla (tributary of river Purna) near Alewadi village to store 13.1030 Mm^3 of water and utilize 11.132 Mm^3 of water for irrigating 1168 ha of land and 1.7620 Mm^3 for drinking water purpose to nearby villages. The gross command area (GCA) is 1825 ha and culturable command area is 1160 ha. The storage

of this project will be utilized to develop 1168 ha of land by flow irrigation. Total catchment area is 27.05 Sq.km. Total land requirement is 299 ha. Total submergence area is 252 ha., which is a private land. No forest land is involved. Total project cost is about Rs. 4751.37 lakhs.

During the discussions, the project proponent admitted that the construction work had already been started. Therefore, the committee noted that a violation has occurred in the project as EAC can consider only fresh proposal beginning from scoping as stipulated vide EIA Notification, 2006.

The EAC was further informed that such cases are to be dealt in terms with the MoEF OM No. J-11013/41/2006-IA.II (I) dated 12.12.2012. Accordingly, the project proponent is required to submit an affidavit with an undertaking not to execute works without obtaining environmental clearance and furnish photographs of the site from all four sides of the project.

The committee mentioned that the extant procedure may be followed in the Ministry to deal with/examine such cases at the first instance. EAC may consider such proposal on the event of such decision to be taken by the MoEF at appropriate level.

The project proponent admitted that the construction work had been started as they were not aware of requirement of such clearances. It was also informed that State Forest Department has asked to stop work in the project.

In both the Projects, in PFR Chapter VIII on Submergence, Population affected has been shown as 'Nil', but it cannot be so, since private land will be affected. This should be corrected.

Agenda Item No. 2.10: Alewadi Larger Minor Irrigation Project in Buldana District of Maharashtra by M/s Minor Irrigation Division, Vidarbha Irrigation Development Corporation, Government of Maharashtra – for Consideration TOR

The project proponent made a presentation. The committee noted that this is a **Category-B** minor irrigation project. The project is submitted to Central Level because submergence area of 184 ha land is involved. The Ambabarva Sanctuary is within 10 Km radius of the project area. The project envisages construction of 21.05 m high and 3380 m long earthen dam across nalla (tributary of river Purna) near Alewadi village to store 10.756 Mm^3 of water and utilize 4.523 Mm^3 of water for irrigating 750 ha of land and 2.34 Mm^3 for drinking water purpose to nearby villages. The gross command area (GCA) is 1333 ha and culturable command area is 1000 ha. The storage of this project will be utilized to develop 750 ha of land by flow irrigation. Total catchment area is 45

Sq.km. Total submergence area is 184 ha., which is a private land. No forest land is involved. Total project cost is about Rs. 3832.61 lakhs.

There is no mention of design flood for the waste weir and the size of channel which transfers water to another basin

During the discussions, the project proponent admitted that the construction work had already been started. Therefore, the committee noted that a violation has occurred in the project as EAC can consider only fresh proposal beginning from scoping as stipulated vide EIA Notification, 2006.

The EAC was further informed that such cases are to be dealt in terms with the MoEF OM No. J-11013/41/2006-IA.II (I) dated 12.12.2012. Accordingly, the project proponent is required to submit an affidavit with an undertaking not to execute works without obtaining environmental clearance and furnish photographs of the site from all four sides of the project.

The committee mentioned that the extant procedure may be followed in the Ministry to deal with/examine such cases at the first instance. EAC may consider such proposal on the event of such decision to be taken by the MoEF at appropriate level.

The project proponent admitted that the construction work had been started as they were not aware of requirement of such clearances. It was also informed that State Forest Department has asked to stop work in the project.

In both the Projects, in PFR Chapter VIII on Submergence, Population affected has been shown as 'Nil', but it cannot be so, since private land will be affected. This should be corrected.

Agenda Iem No. 2.11: Revision of capacity of Yamne Stage-I HEP from 60 MW to 135 MW Project in Upper Siang District of Arunachal Pradesh by M/s SS Yamne Power Pvt. Ltd – for revision of TOR.

Yamne Stage -II Hydro-electric Project of 135 MW, by M/s SS Yamne Power Private Limited, a Run-of-River scheme with diurnal pondage is proposed on the Yamne river, between EL $\pm$735m upto EL$\pm$ 565m in the Upper Siang district of Arunachal Pradesh. The dam site is located about 400 m downstream of Yamming river confluence with Yamne River, a left bank tributary of Yamne River. The project comprises of a 47 m high Dam from average river bed level with 4 no. spillway and controlled by radial gates. A surface powerhouse is proposed on the left bank of river Yamne. The design energy shall be 602 million units (MU) in 90% dependable year at 95% plant availability. The total catchment area up to the barrage site is 625 sq km. The

project was appraised in the 65th meeting of Expert Appraisal Committee for River Valley Projects and Hydropower Projects held on 23.3.13.

EAC noted that total land (including Forest, Community land with vegetation cover, Community Private Land (Agricultural/Jhum), River bed area etc) required for construction of the project is around 493.50 ha, of which 10 ha is private land with agriculture cover, 138 ha comprises of Private land and 345.5 ha comprises of land with forest cover. Total submergence area is about 225 ha. Total area required for muck dumping is around 52 ha.

It was suggested by EAC to locate the muck dumping area as per MoEF guidelines i.e. in non- forest area. Project developer informed that actual land requirement shall be finalized after the actual survey during DPR/EIA report. National Parks/Wildlife Sanctuaries/Biosphere Reserve/Historical Monuments are not located with-in 10 km radius of the project.

EAC suggested to review the length of Head Race Tunnel from 11.3 km in DPR phase; as this shall make the river dry for long stretch. EAC also suggested reviewing the dam height in DPR phase so as to reduce the submergence area.

EAC sought approval letters from State Govt. pertaining to change in Tail water level of project from El. 630 m to El. 565 m. As per the MoA finalized with state government of Arunachal Pradesh, river reach allotted to developer for development of Yamne stage I HEP is till El. 600m only. The project developer informed, as downstream stretch is also allotted to same developer from El. 600m to El. 400m therefore, requested EAC to accept the proposal in ToR.

The requisite formal approval letters shall be submitted by the developer in due course after the approval of TWL by concerned statutory authority and also shall be incorporated in EIA/EMP reports.

EAC sought clarifications on methodology of deriving the Long Term series for discharge data. The Developer informed that the series has been developed by developing run-off relationship with adjacent right bank Siyom basin Raying and Pangin stations available discharge and rainfall data and has been since approved by CWC The installed capacity is worked out based on approved series which resulted to 135 MW installed capacity.

For confirmation and assessment of availability of design discharge at project site, EAC called for observed discharge and rainfall data at project site being monitored by the project developer.

It was confirmed during the meeting that Yamne stage I is upper most development on Yamne river and at present between Yamne stage I HEP with TWL as

El. 565 m and downstream Yamne stage II HEP with FRL as El. 536 the free stretch is 3.68 km.

Regarding minimum flow, the developer informed that for sustenance of the aquatic life a 20 % of the average lean season flow of the 90 % dependable has been adopted for which 3.35 cumecs shall be released and power potential studies are being done at PFR stage considering same resulting in Installed capacity of 135 MW with design energy of 602 MU. The EAC recommended that an estimate for the environmental release in monsoon and non-monsoon-non lean seasons should also be carried out considering the current norms of MoEF. By considering the monsoon and non-monsoon non- environmental release, the reduction in design energy, design discharge and Installed capacity will be estimated by the developer in DPR studies and got approved by statutory authorities concerned.

EAC was of the opinion that since the project has been shifted to new site, a fresh 3 season field studies needs to be conducted. However, data collected earlier can be used to the extent possible.

Regarding sediment load, it was suggested by the EAC to conduct sedimentation studies for removal of silt by regular flushing methodology and reservoir of 4 km length acting itself as de-silting basin, as being proposed in PFR. For flood calculation the PMP and PMS value collected from IMD, shall be included in the DPR.

EAC also recommended to establish micro seismic earthquake monitoring stations at project site and collect the data for 1 year and include the data in DPR.

EAC also recommended to include land required for green belt development in the overall land requirement for the project. The Developer assured that the Greenbelt development plan shall be covered in EIA/EMP report

After detailed deliberation and clarifications, the EAC recommended to resubmit the proposal factoring the following:

- The installed capacity of the HEP is reworked out to a realistic level factoring release of minimum environmental flow required to be released during all major three seasons. Notwithstanding a downstream study to be commissioned, the minimum environmental flow release would be 20% of average of four lean months of lean period, 20-30% of flows during non-lean and non-monsoon period and 30% of average flow including spillage during monsoon period corresponding to 90% dependable year. The EAC observed that the capacity will obviously get reduced to factor this aspect.
- Length of diverted stretch of river may be reduced to ensure that minimum length is subjected to drying up. This could be done by exploring possibility to reduce length of 11.3 km long HRT.
- Approval letters from State Govt. pertaining to change in Tail water level of project from El. 630 m to El. 565 m has to be produced.

- New influence area/study area due to shifting of dam site
- Observed discharge and rainfall data monitored at project site to be submitted to EAC.

In addition, the following additional conditions will have to be complied:

- Three season field studies to be conducted as per revised layout.
- A free flow stretch of 3.68 km shall be maintained between TWL of Yamne Stage-I HEP and FRL of downstream Yamne Stage-II HEP.
- Micro-Seismic Earthquake monitoring station to be established and data for 1 year to be collected and included in the DPR.
- Area for Greenbelt development to be included in the overall land requirement for the project.
- Lay out plan should indicate desanding arrangement required to eliminate sediments of size greater than 0.2 mm.
- Will it be possible to construct stilling basin 18 m below NSL as shown.
- More data about new zero elevation after 50/100 year of sedimentation should be furnished.

The EAC recommended that the project be resubmitted accordingly for fresh consideration for enhancement of capacity.

Agenda Item No. 2.12: Lendi Major Irrigation Project (Interstate) in Nanded District of Maharashtra and Nizamabad District of Andhra Pradesh by M/s. Godavari Marathwada Development Corporation, Government of Maharashtra – For Reconsideration for Environmental Clearance.

The project proponent made a detailed presentation. This is a joint-venture major Inter-State project on Lendi River providing irrigation and drinking water facility in Nanded District of Maharashtra & Nizamabad District in Andhra Pradesh. The project envisages construction of 27.83 m high (from the river bed) and 1651 m long earthen dam across Lendi river to provide irrigation facility in Maharashtra and Andhra Pradesh States. The project proponent initially mentioned that the project is to provide irrigation facility for 27,000 ha in Maharashtra and 22,000 ha in Andhra Pradesh. Total entire catchment area of 1594 Sq. km falls in Maharashtra State. Total submergence area is 2338.06 ha. Nineteen (19) villages are likely to be affected (fully -10 + partially -2 + lose only agricultural land-7) due to this project. A total of 4643 families consisting of 18,915 persons are likely to be affected due to this project only in Maharashtra State. No person will be affected in Andhra Pradesh. Total project cost is Rs.554.54 Crores.

This project was earlier considered by the EAC in its meeting held on 11-12th November, 2011. During the discussions, the committee noted that the non-availability of adequate environmental flow in the river both in the monsoon and non-monsoon

seasons after abstraction of water for irrigation. A reservoir working table for 75% dependable year was necessary for clearly exhibiting the release into the river on a 10-daily basis. The EAC sought that a clear indication of environmental flow with supporting hydrology along with the 10-daily discharge table to be provided to get a clear picture of water availability in the project.

The project proponent has mentioned that the total catchment area is 1594 Sq. km with a total yield is 241.30 Mm^3 (8.52 TMC). The annual utilization is 180.11 Mm^3 (6.36 TMC). The average annual rainfall is 838 mm. Total submergence area is 2338.06 ha. The project envisages construction of 27.83 m high (from the river bed) and 1651.40 m long earthen dam with masonary spillway across Lendi River. The total length of the common canal is 19 Km. The length of the canal in Maharashtra is 28.46 Km and length of the canal is Andhra Pradesh is 35 Km. The gross command area (GCA) is 32,410 ha; culturable command area (CCA) is 28,286 ha and irrigable command area (ICA) is 26,924 ha (Maharashtra- 15,710 ha + Andhra Pradesh -11,214 ha). Total Total land requirement for the project is 2569.42 ha. Nineteen (19) villages are likely to be affected (fully -12 + partially -7) due to this project. A total of 5731 families consisting of 30,680 persons are likely to be affected due to this project only in Maharashtra State. No person will be affected in Andhra Pradesh. The project cost is Rs.554.54 Crores.

It has been shown that the 75% dependable yield is 241.30 Mm^3. After considering the up-stream utilization of 85.52 Mm^3, the net yield is only 155.78 Mm^3. The irrigation requirement is 180.11 Mm^3 and the shortage of 24.33 Mm^3 is supposed to be met by groundwater supplementation. With this scenario, it appeared that during monsoon, there will be hardly any spill into the river. Thus, the committee mentioned that a 10-daily simulation table (reservoir working table for the 75% dependable yield) with release towards environmental flow will be exhibited and presented in detail keeping in view of the aquatic biodiversity and downstream user needs.

Doubts were expressed on the adequacy as to how the reservoir will be filled-up with 75% DY flow scenario. The committee is of the opinion that perhaps a smaller reservoir will be adequate requiring less submersion (i.e. 2338 ha of area) than 19 villages now getting affected and 12 villages are fully resettled. The proponent could not provide convening facts/figures and analytical data to substantiate this. The committee also enquired about the details of hydrology and irrigation planning clearance from CWC.

After thorough scrutiny and examination of all environmental related issues, the committee sought additional information/clarifications on the following:

(i) The overall irrigation efficiency has been brought down to a more reasonable value of 50% from the earlier 65.52%, on the basis of CWC guideline (Page 137 Vol. I). But, no field-measured value of the conveyance and the field application efficiency

from some of the currently operational irrigation projects are given, as was desired by the EAC. In the period intervening between the earlier presentation and now, it should have been possible by the department to get some firsthand data on these.

(ii) The lean season flow release to the D/S is 0.504 m^3/s (Page 148 Vol. I). But the corresponding flow depth and velocity are not mentioned. It has also not been clarified as how such a small flow was considered adequate to sustain aquatic life, when the pristine flow might have been much higher. Besides, the average daily flow (or 10-daily flow) in seasons other than the lean season also needs to be given to understand the river condition D/S of the point of diversion of water elsewhere for irrigation. In fact, the replies listed on Page 148 Vol. I, are more qualitative than quantitative.

(iii) According to Compliance Report (Page 2 Vol. I), details regarding 'adoption of efficient methods of irrigation' are supposed to be in Page 115 of Chapter 8. But there is no such page in Chapter 8 (it starts from Page 131). In Page 115 of Chapter 5, the issue is cursorily mentioned as a statement of a known fact and is for Andhra Pradesh. No such reference is found for the Maharashtra part in Chapter 5. In Maharashtra part also there are loamy sand and sandy soils at Sultanpet and Chainpur, where continued flood irrigation may be harmful in the long run. Thus, the committee gets a feeling that the important issues of scientific irrigation water management and adoption of water saving irrigation methods have been glossed over. This is undesirable in the current times of fresh water scarcity and in the progressive states of Maharashtra and Andhra Pradesh. The proposed cropping pattern in Maharashtra (Page 19 Chapter 1, Vol I) implies that at least for some percentage of the Sugarcane, Chilli and Groundnut (Total area 19% of the total), introduction of advance irrigation methods would be beneficial.

(iv) According to Compliance Report, (Item 3, Page 3), Pages 8 and 13 of Chapter 8 is supposed to have discussions on adverse impacts on ground water due to continued in-efficient flow irrigation. As mentioned earlier, the first page in Chapter 8 is numbered 131 and hence, the information given is misleading. The related text found in pages 140 to 144 are imperative in nature and no concrete plan for amelioration of groundwater table rise is found in the text. A concrete plan implies a plan of development of groundwater, year-wise phasing, budget, etc. are to given

(v) In Page-16 of Ch 1, Page-153 of Ch-8 and Pages 98-100 of Chapter 16 do give some secondary data on groundwater table, area irrigated by groundwater, etc., (Vide Compliance Report Page-1), but this was not asked during the earlier presentation. This is very clear from the text at Item 4 of Page 1. Thus, the committee has also a feeling that the Compliance Report has been prepared just as a formality and the issues raised have not been meaningfully addressed with work plans that can be monitored in terms of their progress.

(vi) The details need to be presented as to how the 75% DY of 9.687 TMC from catchment was derived. Whether it is from rainfall or discharge measurement. The run-off depth is found to be 168 mm and the corresponding run-off factor is 0.2 seems to be very low needs to clarified. And also a computation table should be presented for spillway design flood of 11,660 cumec and its determination.

(vii) Provide inflow series for 75% DY i.e. table showing 75% inflow series, flow diverted for irrigation and drinking water, environmental flow releases and the spill flow.

(viii) The details for sedimentation of the reservoir and separate computations for silting of the reservoir need to be provided.

(ix) The project area lies in Seismic zone-II. However, the design of the project area is planned for higher zone which needs to be explained. The detailed geo-morphological and geological studies are recommended for the project area.

(x) A good location map with FCC should be provided to show all the project components. An Index map showing the location of the project in Maharashtra and Andhra Pradesh needs to be provided.

(xi) Chapter-2 of EIA – detailed methodology needs to be provided for each parameter studied in the project. Vegetation data should be given first and thereafter ecological data should be presented. The documentation of forest types in the catchment area and their tree flora should be given.

(xii) Chapter-9 of EIA – Ecological Studies - detailed methodology followed for vegetation studies including altitudes for various sampling sites data should be presented.

(xiii) The documentation for trees, shrubs and herb should be provided. Methodology and sampling details for calculation of *frequency, abundance* etc needs to be given. Details of Shannon-Weiner Index should be given in respective tables along with *frequency, abundance* etc and not separately. The spelling mistakes of the Botanical names (eg. ***Pongamia paniculata)*** should be checked and corrected.

(xiv) The faunal list provided in the EIA report is quite exhaustive. However, specific suggestions for the conservation of RET species have not been included in the EMP. A chapter on Biodiversity conservation plan should be included in the EMP to address this.

(xv) A highly promising Fisheries management plan has been submitted in the report, but the target fish species are not mentioned properly. The details about the construction of fish hatchery and seed stocking plan need further details. Fisheries development activities, organisation of fisher's, conservation of downstream river bed etc. mentioned in the reports need further details.

(xvi) The financial details of the each plan under EMP should be given separately not a consolidated amount/figure.

EAC recommended that the project will be reconsidered after receiving the requisite information/clarifications on the above issues.

Too many discrepancies are there in the total number of project affected families and persons (EIA report page Nos. 263-64, 290, 291). Actual number of PAF should be enumerated as of 2012.

3.0 Any other item with the permission of the chairman

With the permission of the Chairman, the following item was considered:

(i) Luhri HEP in Shimla, Kullu and Mandi Districts of Himachal Pradesh by M/s. Satluj Jal Vidhut Nigam Ltd- for Environment Clearance.

The EAC in its meeting held on 23-24th November, 2012 considered this project with the following broad recommendations/observations:.

1. The river holds cold water mahsheer and snow-trout fishes, which need Flow-through Indoor hatchery system with hatchery trays, through and feeding through. Therefore the Fishery Management Plan needs to be revised with provision of Flow-through hatchery system.

2. A site specific study may be carried-out for establishing the proper environmental flow release during monsoon, non-monsoon and lean months corresponding to the 90% dependable year. Release of minimum environmental flow must mimic the pre-dam flow pattern of the river for sustaining the aquatic bio-diversity together with downstream user need and accordingly, water withdrawal for power generation is to be regulated. A minimum environmental flow of 25% of average four lean season months shall be released. During monsoon period, average release should 30% of the monsoon flow including spillage, during monsoon period and release during non-monsoon and non-lean period should be 20-30% of average flow corresponding to 90% dependable year.

3. A downstream study preferably by CIFRI and WII may be carried –out in a holistic manner to determine the minimum flow required to maintain the ecological integrity of the river taking in to account water requirement for various other downstream use.

The project proponent, in its response, has mentioned that Himachal Pradesh Government has awarded the Cumulative Impact Assessment Study of Satluj Basin to ICFRE who is taking up this study in collaboration with IIT, Roorkee, Directorate of Coldwater Fisheries Research, Bhimtal and Salim Ali Centre for Ornithology& Natural History, Coimbatore. The study also includes Luhri HEP and therefore the outcomes of this study will be binding on the project. Further, based on the environment flow recommendations, the design discharge has now been reduced to 380 cumecfrom 480 cumec as originally mentioned. Therefore, the capacity of the project has now been reduced to 600MW and the project requested the committee to issue EC for 600 MW capacity.

On being appraised accordingly, the EAC in its meeting held on 1-2nd February 2013 desired to know the revised position/status of environmental flow due to proposed change in capacity and whether it will cause any significant impact due to revised and realignment of HRT for example impact on muck disposal and its planning, before taking a final view.

The project proponent, during EAC meeting held on 22-23rd March 2013 was asked to explain these issues. It was clarified that environmental flow release of 177.78 cumes (30%) during monsoon period that is June to Sept, 40.50 cumec (25%) during Non-monsoon Non-liner period I.e. Oct-Nov and April-May and 24.67 cumec (25%) during lean period will be released downstream of the dam in line with the EAC recommendations and to ensure the above Environmental releases a dam toe power house of 24 MW capacity matching with the environmental flow in monsoon will be provided and shall be made operational with the project.

Due to reduced capacity, the project proponent has now proposed a single tunnel of 10.5 m diameter in place of twin tunnel 9 meter diameter each. It was clarified that there will be no change in the alignment of HRT and in numbers and locations of adits. The design discharge for power generation has, however, come down from **480m cumecto 380 cumec**.

During construction phase 99,77,327 m^3 of the muck (with 45% swelling factor) will be generated and 30% of this much will be utilized as aggregate and for creating job facilities. The balance muck 69,84,129 m^3 will be dumped in 13 no originally pre identified dumping sites with a capacity of 90,45,704 m^3 involving total land of 64.728 ha.

The revised DPR with an installed capacity of 588 MW with dam toe power house of 24 MW has already been submitted to CEA. The capacity of the project may vary from 588 MW to 600 MW since the detailed power potential studies are

under finalization by CEA. EAC noted that as long as environmental parameters will remain unchanged, slight alteration in installed capacity may be accepted.

Stage-I approval of the Central Government under the Forest (Conservation) Act, 1980 for the diversion of 271.1577 ha forest land for the construction of project has since been received vide letter F. No. 8-54/2011-FC dated 27.02.13.

In view of the above clarification given by the project proponent on dated 23/03/13 and after the detailed deliberation, the committee was satisfied with the environmental releases by the project proponent and its muck management due to revised capacity and appreciated the concerns shown by the project proponent by reducing the power potential from 775 MW to 600/588 MW to accommodate enhanced environmental flow release. The committee recommended the Environmental Clearance to the project for revised capacity of 588 MW along with a Dam toe power house of 24 MW capacity.

The meeting ended with a vote of thanks to the chair.

Annexure

List of EAC members and Officials of Project Proponents/Consultants who attended 65th Meeting of Expert Appraisal Committee for River Valley & Hydro Electric Power Projects held on 23rd- 24th March, 2013 in New Delhi

A. Members of EAC

1.	Shri Rakesh Nath	- Chairman
2.	Dr. B. P. Das	- Vice-Chairman
3.	Dr. Arun Kumar	- Member
4.	Dr. S. Bhowmik	- Member
5.	Dr. K. D. Joshi	- Member
6.	Dr. (Mrs.) Maitrayee Choudhary	- Member
7.	Dr. S. K. Mazumder	- Member
8.	Dr. A. K. Bhattacharya	- Member
9.	Dr. Praveen Mathur	- Member
10.	Dr. J. K. Sharma	- Member
11.	Dr. Dhananjay Mohan	- Member
12.	Shri B. B. Barman	- Member Secretary & Director, MoEF
13.	Dr. P. V. Subba Rao	- MoEF

B. Papu HEP (90 MW) Project in East Kameng District of Arunachal Pradesh by M/s Papu Hydropower Projects Ltd – for Consideration TOR

1.	Shri M. S. Gusain	-	President
2.	Shri N. D. Arora,	-	Vice President
3.	Shri Narinder Kumar,	-	Manager
4.	Shri Arun Bhaskar	-	Director
5.	Shri Vimal Garg	-	Director

C. Revision of Capacity of Sawalkote HEP from 1200 MW to 1856 MW in Ramban District of Jammu & Kashmir by M/S. J&K Power Development Corporation.

1.	Er. Zahoor Ahmad Chat,	-	Executive Director
2.	Er. Ravinder Nath Bhat,	-	Chief Engineer
3.	Er. Vijay Nagri,	-	Ex. Engineer

D. New Ganderbal HEP (93 MW) in Ganderbal District of Jammu & Kashmir by M/s. J&K Power Development Corporation – For Reconsideration for Environmental Clearance.

1.	Er. Zahoor Ahmad Chat,	-	Executive Director

2.	Er. Ravinder Nath Bhat,	-	Chief Engineer
3.	Er. Meenakshi Raina	-	Assistant Manager
4.	Shri Yamesh Sharma	-	EIA Coordinator
5.	Shri K. K. Gupta	-	Ex. Advisor
6.	Dr. M. A. Khalid	-	CEO
7.	Shri K. Ahmad	-	Manager

E. Lower Kopili HEP (150 MW) project in Karbi Anglong & North Cachar Hill Districts of Assam by M/s. Assam Power Generation Corporation Ltd – for Reconsideration TOR.

1.	Shri Vijayendra,	-	Managing Director
2.	Shri Atul Ch. Boruah,	-	CGMH
3.	Shri U. R. Subramanian	-	Sr. Consultant
4.	Shri Utpal Dutta	-	AGM
5.	Shri Ashok Basistha	-	DGM
6.	Shri R. Kapoor	-	L O
7.	Shri Aman Sharma	-	Consultant

F. Discussion of Basin Study for Lohit River Basin in Arunachal Pradesh by M/s. WAPCOS.

1.	Shri Aman Sharma	-	Consultant

G. Jelam Tamak HEP (108 MW) Project in Chamoli District of Uttarakhand by M/s. THDC India Ltd – for Environmental Clearance.

1.	Shri P. P. S. Mann	-	General Manager
2.	Shri Sanjay Kher	-	Additional General Manager
3.	Shri J. L. Narang	-	Additional General Manager
4.	Dr. D. L. Bhatt	-	Sr. Manager
5.	Shri Rajeev Govil	-	Sr. Manager
6.	Shri Gajendra Singh	-	Sr. Manager
7.	Shri Dinesh Aswal	-	Deputy Manager
8.	Shri J. P. Bhatt	-	Scientist
9.	Shri D. C. Nautiyal	-	Scientist
10.	Dr. Dorje Dawa	-	Scientist
11.	Ms. Sudha Tiwari	-	Research Fellow
12.	Shri Sandeep Aggarwal	-	Sr. Manager
13.	Shri Prabhakaran	-	Assistant Manager

H. Mawphu HEP (85 MW) Project in East Khasi Hills District of Meghalaya by M/s NEEPCO Ltd – for Consideration TOR.

1.	Shri I. H. Hazarika	-	Executive Director
2.	Shri Daya Shankar Rai	-	Head of Project
3.	Shri Kamalendu Deb	-	Manager (C)

4.	Dr. Aman Sharma	-	Consultant
5.	Dr. A. K. Sharma	-	Chief (LAW)
6.	Dr. S. K. Tyagi	-	Chief Ecologist

I. Tuivawl HEP (42 MW) Project in Aizwal District of Mizoram by M/s SPML Energy Ltd – for Consideration TOR.

1.	Shri Amanullah	-	Executive
2.	Dr. Monomoy Gorswami	-	Chief Manager
3.	Shri Dhruva Chakravorty	-	Chief Manager

J. Ar-kacheri Larger Minor Irrigation Project in Buldana District of Maharashtra by M/s Minor Irrigation Division, Vidarbha Irrigation Development Corporation, Government of Maharashtra – for Consideration TOR.

1.	Shri R. B. Shukla	-	Chief Engineer
2.	Shri R. P. Landekar	-	Superintending Engineer
3.	Shri U. M. Padamne	-	Executive Engineer
4.	Dr. C. P. Vibhuti	-	Consultant
5.	Shri S. P. Arankalle	-	Assistant Engineer
6.	Shri A. M. Shejule	-	Sect. Engineer

K. Alewadi Larger Minor Irrigation Project in Buldana District of Maharashtra by M/s Minor Irrigation Division, Vidarbha Irrigation Development Corporation, Government of Maharashtra – for Consideration TOR.

1.	Shri R. B. Shukla	-	Chief Engineer
2.	Shri R. P. Landekar	-	Superintending Engineer
3.	Shri U. M. Padamne	-	Executive Engineer
4.	Dr. C. P. Vibhuti	-	Consultant
5.	Shri S. P. Arankalle	-	Assistant Engineer
6.	Shri A. M. Shejule	-	Sect. Engineer

L. Luhri Project for consideration of Environmental Clearance.

1.	Shri S. K. Sharma	-	General Manager
2.	Shri Arvind Mahajan	-	Additional General Manager
3.	Shri Rajeev Aggarwal	-	Deputy General Manager
4.	Shri Shiraz Swan	-	Sr. Engineer
5.	Shri Ramanuj Verma	-	Officer (Env.)
6.	Shri J. P. Bhatt	-	Scientist
7.	Shri D. C. Nautiyal	-	Scientist

M. Lendi Major Irrigation Project (Interstate) in Nanded District of Maharashtra and Nizamabad District of Andhra Pradesh by M/s. Godavari Marathwada

Development Corporation, Government of Maharashtra – For Reconsideration for Environmental Clearance.

1.	Shri Q. S. Lokhande	-	Chief Executive
2.	Shri K. Sriram Reddy	-	Superintending Executive
3.	Shri V. R. Guvale	-	Advisor
4.	Shri Uewale Adhikrao	-	Consultant
5.	Shri Laxman Sangnor	-	Executive Engineer
6.	Shri S. D. Chate	-	Superintending Engineer
7.	Shri Sanjay Mahajan	-	Secretary Environment

N. Revision of capacity of Yamne Stage-I HEP from 60 MW to 135 MW Project in Upper Siang District of Arunachal Pradesh by M/s SS Yamne Power Pvt. Ltd – for revision of TOR.

1.	Shri Nipun Tayal	-	Project Manager
2.	Shri Manish Das	-	Sr. Engineer
3.	Shri Syed Javed Mohsin	-	Managing Director
4.	Dr. Aman Sharma	-	Consultant
5.	Shri S. T. Sud	-	Consultant
6.	Shri Yogendra Kumar	-	President
7.	Shri R. B. Singh	-	Sr. Manager
8.	Shri Rajendra Singh	-	Advisor Manager