

**MINUTES OF THE 33<sup>RD</sup> MEETING OF THE EXPERT APPRAISAL COMMITTEE FOR RIVER VALLEY AND HYDROELECTRIC PROJECTS HELD ON 29<sup>TH</sup> AUGUST, 2022 FROM 10:30 AM – 2:00 PM THROUGH VIDEO CONFERENCE.**

The 33<sup>rd</sup> meeting of the re-constituted EAC for River Valley & Hydroelectric Projects organized by the Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi, was held on 29<sup>th</sup> August, 2022 through video conference, under the Chairmanship of Dr. K. Gopakumar. The list of Members present in the meeting is at **Annexure-I**.

**Agenda Item No. 33.1**

**Confirmation of the minutes of 32<sup>nd</sup> EAC meeting**

The minutes of the 32<sup>nd</sup> EAC (River Valley Hydroelectric Project) meeting held on 12<sup>th</sup> August, 2022 were confirmed.

**Agenda Item No. 33.2**

**Dugar Hydro Electric Project (500 MW) in an area of 220.62 ha in Luj Village, Chamba District, Himachal Pradesh by M/s NHPC Ltd. – Environmental Clearance (EC) - reg.**

**[Proposal No. IA/HP/RIV/277441/2020; F. No. J-12011/08/2020-IA.I]**

**33.2.1:** The proposal is for grant of Environment Clearance (EC) to Dugar Hydro Electric Project (500 MW) in an area of 220.62 ha in Killar Village, Chamba District, Himachal Pradesh by M/s NHPC Ltd.

**33.2.2:** The details of the project submitted by project proponent and ascertained from the document submitted are mentioned below:

- i. The project is located on river Chenab, near Luj village in district Chamba, Himachal Pradesh which is about 10 km from the nearest town, Killar. The nearest railheads are the railway stations Udhampur and Pathankot. Udhampur Railway Station is in Udhampur city in the Union Territory of Jammu & Kashmir, while Pathankot Railway Station is in Pathankot city in the state of Punjab. The proposed dam site is located at latitude 33°07'05" N and longitude 76°21'20.7"E.
- ii. The MoEF&CC granted Terms of Reference vide letter no. J-12011/08/2020-IA-I dated 5<sup>th</sup> August, 2020 for 449 MW installed capacity. Subsequently, amendment in Terms of reference for revised installed capacity from 449 to 500 MW was accorded by MoEF&CC vide letter no. J-12011/08/2020-IA-I dated 8<sup>th</sup> February, 2021.
- iii. The Dugar HEP is envisaged as a run-of-river scheme with a 500 MW installed capacity located near Luj village for utilizing the flows of Chenab River to harness the head created by constructing a 128 m high dam (from the deepest foundation) with a top length of 210.65 m; and Full Reservoir Level (FRL) and Minimum Draw Down Level (MDDL) levels at 2114.0

m and 2102.35 m. respectively. An underground powerhouse consisting of the main plant of 412MW (4 units of 103 MW) and auxiliary plant of 88 MW (2 units of 44 MW).

iv. Salient features of Dugar HEP are as follows:

<b>Project location</b>	
State	Himachal Pradesh
District	Chamba
River	Chenab
Vicinity	Luj village
Latitude	33° 07' 05" N
Longitude	76° 21' 20.7" E
Nearest rail head; Udampur (J&K)	270 km
<b>Hydrology</b>	
Catchment area	7823 km <sup>2</sup>
Permanent snow fed area	4458 km <sup>2</sup>
Flood discharge for river diversion	2700 m <sup>3</sup> /s
Probable Maximum Flood (PMF)	9425 m <sup>3</sup> /s
<b>Reservoir</b>	
Full Reservoir Level (FRL)	2114 m
Maximum Water Level (MWL)	2114 m
Minimum Draw Down Level (MDDL)	2102.35 m
Gross storage at FRL	61.58 10 <sup>6</sup> m <sup>3</sup>
Live storage	16.57 10 <sup>6</sup> m <sup>3</sup>
<b>Dam &amp; Spillway</b>	
Dam Type	Concrete Gravity
Design flood (PMF)	9425 m <sup>3</sup> /s
Top of the dam	2116 m
Full reservoir level (FRL)	2114 m
Length of dam at top	210.65 m
Maximum height (From deepest Bed Level)	128 m
Total number of blocks	13
Number of overflow blocks	6
Number of non-overflow blocks	7
	Combination of free overflow spillway & sluice spillway
Energy Dissipation Type	Flip bucket
<b>Upper-Level Spillway</b>	
Number	1
Size	8.2 (W) x 11.7 (H) m
Type of Gate	Radial
Size of Spillway Stoplog & Type	8.2m (W) x 11.89m (H)/ Slide m
Head	11.89 m
Energy Dissipation type	Flip Bucket
Sill level	2102.115 m
<b>Lower Level Spillway</b>	
Number	5
Size	8.2 (W) x 10.65 (H) m
Size of Spillway Stoplog	8.2m (W) x 14.7m (H) (1 set of 7 Units) m
Head	62.9 m
Sill Level	2051.1 m
<b>River Diversion</b>	
Diversion Discharge	2700 m <sup>3</sup> /s
Location	Right bank
No. of diversion tunnels	2

Diameter of each diversion tunnel	11.5 m, Horse-shoe shape
Length of diversion tunnel	463.0 m (DT1), 577.0 (DT2)
Invert level at Entry	2022 m
Invert level at Exit	2016 m
Height of upstream coffer dam	23.7 m
Height of downstream coffer dam	13.5 m
Diversion tunnel Gate (type of Gate)	Fixed wheel type
Size of Opening	4.7 m (W) x 11.5 m (H)
<b>Power Intake Main Unit</b>	
Location	Left bank
No.	2
Design discharge per intake	252.475 m <sup>3</sup> /s
Invert level	2083.00 m
C/L of Intake	2087.05 m
Type of Gate	Fixed wheel
Size of gate	6.40 m (W) x 8.10 m (H)
<b>Auxiliary Power Plant</b>	
Location	Left bank
No.	1
Design discharge per intake	111.08 m <sup>3</sup> /s
C/L of Intake	2091.95 m
<b>Trash Rack</b>	
Number & Size	02 Nos, 4.5m (W) x 29.14 m (H)
No & Type of Gate	01 No & Fixed Wheel
Design Head	25 m
Size of Gate	4.65 m (W) x 5.90 m (H)
<b>Pressure Shaft/ Penstock</b>	
Number & Type	02 nos. for main Units & 01 no. for Auxillary
Design discharge (Excluding vertical)	252.475 m <sup>3</sup> /s (Main) & 111.08 m <sup>3</sup> /s (Auxillary)
Diameter	7.25 m (Main), 5.1 m (Auxiliary)
Length	Main-312.4, 272.7, m & Auxillary-251.7
Velocity (in 7.25m dia. and 5.1m dia. pressure)	6.1 m/s (Main) & 5.58 m/s (Aux.)
<b>Penstock</b>	
Numbers	04 nos. for Main, Circular and 02 nos. for
Diameter	4.85 m (Main) & 3.7 m (Auxiliary)
Length	37.2 m x 4 m (Main) & 29.9 x 2 (Auxiliary)
<b>Power House</b>	
<b>Main Unit</b>	
Type	Underground
Size (L x W x H)	164.5 m x 22.0 m x 46.7 m
Net Head / Rated head	89.92
Head Loss (All units / One Unit)	4.86
Nos. & type of Turbine	4 Nos., Francis
Unit Discharge	126.2375 m <sup>3</sup> /s
Unit Installed capacity	103 MW
No of Gates	4 Nos.
Size of Gate	6.0m(W) x 7.7m(H)
Type of Gate	Fixed Wheel
Sill level	1992.5
<b>Auxiliary units</b>	
Nos. & type of Turbine	02 Nos., Francis
Unit Installed capacity	44 MW
Unit Discharge	55.54 m <sup>3</sup> /s
Net Head / Rated head	87.31 m
Head Loss (All units / One Unit)	4.71 m
No of Gates	2 Nos.,

Size of Gate	6.8 m (W) x 4.0 m (H)
Type of Gate	Bonneted Fixed Wheel
Sill level	1998
<b>Transformer Cavern</b>	
Type	Underground
Cavern Size (L x W x H)	158.5 m (L) x 15.0 m (W) x 20.8 m (H)
Number	1
Transformer Details	45 MVA, 13.8/400
<b>Surge Arrangement D/S PH</b>	
Number & Type	01, Underground Surge Chamber
Size (L x W x H)	81.8 m (L) x 10.8 m (W) x 47.85 m (H)
<b>Tailrace Tunnel/ Channel Main Unit</b>	
Number & Type	01 No., Tunnel
Diameter & Shape	12.1m Dia., Horse Shoe
Length	400 m
Design discharge	504.95 m <sup>3</sup> /s
Adit to TRT	155 m
No of Gates & their Size	02 Nos, 5.1m(W) x 12.1m (H)
Type of Gate	Fixed Wheel
Sill level	2012 m
Design Head	21.04 m
<b>Auxiliary Plant</b>	
Number & Type	01 No, Tunnel
Diameter & Shape	6.2m Dia., Horse Shoe
Length	168 m
Design discharge	111.08 m <sup>3</sup> /s
No of Gates & their Size	01 No, 5.1m(W) x 6.2m (H)
Type of Gate	Fixed Wheel
Sill level	2015 m
Design Head	27.03 m
<b>Estimated cost at Completion level (Apr'21 PL)</b>	
Civil works (Including Direct & Indirect charges)	₹ 2745.07 (in crores)
E&M works	₹ 927.21 (in crores)
Cost of Miscellaneous works (including	₹ 9.76 (in crores)
Total Hard cost	₹ 3682.04 (in crores)
IDC and financing charges	₹ 568.16 (in crores)
Total Project cost	₹ 4250.20 (in crores)
Grant in Terms of MoP OM dated 08.03.2019	₹ 262.86 (in crores)
Total Project Cost after grant	₹ 3987.34 (in crores)
<b>Power benefits</b>	
<b>Main plant (4 x 103 MW)</b>	
Design energy (at 95% plant availability)	1395.82 GWh
<b>Auxiliary plant (2 x 44 MW)</b>	
Design energy with 95% plant availability	364.03 GWh
<b>Financial aspects Tariff as per CERC</b>	
Cost of generation (1st Year Tariff) per kWh at	₹ 4.43
Cost of generation (Levellised Tariff) per kWh at	₹ 4.46
<b>Construction period</b>	
Total construction period excluding	74 months
Preconstruction activities	24 months

v. **Chenab Basin Study vis-à-vis Dugar HEP:**

Total catchment area of Chenab River in Himachal Pradesh is 7878 sq km and its length is about 260 km. Chenab CEIA report has been approved and accepted by MoEF&CC in 2018. The study

focussed on Chenab basin, from the origin of Chandra and Bhaga rivers and upto the confluence of Sanasari Nala with Chenab River i.e., the entire Chenab Basin within the state of Himachal Pradesh. Total hydropower potential of Chenab River in Himachal is assessed as 3510.95 MW (56 projects) out of which only 6.40 MW (6 micro hydel) has been commissioned till the finalization of the report. Out of remaining 50 projects, 20 are large projects i.e. with installed capacity of greater than equal to 25 MW; 9 are small HEPs i.e. IC of greater than 5 MW and less than 25 MW and 21 are micro hydel i.e. IC < 5 MW promoted by Himurja. Detailed Cumulative Impact Assessment carried out based on 3 season baseline data for entire study area and recommendations are made for sustainable development of hydropower projects in the basin.

Dugar HEP is one of the 20 large projects proposed in Chenab basin. Cumulative Environmental Impact Assessment (CEIA) Study for Chenab River basin in Himachal Pradesh Report has recommended Dugar HEP for development in the present form and have noted that ***“Reoli Dugli, Sach Khas and Dugar HEPs - These projects are located in well forested area of otherwise scanty forested landscape of Chenab basin and is rich in biological wealth with large sized trees. Projects can be developed in the present form without any modification/change of parameters. Specific issues should be addressed in the EIA report with mitigation and management plan.”***

Environment Flow release recommendation for Dugar HEP has been worked in the CEIA report based on modelling study and final recommendations are reproduced below. These have been accepted and incorporated in the project design:

	<b>% of Average Discharge of Low Flow Period in 90% DY</b>	<b>% of Average Discharge of High Flow Period in 90% DY</b>	<b>% of Average Discharge of Intermediate Period in 90% DY</b>
<b>Months</b>	<b>Nov to Apr</b>	<b>June to Sept</b>	<b>May and Oct</b>
Average Discharge based on 90% DY (1993-94)	81.04	567.86	168.04
Environment Flow Release Recommendation (%)	25%	20%	25%
Minimum Environment Flow to be maintained (cumec) in respective months	20.26	113.57	42.01

- vi. **Baseline Study period:** The field surveys for the collection of primary data were conducted between March 2021 and September 2021 covering winter, pre-monsoon/summer, and monsoon seasons to collect data/ information on terrestrial ecology and physical environment.

Parameters	Winter	Summer/ Pre-	Monsoon
Soil	March 2021	May-June 2021	August-September
Air Environment	March 2021	May-June 2021	August-September
Noise & Traffic	March 2021	May-June 2021	August-September
Water Quality	March 2021	May-June 2021	August-September
Vegetation	March 2021	May-June 2021	August-September
Fauna surveys	March 2021	May-June 2021	August-September
Socio-economic survey of Project affected	August-September 2021		

vii. **Ambient Air Quality:**

The ambient air quality monitoring sites were selected based upon the wind roses in different seasons (given later in the chapter) and was done at 6 locations in the study area during the Winter, Pre-monsoon, and Monsoon seasons by the RSET team with the help of a team of NABL accredited laboratory.

**PM2.5 levels**

PM2.5 levels were minimum at AQ3/Near Dharwas Village with 8.4 µg/m<sup>3</sup> during the winter season, 7.0 µg/m<sup>3</sup> during the pre-monsoon season and 5.6 µg/m<sup>3</sup> during monsoon. Maximum levels of PM2.5 were recorded at AQ4/Near Killar village where levels were 29.0 µg/m<sup>3</sup>, 26.7 µg/m<sup>3</sup> and 18.2 µg/m<sup>3</sup> during Winter, Pre-monsoon, and monsoon seasons, respectively

**PM10 levels**

The maximum PM10 levels observed during ambient air quality monitoring were 74.5 µg/m<sup>3</sup>, 68.7 µg/m<sup>3</sup> and 58.7 µg/m<sup>3</sup> at monitoring site AQ4/Near Killar village in winter, premonsoon, and monsoon seasons, respectively. Minimum levels were recorded at monitoring site AQ3/ Near Dharwas Village with 21.2 µg/m<sup>3</sup> in the winter season, 16.5 µg/m<sup>3</sup> in the pre-monsoon season, and 14.5 µg/m<sup>3</sup> in the monsoon season

**SO<sub>2</sub> levels and NO<sub>2</sub> levels**

The SO<sub>2</sub> and NO<sub>2</sub> levels observed during the study were much lower than the permissible limit of 80 µg/m<sup>3</sup> at most of the locations. SO<sub>2</sub> was maximum at AQ4/Near Killar village with 7.2 µg/m<sup>3</sup> during the winter season, 6.6 µg/m<sup>3</sup> during the pre-monsoon season, and 6.3 µg/m<sup>3</sup> during monsoon. Similarly, NO<sub>2</sub> was maximum at AQ4/Near Killar village with 9.0 µg/m<sup>3</sup> during monsoon season, 7.8 µg/m<sup>3</sup> during the pre-monsoon season, and 7.0 µg/m<sup>3</sup> during monsoon

viii. **Ambient Noise Levels:**

The results of sound levels monitoring i.e., equivalent Noise levels [Leq dB(A)] in the study area in below table. Levels were compared with the Ambient Air Quality Standard in respect of Noise, given in Schedule as part of The Noise Pollution (Regulation and Control) Rules, 2000 (amended to date). From the recorded values, day-time equivalent levels were calculated. From the data on sound pressure levels equivalent levels (Leq) for daytime, night-time, as well as day-night average, were calculated.

Site Code	Monitoring location	Winter			Pre-monsoon			Monsoon			CPCB	
		Leq Day dB(A)	Leq Night dB(A)	Leq Day and Night dB(A)	Leq Day dB(A)	Leq Night dB(A)	Leq Day and Night dB(A)	Leq Day dB(A)	Leq Night dB(A)	Leq Day and Night dB(A)	Day Time dB(A)	Night Time dB(A)
NT1	Near Sansari Nala	46.0	34.8	45.6	44.1	4.1	44.1	50.7	38.4	50.0	55	45
NT2	Near Luj Village	46.6	35.8	46.3	45.5	35.0	45.3	52.0	40.1	51.4	55	45
	Near Dheda	44.6	34.2	44.5	43.6	33.6	43.6	49.6	37.9	49.0	55	45
NT4	Near Killar	53.1	40.9	52.4	52.0	40.1	51.4	58.5	45.5	57.6	65	55
NT5	Near Chacharwas Village	48.1	37.5	47.9	47.0	36.7	46.9	53.4	42.0	52.9	55	45
NT6	Near Findru Village	49.1	38.2	48.8	47.9	37.5	47.8	54.1	42.2	53.5	55	45

ix. **Soil:**

Predominant soil type is Typic Udorthents (33.52%) which is found at middle slopes characterized by rock outcrops, deep well drained, mesic, loamy skeletal soils on very steep slopes with severe erosion. Typic Cryorthents second predominant soil type found near the ridge slopes and is characterized by rock outcrops, with shallow depth, excessively drained, loamy skeletal soils on very steep slopes prone to severe erosion. Valley floor is comprised of Dystric Eutrochrepts which are deep, well drained, mesic, coarse-loamy soils on gentle slopes with loamy surface and moderate erosion. Glaciated areas have Lithic Cryorthents which are Shallow, excessively drained, sandy-skeletal soils with sandy surface.

Bulk density reflects the soil's ability to function for structural support, water and solute movement, and soil aeration. Most of the soils in the study area are Sandy Clayey Loam. The average bulk density of soil is medium due to the presence of clay content varied from 1.25 to 1.44 (g/cc) at various locations in the study. Porosity and water holding capacity are generally low to medium in the area thereby affecting the permeability of the soil as porosity varied between 36.5% and 48.9% while water holding capacity varied between 28.0% and 47.0%. Most of the area has an almost neutral soil reaction. Electrical conductivity varied between 102 and 280  $\mu\text{S}/\text{cm}$  which is a measure of soluble salts i.e., salinity. Soil with EC up to 2000  $\mu\text{S}/\text{cm}$  is considered non-saline soil

x. **Water Environment:**

a) Surface Water Quality

Analytical results of water quality at all 6 sampling locations during three seasons. The pH varied from 7.06 to 7.3 during the monitoring. Dissolved oxygen ranged from 7.8 to 10.3 mg/l at all sampling locations. All the heavy metals were below detectable limits. Biological oxygen demand levels ranged from <2.0 mg/l at all sampling locations. Chemical oxygen demand levels ranged from <6.0 mg/l in samples collected in the study area.

#### b) Drinking-Water Quality Index

The analysis of water quality, therefore, is based upon 9 parameters as defined for WQI above, and based upon the score at each sampling site water quality has been designated as Excellent, Good, Medium, etc. as per the range defined. The water quality index based upon the above parameters is given in the table below

WQ	SW1	SW2	SW3	SW4	SW5	SW6
Winter	81.07	79.58	80.49	81.62	79.91	80.97
Pre-monsoon	78.91	77.29	78.14	78.85	78.61	78.95
Monsoon	77.83	77.65	78.68	79.58	79.12	77.62

Therefore, based upon CPCB guidelines as well the WQI calculated above the water of Chenab River and its tributaries is safe for drinking without conventional treatment but after disinfection.

#### xi. Floristic Diversity:

Forest is dominant land use pattern in the study area as more than 50% of the study area is under good forest cover. These forests are comprised primarily of Northern Dry Mixed Deciduous Forest classified according to 'A Revised Survey of the Forest Types of India' by Champion and Seth (1968).

Among the tree species *Cedrus deodara*, *Pinus gerardiana*, *Pinus wallichiana*, *Picea smithiana*, *Abies spectabilis*, are the conifer species forming the top canopy. *Celtis australis*, *Juglans regia*, *Salix tetrasperma*, *Salix denticulata*, *Populus ciliata*, *Corylus jacquemontii*, *Ulmus wallichiana*, *Fraxinus xanthoxyloides*, *Robinia pseudo-acacia* and *Alnus nitida* are the associated tree species in the forest area.

Shrub vegetation in the area was represented by *Abelia triflora*, *Artemisia maritima*, *Berberis aristata*, *Berberis lycium*, *Cotoneaster bacillaris*, *Daphne oleoides*, *Clematis montana*, *Rabdosia rugosa*, *Ephedra gerardiana*, *Jasminum humile*, *Olea ferruginea*, *Rosa macrophylla*, *Rosa moschata*, *Rubus foliolosus*, *Rubia cordifolia*, *Rubus niveus*, *Sambucus wightiana*, and *Sorbaria tomentosa*. *Carex inanis*, *Kyllinga squamulata*, *Agrostis pilosula*, *Arthraxon lancifolius*, *Bromus japonicus*, *Eragrostis pilosa*, *Poa annua*, *Stipa roylei*, etc. are the grass species in the catchment, mostly grown on barren rocky steep slopes.

The project area harbors 182 plant species belonging to different plant groups like Angiosperms (160 species), Gymnosperms (9 species), Pteridophytes (5 species), Bryophytes (3 species), and Lichen (5 species).

As per the IUCN Red List of Threatened Species Version. 2021-3, *Angelica glauca* is listed under Endangered (EN) category, *Saussurea costus* under Critically Endangered (CR), *Ephedra gerardiana* and *Ulmus wallichiana* are under the Vulnerable (VU) category, and *Abies spectabilis* and *Pinus gerardiana* under Near Threatened (NT) category. The rest of the species



evaluated are either List Concern (LC) or Data Deficient (DD) category. As per RED data book of Indian Plants *Saussurea costus* is listed as Endangered and *Acer caesium* is listed as Vulnerable species. Rest of the plant species reported from the study area are not listed under any RET category.

#### xii. **Faunal Diversity**

**Mammals:** During field surveys only Rhesus macaque (*Macaca mulatta*), Common mongoose (*Herpestes edwardsii*), and Common langur (*Semnopithecus entellus*) were the species sighted in the study area. Presence of Common Leopard (*Panthera pardus*), Hanuman Langur (*Semnopithecus entellus*), Himalayan Goral (*Naemorhedus goral*), Indian Muntjac (*Muntiacus muntjac*), and Himalayan black bear (*Ursus thibetanus*) was confirmed by forest officials and villagers in the project area.

**Avifauna:** A total of 34 species of bird species 8 Order and 20 families were recorded during the field survey from the study area. Most commonly found birds were Rock Pigeon, Chukar partridge, Jungle Babbler, Drongo, Plumbeous water redstart, Red-vented Bulbul, Blue Whistling Thrush, Myna House sparrow, and Crow. A large portion of avifauna species comprised of resident birds in the project study area.

**Herpetofauna:** During the survey, Garden lizard (*Calotes versicolor*), Kashmir Rock Agamid (*Laudakia tuberculata*), and Skinks (*Asymblepharus ladacensis*) were the species sighted in the area.

**Butterflies:** 11 species of butterflies were recorded during the field survey. Indian cabbage white, Pearl white, and Indian Tortoiseshell were the frequently sighted species observed all along the water bodies.

**Aquatic Ecology:** Among the aquatic organisms, 22 species of phytobenthos and 11 species of phytoplankton were recorded from river Chenab and its tributaries. During sampling 3 species of zooplankton and 8 genera of macro-invertebrates (MI) were recorded from various sampling site.

**Fish fauna:** During the experimental fishing no fish was captured during experimental sampling. According to published literature, no fish species was reported from the area. According to the villagers, Snow trout (*Schizothorax richardsonii*) is the only species occasionally sighted and captured from Chenab River in the area

#### **Conservation Status**

As per the IUCN Red List of Threatened Species, Version 2021-3, Common Leopard (*Panthera pardus*) and Himalayan black bear (*Ursus thibetanus*) are the species listed under the Vulnerable (VU) category. Himalayan Goral (*Naemorhedus goral*) is the species listed under the Near Threatened category of IUCN. As per Wildlife (Protection) Act (1972), Common Leopard (*Panthera pardus*) is listed as a Schedule I species.

xiii. **Land Requirement:** The total land requirement for Dugar HEP is estimated as 220.62 ha out of which, 8.78 ha is private land, and the remaining 211.84 ha is forest land. The submergence area will cover 160.45 ha, which is completely forest land. Prima facie no site of archaeological and religious importance is getting affected due to the project.

xiv. **Ecological sensitive Area:** Sechu Tuan Wildlife Sanctuary is the nearest (21.10 km from Dam site and 12 km from Tip of Reservoir) protected area.

xv. **Muck disposal Plan:**

The construction would involve about 3,70,880 cum of soil excavation and 9,23,970 cum of rock excavation. About 60% of rock excavation is expected to be used for producing coarse and fine aggregate for concrete production and in fillings for developing areas for construction facilities. The total quantity of excavation in common soil and balance quantity of rock excavation would have to be disposed of in designated muck disposal areas. Thus, considering swell factors 0.63 for rock and 0.80 for common soil as adopted from CWC Guidelines and redeposit compaction factor of 83%, the total muck disposal to be disposed of is 716676 Cum.

Muck dumping plan involves careful selection of muck disposal site/s based upon environmentally sustainable guidelines, adopting suitable dumping methodology right from loading and transportation of muck from the excavation sites through 20T Rear Dumpers, management of dumping sites, and monitoring of muck disposal process to ensure minimum spillage during transportation, dumping, and compaction, and then finally rehabilitation of dumping sites through revegetation.

xvi. **Rehabilitation and Resettlement Plan:**

None of the families will be losing any house, therefore there is no displacement. 121 individual landowners have been identified for 8.78 ha of land. Private land (8.78 ha) proposed to be purchased as per the provisions relating to rehabilitation and resettlement for the Project as per the **Section 2 (1)** of the “RFCTLARR, 2013”.

xvii. **Environmental Management Plan:**

S. No	Component of EMP	Capital Cost (Rs. In lakh)	Recurring Cost (Rs. In lakh)										Total	
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10		
1	Catchment Area Treatment Plan	5981.03	0	0	0	0	0	0	0	0	0	0	0	5981.03
2	Compensatory Afforestation Plan & NPV	4395.53	0	0	0	0	0	0	0	0	0	0	0	4395.53
3	Biodiversity Conservation & Wildlife	173.36	0	0	0	0	0	0	0	0	0	0	0	173.36
4	Fisheries Conservation and Management Plan	40	0	0	0	0	0	0	0	0	0	0	0	40.00
5	Muck Dumping and Management Plan	0	50	80.5	80.5	80.5	80.5	80	70	50.3	50.5	48	670.80	

6	Landscaping, Restoration of Quarry, and	0	1.63	0	0	0	10	10	333.17	20.00	20.00	10.00	404.80
7	Reservoir Treatment Plan	40	0	0	0	0	0	0	0	0	0	0	40.00
8	Green Belt Development Plan	0	0.00	40	50	55	78.85	67.16	45.6	30.5	25	20	412.11
9	Sanitation and Solid Waste Management Plan	110.00	20.64	20.64	20.64	20.64	20.64	20.64	20.64	20.64	20.64	20.64	316.40
10	Public Health Delivery System	75.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	335.00
11	Energy Conservation Measures	60.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	300.00
12	Labour Management Plan	50.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	140.00
13	Disaster Management Plan	135.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	155.00
14	Control of Air, Noise and Water Pollution	0.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	50.00
15	Environmental Monitoring Programme	0.50	11.10	11.10	11.10	11.10	11.10	11.10	11.10	11.10	11.10	11.10	111.50
16	Rehabilitation and Resettlement Plan**	100.00	0	0	0	0	0	0	0	0	0	0	100.00
17	LADF @ 1.5% of Rs.3987.34 crore (project)	5981.01	0	0	0	0	0	0	0	0	0	0	5981.01
<b>Total</b>		<b>17141.43</b>	<b>149.37</b>	<b>218.24</b>	<b>228.24</b>	<b>233.24</b>	<b>267.09</b>	<b>254.9</b>	<b>546.51</b>	<b>198.54</b>	<b>193.24</b>	<b>175.74</b>	<b>19606.54</b>

xviii. **Glacial Lake Outburst Flood (GLOF):** A study has been carried out by NHPC for the largest existing Glacial Lake (Area 160 ha) located at around 205 km from dam site. CWC cleared the GLOF on 23/12/2020 and recommended GLOF value of 1145 Cumec.

xix. **Fisheries Management plan:** No spawning grounds were observed in the river in the project area, therefore the impact of the project on fish migration is not envisaged. A ZSI Publication (2010-2011) and Cumulative Environmental Impact Assessment Study of Chenab Basin in Himachal Pradesh also reported that there are no records of fishes from Pangri valley.

However, Snow trout (*Schizothorax richardsoni*) was introduced by the State Fisheries Department, the study team has not observed the presence of any fish in the river.

**Enriching fish habitat and maintaining river ecology:**

For conservation and management of fishery in reservoir area (1.065 sq. km.) of Dugar HEP, to explore the possibility of reservoir fisheries in Chenab River and its tributaries, it is proposed that detailed study will be carried out by State Fisheries Department along with Directorate of Coldwater Fisheries Research, Bhimtal. Budgetary provision of Rs. 40.00 lakh has been proposed to explore the possibility of reservoir fisheries in the proposed reservoir of Dugar HEP.

**Wildlife Conservation Plan:**

Following activities have been planned for conservation of wild life in the region:

- i. Wildlife Habitat Preservation & Improvement
- ii. Establishment of Eco Park
- iii. Biological fencing
- iv. Prevention and Control of Forest Fire
- v. Development of Grazing land/ Pastures
- vi. Awareness promotion
- vii. Strengthening of Infrastructural Facilities of Forest Department
- viii. Biodiversity Management Committee (BMC)

Conservation Plan of Schedule I species was submitted to Division Forest Office, Pangti Forest Division, Himachal Pradesh Forest Department. Same has been approved by State Forest department via letter No.: Acctt./4017, dated 17.03.2022. The estimated cost of implementation of various activities envisaged in the Biodiversity Conservation and Management Plan would be Rs. Rs. 173.36 lakh.

**xx. Project benefit:**

Dugar Hydro Electric Project will help in harnessing potential of river Chenab for generating electricity to the tune of 1759.85 MUs in a 90% dependable year annually and bring benefits of renewable energy to state of and country. In addition to this, other benefits from the project are:

- a. As per the Memorandum of Understanding (MoU), Government of Himachal Pradesh will get the Royalty Free Energy in the shape of free power @4% from 1st to 10th year, @8% from 11th to 25th year, 12% from 26th to 40th year & 25% beyond 40 years and 1% additional free Power for LADF of the deliverable energy, period starting from the date of Scheduled Commercial Operation Date/ Synchronization of the first-generation unit, whichever is earlier.
- b. NHPC Limited shall contribute 1.5% of the cost of the project towards pre commissioning Local Area Development Fund (LADF).
- c. Increase in green cover of the region
- d. Conservation of Biodiversity and Wildlife through implementation of Biodiversity and Wildlife Conservation and Management Plan.
- e. Large scale investment in the region will bring about several positive changes in the region and expected to improve the quality of life of local population. The project will help improve local infrastructure and employment generation for local during construction and operation phase.

f. There will be secondary employment opportunities for locals in terms of catering to the daily need of all the staffs and labours and floating population of transporters and material suppliers to the site.

xxi. **Public hearing:** Publications of notice for public hearing were given in state level Hindi and English newspaper “Punjab Kesari” and “Times of India” dated 20.03.2022. Public hearing conducted on 20.04.2022 under the chairmanship of Resident Commissioner, Sub-Division, Pangi in Chamba District, H.P.

xxii. **Status of other statutory clearances:**

1. CWC cleared the water availability series vide 1/HP/48/2012/Hyd (N) /534 dated 10/12/2013. May 2020 has been received from Central Water Commission. Accordingly, the average 10 daily water availability series (data base 1974-2012) as approved by the Central Water Commission has been updated up to the year 2020 by transferring the CWC observed discharge data at Udaipur G&D site to Dugar HEP dam site by catchment area proportion (factor = 1.324) following the same methodology as adopted earlier. Central Water Commission approved water availability series (data base 1981-2020). The average annual yield has been computed as 10123 MCM.
2. Stage-I FC clearance for divergence of 211.84 ha is forest land is yet to be obtained.

**33.2.3: The EAC during deliberations noted the following:**

The proposal is for grant of Environmental Clearance to Dugar Hydro Electric Project (500 MW) in an area of 220.62 ha in Killar Village, Chamba District, Himachal Pradesh by M/s NHPC Ltd.

The EAC in the present meeting (33<sup>rd</sup> meeting) deliberated on the information submitted (Form 2, EIA/EMP report, kml file, etc.) and as presented along with consultant R S Envirolink Technologies Pvt Ltd. The EAC noted that total land requirement for proposed project is estimated as 220.62 ha out of which, 8.78 ha is private land, and the remaining 211.84 ha is forest land. The submergence area will cover 160.45 ha, which is completely forest land. The EAC also noted that Stage-I FC has not been granted to said project and is under consideration with forest department, MoEF&CC. Public hearing was conducted on 20.04.2022 under the Chairmanship of Resident Commissioner, Sub-Division, Pangi in Chamba District, H.P.

It was further noted by the EAC that muck disposal site and other job facilities area falls under forest area and therefore PP justified that due to unavailability of private land best environment friendly muck dumping site is adopted. Also, in 10km radius of project area there are 25 villages (hamlet) located.

The EAC was of the view that at present there might not be fisheries available in the Chenab River but in future or after construction of project there are possibility of creation of ecosystem for fisheries accordingly a detailed plan has to be prepared in consultation with CIFRI.

Wildlife habitats can be improved by using site specific solutions like retention of hardwood trees to provide an important food source for various wildlife species, control on invasive species and replace them with native plants and creation of Wildlife corridors etc.

**33.2.4** The EAC after examining the information submitted and detailed deliberations *recommended* the proposal for grant of Environmental Clearance by the Ministry to Dugar Hydro Electric Project (500 MW) in an area of 220.62 ha in Killar Village, Chamba District, Himachal Pradesh by M/s NHPC Ltd, under the provisions of EIA Notification, 2006 and as amended with subject to compliance of applicable Standard EC conditions with the following additional conditions:

**1. Environment and Biodiversity management:**

- i. Stage I FC for 211.84 ha of forest land involved in the project shall be submitted prior to grant of EC.
- ii. Necessary clearance under Indus water treaty shall be obtained before implementation of the project.
- iii. The Environmental Management Plan (EMP) shall be strictly adhered to as submitted in the EIA/EMP reports. The budgetary provisions for implementation of EMP, shall be fully utilized and not to be diverted to any other purpose. In case of revision of the project cost or due to price level change, the cost of EMP shall also be updated proportionately.
- iv. As the proposed project falls in Chenab River Basin and its CIA & CCS is already complete, the recommendation of CIA & CCS shall be followed while implementing the Project.
- v. A detailed study shall be carried out in the Upstream and Down Stream of the Project on conservation and management of cold water fishes in consultation with Directorate of Coldwater Fisheries Research, Bhimtal. Accordingly, fish conservation plan be prepared and implemented by Project proponent.
- vi. The contract clause limiting the No. of vehicles used during excavation and transportation shall followed scrupulously and the same shall informed to the ministry.
- vii. Ambient Air Quality Monitoring Stations for real time data to be installed at project site, shall be displayed at project site and its report to be submitted to IRO, MoEF&CC.
- viii. No vehicle purchase shall be allowed from funds earmarked for implementation of Wildlife Conservation plan. Measures for minimizing the human–animal conflict specially for black bear and leopard be suitably incorporated in the wildlife conservation plan in consultation with State Forest Department.

**2. Disaster Management:**

- ix. Disposal of the excavated muck and its filling on the low-lying area with proper measures for the stabilization and greenery to minimize the impacts of the generated construction muck shall be taken up pari passu with construction work.
- x. Stabilization of muck disposal sites using biological and engineering measures shall be taken up immediately to ensure that muck does not roll down the slopes and does not pollute the natural streams and water bodies in surrounding area. The plantation on muck disposal site with local species for restoration of ecology and environment of the project site area.
- xi. Necessary control measures such as water sprinkling arrangements, and construction of paved roads leading to muck disposal sites etc. shall be taken up on priority to arrest fugitive dust at all the construction sites.
- xii. Solid waste generated, especially plastic waste, etc. should not be disposed of as landfill material. It should be treated with scientific approach and recycled. Use of single-use plastics may be discouraged.

### **3. Socio-economic:**

- i. Land acquired for the project shall be suitably compensated in accordance with the prevailing guidelines of the state government and provisions under Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013.
- ii. The area is ecologically fragile therefore Project Proponent shall ensure that safety measures as mentioned in the EMP shall be fully implemented.

### **4. Miscellaneous:**

- i. After 5 years of the commissioning of the project, a study shall be undertaken regarding impact of the project on the environment. The study shall be undertaken by an independent agency.
- ii. Bio-Gas plant (Deenn Bandhu Model of Bio-Gas) shall be installed in the Project affected area for Utilizing Cattle waste (Cow Dung) into renewable source of fuel.
- iii. A Multi-specialty hospital to cater the need of people living within 10 km radius of the project shall be established and managed.
- iv. Sport complex with multi- sport facility shall be established and managed within 10 km radius of the project. The children's from economically weaker section shall be given free of cost sport facility.
- v. Computer labs with internet facility shall be established and managed in primary schools within 10 km radius of project
- vi. Solar panel be provided to the families living in rural areas within 10 km radius of project.
- vii. The Multi-Disciplinary Committee needs to be reconstituted and the meeting needs to be held at regular interval.
- viii. The compliance of above conditions shall be monitored by IRO, MoEF&CC and regularly site visit thrice in year. The compliance report of IRO shall be regularly submitted to MoEF&CC.
- ix. PP shall procure construction material only from those Organizations having all valid legal/statutory clearances/permissions or necessary permission to be obtained for quarrying construction materials for the project as per the EIA Notification, 2006 and as amended thereof.
- x. An institutional mechanism to be developed to ensure the preference of jobs to PAFs and also a policy for preferential treatment for award of sundry works to the PAFs and their dependents.

### **Agenda Item No. 33.3**

**Patgaon Pumped Storage Project (2100 MW) in an area 140.25 ha in Kolhapur & Sindhudurg District, Maharashtra by M/s Adani Green Energy Limited – Terms of Reference (TOR) - reg.**

**[Proposal No. IA/MH/RIV/288548/2022; F. No. J-12011/12/2022-IA.I (R)]**

**33.3.1:** The proposal is for grant of Terms of Reference to Patgaon Pumped Storage Project (2100 MW) in an area 140.25 ha in Kolhapur & Sindhudurg District, Maharashtra by M/s Adani Green Energy Limited.

**33.3.2:** The details of the project submitted by project proponent and ascertained from the document submitted are mentioned below:

- i. The proposed 2,100 MW (6\*300 MW + 2\*150 MW) Patgaon Pumped Storage Hydroelectric Project (the Project) with a storage capacity of 12.6 GWh consists of utilising the existing Patgaon reservoir across Vedganga River in Bhudargad Taluka of Kolhapur District (upper Reservoir) and involves construction of Powerhouse and Lower Reservoir near village Anjiwade of Kudal Tehsil, Sindhudurg District in Maharashtra State along with other project components.
- ii. The existing Patgaon Reservoir constructed in 1998 for irrigation purposes provides an opportunity for constructing a pumped storage scheme between this reservoir as upper reservoir and a new reservoir to be constructed as lower reservoir on a seasonal stream in the valley located about 400 m below near village Anjiwade of Sindhudurg District.
- iii. The existing reservoir has a gross volume of 105.26 Mm<sup>3</sup> (live 90.26 mm<sup>3</sup>) and a historic minimum live volume of 17 Mm<sup>3</sup> before onset of the monsoon. A lower reservoir with a similar volume can be established by about 500 m long dam with a maximum height of 57.5 m. The live storage volume works out to about 12.9 Mm<sup>3</sup> equivalent to 12.6 GWh for the actual head and will hence determine the capacity of the Project. For a generation period of 6 hours the installed capacity will be 2,100 MW for a rated discharge of 592.72 m<sup>3</sup>/s. Gross rated head is 411.77m and static heads will vary between 390 m and 441.1 m. The project envisages non-consumptive utilization of gross storage of 13.75 MCM of water by recirculation between upper and lower reservoirs.

iv. **Project location (Coordinates):**

Upper dam (existing): Latitude 16° 6' 47.81" N & Longitude 73° 55' 8.10" E

Lower dam (proposed): Latitude 16° 4' 57.98" N & Longitude 73° 54' 58.76" E

- v. The physical features of the Project consist of twin intake towers in the Patgaon Reservoir followed by twin 230 m long concrete lined low pressure tunnels to twin surge shafts and twin 1380 m / 1481 m long steel lined pressure tunnels branching to 8 units, (six generating/pumping units of 300 MW generating capacity each and two units of 150 MW each) in an open shaft powerhouse. Alternatives like surface penstock with surface power house, and vertical shaft below Upper reservoir, underground power house with a long tail race tunnel were also explored on a broad basis. But the arrangement of underground head race system of pressure tunnel up to open shaft type surface power house closer to lower reservoir with relatively short length of tail race tunnels has been found advantageous and has been adopted. On the downstream side of the powerhouse the draft tubes combine to three 8 m diameter 500 m long concrete lined tunnels and three outlet/intake towers in the lower reservoir. One of the two head race conduits will cater for 1200 MW (four units of 300 MW) and the other for 900MW (2 X 300 MW + 2 X 150 MW units). The diameters of components of the water conductor system are therefore different, namely 11 m and 10 m diameter for the headrace tunnels, 9.0 Pre-feasibility by Splash Power 3 m and 7.8 m diameter for steel lined shafts pressure tunnels reducing to 4.5 m for single unit pressure shafts. Transformers and 400 kV gas insulated switchgear will be located on the ground near the powerhouse. The Project will



connect to the grid at MSETCL substation at Kolhapur, Maharashtra (68 km) or PCGL substation at Mapusa, Goa (48km).

#### vi. **Alternative Studies**

The site selection process of PHS is based on following approaches:

1. Based on proximity to Wildlife Sanctuary / Tiger reserve, potential R & R issues, Geology, interstate issues, EIA, Head, low variation in net head, Water conductor system length vs head, hydrology, constructability & approach available, a broader area for project is identified
2. Possible locations and alternative locations of Reservoirs and powerhouse are identified in the proposed area and their suitability is examined with respect to technical parameters

#### Alternatives for the lower reservoir:

The Topography of the proposed area of Lower reservoir depicts small depressions around the hill area showing possibility of creation of reservoir at two locations.

#### Alternative 1: Upstream of Bhat – Gawasalwadi village

Topographically, the site - 1 is in flat / gradually sloping land which is found suitable and allows to create the desired live storage capacity with a higher head of about 30 meters.

But this location is ruled out due to

- a. Proximity of the Gawasalwadi village
  - b. Relatively high R & R (70-80 houses and lots of farm lands) created due to submergence
3. Disastrous impact in case of dam break. Close to 150 houses very close to lower dam

#### Alternative 2: South of Patgaon Reservoir

The land in the proposed Site - 2 is partly in forest land (non-forest area is about 21 Ha) wherein vegetation density is fairly high. The proposed area is geologically competent. After detailed testing if any abnormalities are found that portion will be covered by geotextile membrane to prevent water seepage. Since the site is compact it is selected for a lower reservoir for further development of the project. The quantity of water required to meet sediment volume and seepage are met from the dead storage of this lower reservoir. The evaporation is met by the west flowing water (to the tune of 30 MCM). Pumped to the upper reservoir if required. Hence this is the most optimal option.

#### Powerhouse Layout:

**Alternative - 1:** Layout with cavern Powerhouse and other components of this scheme are Upper reservoir, Intake structure, Penstock / Pressure Shaft, Cavern powerhouse, Tail Race Tunnel, Tail Race Outlet, Tail Race Channel and Lower reservoir. The underground powerhouse requires Adits viz., Main Access Tunnel to Powerhouse service bay and Transformer Hall, Adit to Powerhouse cavern top, Adit to Transformer cavern top, Bus duct tunnels etc. Most of the components of this alternative are underground except for reservoirs, intake and outfall structure. Considering the works involved as mentioned above, the investigation time and completion of DPR for this alternative will take about 18 months. The total physical construction time for the project is estimated to be around 42 months after completion of DPR. Further the cost of the project will be higher because of most of the

components being underground. The construction duration and the cost of the scheme is very important which will impact the overall financial viability of the project adversely.

**Alternative -2:** Layout with underground Powerhouse accessible with two access shafts directly leading to two service bays. These will also carry power cables, ventilation ducts, lifts, emergency staircase, drainage & dewatering outlet, etc. The shaft and cavern powerhouse involves minimum excavation because the main access tunnel and other tunnels are not there. Investigation time and preparation of DPR will also take about 18 months and construction time for completion of this alternative is estimated to be around 42 months excluding preconstruction works. The advantage of this scheme is the risks will be less due to less underground activities. Considering the risks and the cost overrun in comparison to alternative 1, this option is chosen.

vii. **Land requirement:** The total land required for the construction of various components including infrastructure facilities for Patgaon PSP is estimated to be around 140.25 ha, out of which 69.85 ha is non-forest land and 70.40 ha is forest land. Diversion of forest land for non-forest purpose will be involved for construction of Patgaon project components. Therefore, Forest Clearance is required to be obtained under Forest Conservation Act. The Submergence Area estimated to be around 69.3 ha for Lower Reservoir.

viii. **Ecological Sensitive Area, if any within 10km of project site (WLS, Tiger/elephant corridor, Critically Pollute Area etc):** Not Applicable, Radhanagari WLS is about 10.3 Km from site, is the nearest protected area. ESZ has been notified on 15/10/2020. All the project components are well outside the ESZ.

ix. **Project cost:** Total cost at present cost level is estimated at Rs. 8374 crores including grid connection, all charges and interest during construction which is equivalent to Rs. 3.98 crores/MW. Annual consumption and injection of energy is estimated to be 5,707 GWh and 4,372 GWh, respectively. Assuming cost of energy for pumping at 3.00 Rs./kWh, the levelised tariff according to CERC guidelines becomes 7.53 Rs./kWh.

x. **R & R details:** The landowner family may be losing part of their total land, none of the landowners is losing any house or any other assets. None of the landowner family is displaced due to the proposed project. In view of the above it is noted that the total private land proposed to be purchased through private negotiations. If the total private land required exceeds the specified limits by the relevant rules notified by the State Government, if any related to rehabilitation and resettlement under RFCTLARR, 2013 shall apply for the proposed Project.

The detailed requirements for the R&R plan, if applicable, will be based on the social-economic survey and land utilization for the project. Due consideration ought to be given to the societal requirements in developing the R&R plan.

xi. **Project benefit:**

- a) The project will facilitate energy storage and balance variable power from renewable energy sources (predominately large scale solar plants) available during day time effectively for meeting the energy requirement during peak hours and thereby ensuring grid balancing.
- b) The project will generate 2,100 MW by utilizing a design discharge of 592.72 cumec.

- c) Employment generation for technical staff & workmen category (including locals)

**33.3.3: The EAC during deliberations noted the following:**

The EAC deliberated on the information submitted (Form 1, PFR, kml file, etc.) and as presented in the meeting and observed that the project consists of utilising the existing Patgaon reservoir across Vedganga River in Bhudargad Taluka of Kolhapur District (upper Reservoir) and involves construction of Powerhouse and Lower Reservoir near village Anjiwade of Kudal Tehsil, Sindhudurg District in Maharashtra State along with other project components.

The EAC noted that the proposed plant is situated in Western Ghats of Maharashtra. Further, it was noted that a representation has been received by the EAC wherein it was mentioned that project site is located in wildlife corridor.

**33.3.4** The EAC after detailed deliberation on the information submitted and as presented during the meeting *recommended* for grant of Standard ToR for conducting EIA study for Patgaon Pumped Storage Project (2100 MW) in an area 140.25 ha in Kolhapur & Sindhudurg District, Maharashtra by M/s Adani Green Energy Limited, under the provisions of EIA Notification, 2006, as amended along with the following additional/specific ToR:

**[A] Environmental Management and Biodiversity Conservation:**

- i. Alternative site analysis shall be carried out in terms of ecological aspects viz. loss of Forest ecosystem due to diversion of Forest land/ loss of biodiversity and its impacts on productivity of the ecosystem, water availability, eco-sustainability of water source be used for generation of hydro power and Ecological flows in the small stream/ Nallah. Preference shall be given to minimize forest land.
- ii. Impact zone decided prior to base line data generation and accordingly, sampling location shall be finalized. Baseline data as mentioned in Standard ToR shall be collected for preparation of EIA/ EMP report along with soil characteristics which shall be studied at minimum 10 locations. The ground water level at 10 locations shall be measured in project area in all three seasons.
- iii. A study shall be carried out on impact of project activity on the aquatic and terrestrial ecosystem, within project area classifying the impact zones (highly impact/low impact zone) based on seasonal variations and covering the aspects related to impacts on aquatic ecosystem/ primary productivity due to quantity of water to be lifted for power generation and thermal stratification. Accordingly, Environment Management plan shall be prepared.
- iv. Sampling locations be located to cover villages situated near the reservoir and around boundary of forest area for collection of baseline data and data to be incorporated in EIA/ EMP report.
- v. The study shall be conducted and approved by CWC regarding assessment of E-Flow of water in the river Vedganga in terms of draft notification S.O. 3072(E) dated 6<sup>th</sup> July, 2022 issued by the Ministry for Western Ghats.
- vi. Details about other projects located on the river basin of river Vedganga along with their longitudinal distance between two projects be submitted. In case of more than one project a detailed Cumulative Impact Assessment and Carrying Capacity study covering aspects related to impact of each project on the flow pattern of the rivers and forest and biodiversity shall be conducted through a reputed Government institute having expertise in the area.
- vii. Identify the sand mining/ quarrying sites in submergence area and downstream of reservoir.

- viii. Source of construction material and its distance from the project site along with detailed transportation plan for construction material in view of the project site location in Western Ghats be submitted.
- ix. A detailed reclamation/ restoration plan of quarrying site/sites be incorporated in the EIA/EMP report.
- x. Certificate and certified map from Chief Wildlife Warden shall be submitted mentioning that project boundary is located outside the Eco Sensitive Zone (ESZ) and no Wildlife Sanctuary falls within 10 km of Project site.
- xi. A detailed wildlife conservation plan for Schedule –I species be prepared duly approved by the Chief Wild Life Warden be submitted.
- xii. In case any Wildlife Corridor is located within 10 km radius of the project site a detailed study shall be conducted to assess the impact of project on safe movement of wild animals.
- xiii. Reservoir/ River banks protection plan all along the submergence need to be prepared and incorporated in EIA/ EMP.
- xiv. Scope of watershed development in the 10 km radius of the project shall be studied in consultation with Govt. institutions/ Indian Council of Agriculture Research (ICAR)and accordingly a detailed Water Shed Development Plan shall be prepared and incorporated in EIA/ EMP report.
- xv. MoU for water uses for the project shall be signed and approved by concerned authority.
- xvi. Environmental matrix during construction and operational phase needs to be submitted.
- xvii. Matrix formulated on the basis of detailed study and field survey of flora and Fauna methodology used shall be mentioned in the EIA report.
- xviii. Endemic plant and animal species found in the area concerned shall be provided instead listing entire endemic species found in the State.
- xix. Details of Flora and Fauna reported in submergence area, Nos. of tree along with their density and nomenclature required to be cut for reservoir creation and other project component.
- xx. Project impact on avi-fauna shall be studied and incorporated in EIA/ EMP report.
- xxi. Impact assessment on the fish diversity based on the hydrological alteration at the water drawing sources (reservoir) shall be studied.
- xxii. Stage-1 Forest Clearance shall be obtained.

#### **[B] Socio-economic Study**

- xxiii. Declaration by the project proponent by way of affidavit that "No" Inter-state issue/ policies issue is involved with any state in the project. Consent from other state for drawing of water from Narmada River, if required.
- xxiv. All the tasks including conducting public hearing shall be done as per the provisions of EIA Notification, 2006 and as amended from time to time. Public hearing issues raised and compliance of the same shall be incorporated in the EIA/ EMP report in the relevant chapter.
- xxv. Statement on the commitments (activity-wise) made during public hearing to facilitate the discussion on the CER in compliance of the Ministry's OM F.No.22- 65/2017- IA.III dated 30<sup>th</sup> September, 2020 shall be submitted.
- xxvi. Tentative no. of project affected families shall be identified and accordingly appropriate Rehabilitation & Resettlement plan shall be prepared.

#### **[C] Muck Management/ Disaster Management**

- xxvii. Details of quantity of muck generation component wise and disposal site along with transportation plan and its monitoring to be provided.
- xxviii. Details of Muck Management plan prepared along with estimated cost incorporated in EIA/EMP report.
- xxix. Techno-economic viability of the project must be recommended from CEA/ CWC

**[D] Miscellaneous.**

- xxx. Pre-DPR Chapters viz., Hydrology, Layout Map and Power Potential Studies duly approved by CWC I CEA shall be submitted.
- xxxi. Undertaking need to submitted on affidavit that regarding no activities has been yet on the project site and water allocated to this scheme shall not be diverted to other purpose.
- xxxii. Both capital and recurring expenditure under EMP shall be submitted.
- xxxiii. The photograph should bear the date, time, latitude & longitude of the monitoring station/ sampling location. In addition to this PP should submit the original test reports and certificates of the labs which will analyze the samples.
- xxxiv. Arial view video of project site shall be recorded and to be submit.

**Agenda Item No. 33.4**

**Sirkari-Bhyol Rupsiabagar Hydro Electric Project of 168 MW as Run of River scheme in an area of 30 ha in Tehsil Munsiyari, Pithoragarh District (Uttarakhand) by M/s UJVN LTD – Reconsideration for grant of Environmental Clearance (EC) – Reg.**

**[Proposal No. IA/UK/RIV/130432/2019; F. No. J-12011/12/2015-IA.I]**

**33.4.1:** The proposal is for reconsideration for grant of Environment Clearance (EC) to Sirkari-Bhyol Rupsiabagar Hydro Electric Project of 168 MW as Run of River scheme in an area of 30 ha in Tehsil Munsiyari, Pithoragarh District (Uttarakhand) by M/s UJVN LTD.

**33.4.2: Observation by EAC in earlier meeting:**

1. The proposal was earlier considered by reconstituted EAC in its 7<sup>th</sup> and 10<sup>th</sup> meeting held on 25.02.2021 and 15.04.2021 subsequently and deferred the proposal seeking additional information.
2. Point-wise replies submitted by the PP vide letter dated 16.08.2022 in response to additional details sought (ADS) by EAC in its 10<sup>th</sup> meeting are as follows:

**Query 1: Approval of CWC on Pre-DPR chapter of hydrology**

**Reply:** Copy of approval of CWC on pre-DPR chapter of Hydrology has been submitted. Monthly water availability at Sirkari Bhyol - Rupsiabagar diversion site vide letter no.1/UTT/60/2014/Hyd(N)/131-33 dated 21.02.2017. Water availability series (10- Daily discharge) has been approved by CWC vide letter no.1/UTT/60/2014/Hyd(N)/367-69 dated 10.03 2017. Design flood has been approved by CWC vide letter no. 1/UTT/60/2014/Hyd(N)/303-305 dated 13.04.2017.

**Query 2: The study report on the extent of occurrence of glaciers and glacial lakes within the study area and their contribution to the river flow and the risk assessment of Glacier Lake Outburst Floods (GLOFs) in consultation CWC.**

**Reply:** Glacial Lake Outburst Flood, "GLOF" Study of Sirkari Bhyol-Rupsiabagar HEP (120 MW), Uttarakhand was entrusted to R.S. Envirolink Technologies Pvt. Ltd., Gurgaon. They conducted the study and the report was submitted to the CWC vide letter No. 980/UJVNL/03/D (P/ GM(CDH&NP)/SBR, dated 14.12.2021.

The GLOF simulation has been carried out on MIKE11 for the combined volume of glacial lake GL65 and GL62 for the two initial flood conditions of Goriganga river (i) Steady discharge corresponding to average annual flow distributed along the study reach (ii) Steady discharge corresponding to 100-year return period flood distributed along the study reach.

For average annual initial discharge condition, the GLOF peak of 2141 cumec at its origin gets attenuated to 1620 cumec at the project diversion site. The GLOF peak takes about 63 minutes to reach the diversion site located about 50 km d/s of GL65. For 100-year return period flood initial discharge condition, the GLOF peak of 2141 cumec at its origin gets attenuated to 1672 cumec at the diversion site. The GLOF peak takes about 57 minutes to reach the project diversion site.

The report was appraised by the CWC with respect to methodology, criticality analysis, breach simulation, tentative peak discharge and attenuation pattern of GLOF Hydrograph. Assuming breaching of the identified combined glacial Lakes GL62 (Latitude 30°33'37.99" N & Longitude 80°10'30.22" E) & GL65 (Latitude 30°33'51.76" N & Longitude 80°10'42.16" E), situated at 50 km upstream of Sirkari Bhyol - Rupsiabagar HEP, with combined estimated volume of about 4 MCM, the tentative peak discharge resulting into Glacial Lake outburst Flood (GLOF) event was reported as 1672 cumec.

The CWC vide letter No. 6/11/2021/FE&SA/50-54, dated 7.2.2022 intimated that report was generally found to be in order within the conditions/criterion, assumptions and imitations of the model parameters adopted in the study.

**Query 3: Fish sampling methodology, sampling location and area covered during sampling required to be revalidated from scientific references. Fish occurrence and requirement of fish pass needs to be examined in consultation with CIFRI.**

**Reply:** Revalidation of fishery survey of Goriganga at project site of Sirkari- Bhyol Rupsiabagar Hydro Electric Project, District Pithoragarh, Uttarakhand was conducted through Centre for Interdisciplinary Studies of Mountain & Hill Environment (CISMHE) University of Delhi, during October 2021. The survey was conducted in the river waters stretching from 5 km downstream of powerhouse to 5 km upstream of barrage site. A total of 5 sites were selected for fishing, of these three sites were located in the main stem of the Goriganga while two were located in tributaries namely, Jaulchidda Gad and Jimi Gad. Different types of fishing gears and methods (cast net, hook and line, Thali Trap and visual examination of 62 pools and interaction with locals) were used in the present study area, however, the presence of fish species could not be confirmed. Also, the local people interviewed denied the presence of fish fauna in this zone of Goriganga river. The visual observations revealed the absence of fry and

fingerlings in the pools indicating that the fish species do not use the present study sites as spawning ground. Details of sampling sites, fishing gears and fishing efforts are given in Table.

Parameters	Sampling				
	S 1- U/s of Barrage Site (Bugdiyar)	S 2- Jaulchidda Gad (Rargadi)	S 3 Barrage Site (Rargad	S 4 D/s of Power house site	S 5 Jimi Gad
Lat/Long	30°12'20"N	30°11'02"N	30°11'02"N	30°07'58"N	30°08'15"N
	80°13'32"E	80°13'46"E	80°13'50"E	80°15'02"E	80°14'35"E
Altitude	2155	2130	2120	1490	1566
Visual Observations in	24	14	24	Nil	Nil
Cast Net (efforts in	32	20	28	16	16
Hook (efforts in	12	20	14	8	12
Thali trap (in number)	8	8	6	4	2
Fish Species	Not	Not	Not	Not	Not

From the present observations it can be inferred that the present study area is a fishless zone. This inference was also supported by the earlier reports on fish fauna of Goriganga river and view point of local people. Among the species reported by Ashok (2014) from Madkot site (1223 m), *Schizothorax richardsonii*, *S. plagiostomus* and *S. progastus* are widely distributed species in the Himalayan waters. If one follows the most protective approach, only these species can be predicted to move upstream of the village of Madkot. However, their movement can be predicted only up to the proposed power house (1500 m). Chances of visiting the proposed barrage site (2120 m) by these species are negligible because of deep gorges, high current velocity and other harsh climatic conditions.

The absence of fish species in this zone can be attributed to the harsh climatic conditions (temperature, and current velocity) and poor availability of fish food. Ashok (2014) also reported very low richness of fish fauna in the middle and upper reaches. He reported only 8 species from Madkot site (1223 m), whereas the present study sites are located between 1566 m and 2155 m elevations. Analyzing the earlier reports (Ashok, 2014; Joshi et al., 1993) and present observations, there are fair possibilities of absence of fish fauna in the present study area.

In the wake of the inference drawn from the present and past studies the possibilities of absence of fish fauna in the present study area, there is no requirement of any fish pass/ladder at the barrage site.

**Query 4: The downstream of the project area is a known habitat for cold-water fishes like snow trout and endemic catfishes, the e-flow requirement in the downstream should be revised or the CWC recommended e-flows for trout zone should be adopted.**

**Reply:** From the present fish fauna studies in Goriganga, conducted by CISMHE, University of Delhi, it has emerged that up to Jimighat (S4-El.1490m), which is about 5km d/s of powerhouse, there are no fishes in Goriganga and its tributaries. This implies that the project domain area (FRL-El 2080m; TWL-El. 1720m) can be construed as a fishless zone. Analyzing the earlier reports (Ashok, 2014) the middle and lower reaches of Goriganga from Madkot

(El.1300m) to Jauljibi (El.600m) are known habitat of cold-water fisheries with ichthyofaunal-diversity increasing from high altitude to low altitude in river. The daily discharge of Goriganga river proposed to be diverted at the barrage site shall be fully repatriated into river through the tail race outlet structure with river bed level at El 1708, located in the fish less zone, shall be thoroughly available on downstream for the fish fauna of middle and lower reaches of the river. Thus, the three-regime e-flow requirement {Lean season 1.87 cumec (20%); Monsoon season 14.13 cumec (30%) and non-monsoon - non-lean season 6.42cumec (25%)} does not warrant any revision.

**Query 5: As the project area is known for conservation significant wildlife such as Musk deer, Snow leopard, Himalayan Black bear etc., the wildlife conservation plan requires revision in terms of dominant wildlife species of the region and a specific conservation plan for the same in the consultation with Expert from State govt and other reputed Central Govt. agencies. Purchase of Vehicles from the budget of the Wildlife Conservation Plan is not allowed.**

**Reply:** In line to the queries raised by the EAC members the Wildlife and Biodiversity Conservation & Management plan was prepared in consultation with Forest Department and submitted to Divisional Forest Officer Pithoragarh. The latter vide his office letter no 5214/12-I dated 22.04.2021 recommended the revised Wildlife and Biodiversity Conservation & Management plan for approval by the competent authority i.e., Chief Wildlife Warden, Uttarakhand. The latter has approved the Wildlife and Biodiversity Conservation & Management plan vide Letter No.246/12-1, Dehradun, dated 24.7.2021.

**Query 6: Sketches showing the arrangement of the proposed de-silting arrangement of the quarrying water should be prepared correctly and be submitted.**

**Reply:** The sketch showing the arrangement of the proposed de-silting arrangement of the quarrying water has been submitted.

### **33.4.3: The EAC during deliberations noted the following:**

The EAC was not in agreement with data generated during the study regarding non-occurrence of fish species in the study area. There are numerous studies which reported presence of various cold water fishes in the region. The EAC opined that the fishes are the best bio indicator for illustrating the ecological health of any aquatic ecosystem including rivers. It was noted that as per previous recommendations of the EAC fish occurrence and requirement of fish pass had to be examined in consultation with CIFRI. But it was conducted through some other institute during October 2021.

It was also noted that a representation has been received mentioning the issues regarding eco-vulnerability of the region viz. frequent occurrence of extreme climate events resulting in flooding, landslides and then related life and property losses in Gori River Basin as the basin already exists 7 large Hydro Power Projects (HPP's) in Gori Ganga River basin and 1 medium scale HPP (proposed). It is also mentioned in the representation that Forest Advisory Committee (FAC) in 2012 has denied the Forest Clearance for 261 MW NTPC Rupsiyabagar - Khasiyabara Hydro-Power Project on the grounds of severe ecological impacts due the site being of high ecological and wildlife value. Sirkari Bhyol Rupsiabagar HEP (120 MW) project not only lies in the same ecological region but is immediately upstream of the cancelled project and shares the same geographical zone of Rupsiabagad.



**33.2.4** *The EAC after detailed deliberation on the information submitted and as presented during the meeting **decided to conduct site visit** by following EAC sub-committee members before making any recommendations on proposal:*

- i. Dr. A. K. Malhotra*
- ii. Dr. Uday Kumar R.Y.*
- iii. Dr. J. A. Johnson*
- iv. Dr. A. K. Sahoo*
- v. Representative from CWC*
- vi. Representative of Ministry of Earth Sciences*
- vii. Representative from MoEF&CC*

**The meeting ended with vote of thanks to the Chair.**

\*\*\*\*\*

**ATTENDANCE LIST**

<b>Sr. No.</b>	<b>Name &amp; Address</b>	<b>Role</b>	<b>Attendance</b>
1.	Dr. K. Gopakumar	Member (Chairman)	P
2.	Dr. A. K. Malhotra	Member	P
3.	Dr. Uday Kumar R.Y.	Member	P
4.	Shri Sharvan Kumar Shri Rajeev Varshney	Member (Representative of CEA)	P
5.	Shri Ashok Kharya	Representative of CWC	P
6.	Dr. J. A. Johnson	Representative of WII	P
7.	Dr. A. K. Sahoo	Representative of CIFRI	P
8.	Dr. Vijay Kumar	Representative of Ministry of Earth Sciences	P
9.	Shri Yogendra Pal Singh	Member Secretary	P

## **APPROVAL OF THE CHAIRMAN**

**From:** [kgopa@iisc.ac.in](mailto:kgopa@iisc.ac.in)

**To:** "Yogendra Pal Singh" <[yogendra78@nic.in](mailto:yogendra78@nic.in)>, [jjj@wii.gov.in](mailto:jjj@wii.gov.in), [ajitkumarmalhotra463@gmail.com](mailto:ajitkumarmalhotra463@gmail.com), "amiya sahuo" <[amiya.sahoo@icar.gov.in](mailto:amiya.sahoo@icar.gov.in)>, [amiya7@gmail.com](mailto:amiya7@gmail.com), "Ashok Kumar Kharya" <[ceenvtmgmi@nic.in](mailto:ceenvtmgmi@nic.in)>, "bijayaketan panigrahi" <[bijayaketan.panigrahi@gmail.com](mailto:bijayaketan.panigrahi@gmail.com)>, "chandrahas deshpande" <[chandrahas.deshpande@welingkar.org](mailto:chandrahas.deshpande@welingkar.org)>, [dchandrahas@gmail.com](mailto:dchandrahas@gmail.com), [mukesh@iitk.ac.in](mailto:mukesh@iitk.ac.in), [lnand@rocketmail.com](mailto:lnand@rocketmail.com), "kn shenoy" <[kn.shenoy@manipal.edu](mailto:kn.shenoy@manipal.edu)>, [udaykumary@yahoo.com](mailto:udaykumary@yahoo.com), "Dr. Vijay Kumar" <[vijay.kumar66@nic.in](mailto:vijay.kumar66@nic.in)>, [Dirhpa3@gmail.com](mailto:Dirhpa3@gmail.com), "Mukesh Sinha" <[sinha.mukesh@nic.in](mailto:sinha.mukesh@nic.in)>

**Cc:** "Saurabh Upadhyay" <[saurabh.upadhyay85@gov.in](mailto:saurabh.upadhyay85@gov.in)>, "Sourabh Kumar" <[sourabh.9@govcontractor.in](mailto:sourabh.9@govcontractor.in)>

**Sent:** Tuesday, September 6, 2022 3:27:21 PM

**Subject:** Re: Draft MOM of the 33rd EAC (RVHEP) meeting held on 29.08.2022 for perusal and comments-reg

Dear Sir

Yes , I approve this. we have incorporated all the suggestions taken during the review meeting.

With warm regards

Prof. K.Gopakumar, FIEEE, FNAE

DESE, Indian Institute of Science

Bangalore-560012, INDIA

**Standard EC Conditions for River Valley and Hydroelectric projects**

**I. Statutory compliance:**

- i. The project proponent shall obtain forest clearance under the provisions of Forest (Conservation) Act, 1986, in case of the diversion of forest land for non-forest purpose involved in the project.
- ii. The project proponent shall obtain clearance from the National Board for Wildlife, if applicable.
- iii. The project proponent shall prepare a Site-Specific Conservation Plan & Wildlife Management Plan and approved by the Chief Wildlife Warden. The recommendations of the approved Site-Specific Conservation Plan/ Wildlife Management Plan shall be implemented in consultation with the State Forest Department. The implementation report shall be furnished along with the six-monthly compliance report. (in case of the presence of schedule-I species in the study area)
- iv. The project proponent shall obtain Consent to Establish/ Operate under the provisions of Air (Prevention & Control of Pollution) Act, 1981 and the Water (Prevention & Control of Pollution) Act, 1974 from the concerned State Pollution Control Board/ Committee.
- v. NOC shall be obtained from National Commission of Seismic Design Parameters (NCSDS) of CWC.
- vi. Necessary approval of CEA shall be obtained for those projects having the project cost more than Rs. 1,000 crores.

**II. Air quality monitoring and preservation**

- i. Regular monitoring of various environmental parameters viz., Water Quality, Ambient Air Quality and Noise levels as per the CPCB guidelines at designated locations shall be carried out on monthly basis and a detailed database of the same shall be prepared and recorded. This shall be used as a baseline data for post construction EIA / Monitoring purposes.
- ii. Appropriate Air Pollution Control (APC) system shall be provided for all the dust generating points including fugitive dust from all vulnerable sources, so as to comply prescribed standards.
- iii. Necessary control measures such as water sprinkling arrangements, etc. be taken up to arrest fugitive dust at all the construction sites.

**III. Water quality monitoring and preservation**

- i. Conjunctive use of surface water to be planned in the project to check water logging as well as to increase crops productivity. The field drains shall be connected with natural drainage system.
- ii. Remodelling of existing natural drains (link drains) and connecting them with irrigated land through constructed field drains, collector drains, etc. are to be ensured on priority basis.
- iii. Before impounding of the water, Cofferdams for both at the upstream and downstream are to be decommissioned as per EIA/EMP report so that once the project is commissioned; cofferdam should not create any adverse impact on water environment including the rock mass and muck used for the Cofferdam.

- iv. As the reservoir will be acting as balancing reservoir and there would be fluctuation of water level during peaking period, efforts be made to reduce impact on aquatic life including impacts during spawning period both at the upstream and downstream of the project
- v. Water depth sensors shall be installed at suitable locations to monitor e-flow. Hourly data to be collected and converted to discharge data. The Gauge and Discharge data in the form of Excel Sheet be submitted to the Regional Office, MoEF&CC and to the CWC on weekly basis.
- vi. Mixed irrigation shall be practised and necessary awareness be given to all the farmers and trained in the use of such systems. Proper crops selection shall be carried out for making irrigation facility more effective.
- vii. On Farm Development (OFD) works like landscaping, land levelling, drainage facilities, field irrigation channels and farm roads, etc. should be taken up in phased manner prior to the start of irrigation in the entire command area. The Command Area Development Plan should be strictly implemented as proposed in the EIA/EMP report

#### **IV. Noise monitoring and prevention**

- i. All the equipment likely to generate high noise shall be appropriately enclosed or inbuilt noise enclosures be provided so as to meet the ambient noise standards as notified under the Noise Pollution (Regulation and Control) Rules, 2000, as amended in 2010 under the Environment Protection Act (EPA), 1986.
- ii. The ambient noise levels should conform to the standards prescribed under E(P)A Rules, 1986 viz. 75 dB(A) during day time and 70 dB(A) during night time

#### **V. Catchment Area Treatment Plan**

- i. Catchment Area Treatment (CAT) Plan as proposed in the EIA/EMP report shall be implemented in consultation with the State Forest Department and shall be implemented in synchronization with the construction of the project.

#### **VI. Waste management**

- i. Muck disposal be carried out only in the approved and earmarked sites. The dumping sites shall be located sufficiently away from the HFL of the river. Efforts be made to reuse the muck for construction and other filling purposes and balanced be disposed of at the designated disposal sites. Once the muck disposal sites are inactive, proper treatment measures like both engineering and biological measures be carried out so that sites are stabilized quickly.
- ii. Solid waste management should be planned in details. Land filling of plastic waste shall be avoided and instead be used for various purposes as envisaged in the EIA/EMP reports. Efforts be made to avoid one time use of plastics.

#### **VII. Green Belt, EMP Cost, Fisheries and Wildlife Management**

- i. Based on the recommendation of Cumulative Impact Assessment and Carrying capacity study of river basin or as per the ToR conditions or minimum 15% of the average flow of four consecutive leanest months, whichever value is higher, shall be released as environmental flow.
- ii. Detailed information on species composition particular to fish species from previous study/literature be inventorized and proper management plan shall be prepared for

insitu conservation in the streams, tributaries of river and the main river itself for which adequate budget provision be made and followed strictly.

- iii. Wildlife Conservation Plan prepared for both core and buffer zones shall be implemented in consultation with the local State Forest Department.
- iv. To enrich the habitat of the project site, plantation shall be raised as envisaged in the EIA/EMP report. Plantation to be developed along the periphery of the reservoir in multi-layers with local indigenous species in consultation with the local State Forest Department.
- v. Compensatory afforestation programme shall be implemented as per the plan approved.
- vi. Fish ladder/pass as envisaged in the EIA/EMP report shall be provided for migration of fishes. Regular monitoring of this facility be carried out to ensure its effectiveness.

#### **VIII. Public hearing and Human health issues**

- i. Resettlement & Rehabilitation plan be implemented in consultation with the State Govt. as approved by the State Govt.
- ii. Budget provisions made for the community and social development plan including community welfare schemes shall be implemented in toto.
- iii. Preventive measures viz. fuming and spraying of mosquito control shall be done in and around the labour colonies, affected villages, stagnated pools, etc. Provisions be made to not to create any stagnatedpools to avoid creation of breeding grounds of the vector borne diseases
- iv. Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.
- v. Labour force to be engaged for construction works shall be examined thoroughly and adequately treated before issuing them work permit. Medical facilities shall be provided at the construction sites.
- vi. Early Warning Telemetric system shall be installed in the upper catchment area of the project for advance intimation of flood forecast.
- vii. Emergency preparedness plan be made for any eventuality of the dam failure and shall be implemented as per the Dam Break Analysis

#### **IX. Corporate Environment Responsibility**

- i. Skill mapping be undertaken for the youths of the affected project area and based on the skill mapping, necessary trainings to the youths be provided for their long time livelihood generation
- ii. The company shall have a well laid down environmental policy duly approve by the Board of Directors. The environmental policy should prescribe for standard operating procedures to have proper checks and balances and to bring into focus any infringements/deviation/violation of the environmental/ forest/ wildlife norms/ conditions. The company shall have defined system of reporting infringements/ deviation/ violation of the environmental/ forest/ wildlife norms/ conditions and/ or shareholders/ stake holders. The copy of the board resolution in this regard shall be submitted to the MoEF&CC as a part of six-monthly report.
- iii. A separate Environmental Cell both at the project and company head quarter level, with qualified personnel shall be set up under the control of senior Executive, who will directly to the head of the organization.

- iv. Action plan for implementing EMP and environmental conditions along with responsibility matrix of the company shall be prepared and shall be duly approved by competent authority. The year wise funds earmarked for environmental protection measures shall be kept in separate account and not to be diverted for any other purpose. Year wise progress of implementation of action plan shall be reported to the Ministry/Regional Office along with the Six Monthly Compliance Report.
- v. Post EIA and SIA be prepared for the project through a third party and evaluation report be submitted to the Ministry after five years of commissioning of the project.
- vi. Multi-Disciplinary Committee (MDC) be constituted with experts from Ecology, Forestry, Wildlife, Sociology, Soil Conservation, Fisheries, NGO, etc. to oversee implementation of various environmental safeguards proposed in EIA/EMP report during construction of the project. The monitoring report of the Committee shall be uploaded in the website of the Company.
- vii. Formation of Water User Association/Co-operative be made involment of the whole community be ensured for discipline use of available water for irrigation purposes

## **X. Miscellaneous**

- i. The project proponent shall make public the environmental clearance granted for their project along with the environmental conditions and safeguards at their cost by 5 prominently advertising it at least in two local newspapers of the District or State, of which one shall be in the vernacular language within seven days and in addition this shall also be displayed in the project proponent's website permanently.
- ii. The copies of the environmental clearance shall be submitted by the project proponents to the Heads of local bodies, Panchayats and Municipal Bodies in addition to the relevant offices of the Government who in turn has to display the same for 30 days from the date of receipt.
- iii. The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and update the same on half-yearly basis.
- iv. The project proponent shall submit six-monthly reports on the status of the compliance of the stipulated environmental conditions on the website of the ministry of Environment, Forest and Climate Change at environment clearance portal.
- v. The project proponent shall submit the environmental statement for each financial year in Form-V to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently and put on the website of the company.
- vi. The project proponent shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities, commencing the land development work and start of production operation by the project. vii. The project authorities must strictly adhere to the stipulations made by the State Pollution Control Board and the State Government. viii. The project proponent shall abide by all the commitments and recommendations made in the EIA/EMP report, commitment made during Public Hearing and also that during their presentation to the Expert Appraisal Committee.
- vii. No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment, Forests and Climate Change (MoEF&CC).

- viii. Concealing factual data or submission of false/fabricated data may result in revocation of this environmental clearance and attract action under the provisions of Environment (Protection) Act, 1986.
- ix. The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.
- x. The Ministry reserves the right to stipulate additional conditions if found necessary. The Company in a time bound manner shall implement these conditions.
- xi. The Regional Office of this Ministry shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data/ information/monitoring reports.
- xii. The above conditions shall be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and the Public Liability Insurance Act, 1991 along with their amendments and Rules and any other orders passed by the Hon'ble Supreme Court of India/ High Courts and any other Court of Law relating to the subject matter.
- xiii. Any appeal against this EC shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010