

**REPORT ON MONITORING THE IMPLEMENTATION OF ENVIRONMENTAL SAFEGUARD OF PARE H.E.PROJECT (110 MW), ARUNACHAL PRADESH**

**Monitoring Report (Part-I)**

(Data sheet)

<b>NAME OF PROJECT</b>		<b>PARE H E PROJECT (110 MW)</b>
<b>1.</b>	<b>Project Type: River-Valley/Mining/ Industry/Thermal/Nuclear/Other (Specify)</b>	River Valley
<b>2.</b>	<b>Name of the Project</b>	Pare H.E. Project.
<b>3.</b>	<b>Clearance letter (s) OM No. and Date</b>	No. J-12011/12/2006-IA-1, Dated 13/9/06 No. J-12011/12/2006-IA-1, Dated 19/9/06
<b>4.</b>	<b>Locations:</b>	
	<b>a) District(s)</b>	Papum Pare.
	<b>b) State (s)</b>	Arunachal Pradesh.
	<b>c) Latitudes/Longitudes</b>	<b>Dam site:</b> Latitude (N) 27 <sup>0</sup> 14'13" Longitude (E) 93 <sup>0</sup> 48'56"
		<b>Power House site:</b> Latitude (N) 27 <sup>0</sup> 12'46" Longitude (E) 93 <sup>0</sup> 48'30"
<b>5.</b>	<b>Address of Correspondence:</b>	
	<b>a) Address of Concerned Project Chief Engineer. (With Pin Code &amp; Telephone/Telex/Fax Nos.)</b>	Head of Project, Pare H.E. Project, NEEPCO Ltd, Doimukh Arunachal Pradesh - 791112 Phone No:- 0360-2278252 Fax No:- 0360-2278253 E-mail : pare_project@yahoo.co.in
	<b>b) Address of Executive Project Engineer/Manager (With Pin Code &amp; Telephone/Telex/fax Nos.)</b>	-----Do-----
<b>6</b>	<b>Salient Features:</b>	
	<b>a) Of the Project</b>	As enclosed in ANNEXURE-I
	<b>b) Of the Environmental Management Plans</b>	As enclosed in ANNEXURE-II
<b>7</b>	<b>Breakup of the Project Area (Forest &amp; Non-Forest):</b>	
	<b>a) Submergence area (Forest &amp; Non-Forest)</b>	111.6 Hac. at FRL.
	<b>b) Others</b>	86.88 Hac.

<b>8</b>	Breakup of the Project affected population with enumeration of those losing houses/dwelling units only, agricultural land only, both dwelling units and agricultural land and land less labours/artisans:	
	Both land and house	3 Nos.
	Only Home	35 Nos.
	Only Land	233 Nos.
	Other immovable Properties	6 Nos.
	<b>Total</b>	<b>277 Nos.</b>
	a) SC, ST/Adivasis	277 PAFS
	b) Others	Nil
<b>9</b>	<b>Financial Details</b>	
	a) Project cost as originally planned and subsequent revised estimates and the years of price reference	Rs. 573.99 Crore at June'07 PL including IDC & FC as per CCEA Clearance.
	b) Allocation made for Environmental Management Plans, with item-wise and years –wise breakup	As per ANNEXURE-II
	c) Benefit cost ratio/internal rate of return and the year of assessment	-----
	d) Whether (C) includes the cost of Environmental management as shown in (b) above.	Yes
	e) Actual expenditure incurred on the Project so far.	Rs 318.00 Crs as on 31.03.2012
	f) Actual expenditure incurred on the Environmental Management plans so far	Rs 3.867 Crs as on 31.03.2012.
<b>10</b>	<b>Forest land Requirement:</b>	
	a) The status of approval for a diversion of forest land for non-forestry use	Final notification for diversion Forest land was accorded on 13 <sup>th</sup> July, 2009 by the Conservator of Forests (Cons) & Nodal Officer (FC), Govt. of Arunachal Pradesh, Itanagar vide letter No. FOR. 10-48/Cons/2006/20714-18.
	b) The status of compensatory afforestation, if any	An amount of Rs 9789300 (8363900.00+1425400) has already been paid to State Forest Dept. Govt. of A.P for implementation of the Compensatory afforestation plan.
	c) The status of clear felling	Nil
	d) Comments on the viability & sustainability of compensatory afforestation programme in the light of actual field experience so far.	Compensatory Afforestation is viable as per field experienced in the Catchment Area.

11	<b>The status of clear felling in non-forest areas (such as submergence area of reservoir, approach roads), if any, with quantitative information.</b>	Reservoir works yet to be started.
12.	<b>Status of Construction:</b>	
	a) Date of commencement (actual and/or planned)	31.08.2009
	b) Date of completion (actual and /or planned)	30.08.12 (Actual),31.08.2013(Planned)
13	<b>Reasons for the delay if the project is yet to start.</b>	NA
14	<b>Date of Site Visits:</b>	
	a) The dates on which the project was monitored by the regional office on previous occasions, if any	13 <sup>th</sup> Feburary'2012, by Mr. S.C. Katiyar, Joint Director, MOEF, Shillong.
	b) Date of site visit for this monitoring report	31.03.12
15.	<b>Details of correspondence with Project authorities for obtaining action plans, information &amp; status of compliance to safeguards</b>	-----

**PARE H.E.PROJECT (110 MW), ARUNACHAL PRADESH  
ENVIRONMENTAL CLEARANCE LETTER NO. J-12011/12/2006-IA-1 DATED  
13.09.2006**

**Part-A Specific conditions:**

Sl. No.	Stipulations	Action taken	Status of compliance
i)	Logerstroemia minuticarpa is a rare and endangered species in the area. Measure for conservation and propagation of the same as proposed in the EMP (Section 6.6) should be followed in toto	For implementation of the scheme, views of multidisciplinary committee members will be taken in the proposed meeting of the committee to be held on 25.04.2012.	
ii)	Catchments Area Treatment Plan as has been proposed should be completed in five years	Catchment area treatment will be taken up as per suggestion of Multi-Disciplinary Committee which has been constituted on 28.07.2010. The first meeting of the committee is scheduled to be held on 25 <sup>th</sup> April'2012. All the measures will be completed within the stipulated time frame.	
iii)	Clearance from National Committee of Seismic Design Parameters (NCSDP) of CWC should be obtained.	Accorded in the 21 <sup>st</sup> meeting held in New Delhi on 08.09.2009 and communicated vide letter No.2/2/2009/FE&SA/696 dated 02.12.2009 by CWC, Govt. of India.	
iv)	Malaria is major water borne disease in the area. Though the flow of the river is very fast, but due to unforeseen situation the flow of the river may slow down at certain points due to construction activities. Occurrence of stagnant pools/slow moving water channels during construction and operation of the project providing breeding source for mosquito and other parasites. The river should be properly channelised so that no small pools poodles are allowed to be formed. Even after taking precaution, due to unforeseen situations,	River diversion is yet to be started as such no flow of river water is obstructed till date. Free medical camps are being organized on monthly basis in the project area and residential spraying of D.D.T with fogging machine is being done at Doimukh colony, Sopo and Jumpa village from time to time.	

	<p>breeding of mosquito and resulting malaria or mosquito borne diseases can increase. If such situation arises, it will be the responsibility of the project authorities to take all corrective steps i.e. residual insecticidal spray in all the project impact area and surrounding 3km area, keeping the flight range of mosquitoes in consideration.</p>		
<p>v)</p>	<p>277 families (all are tribal) from three villages would be affected. Out of that only three families are likely to loose both land and houses and others are loosing either only land or houses. Affected families should be rehabilitated and resettled in consultation with state government.</p>	<p>The Govt. of Arunachal Pradesh has already constituted the necessary R&amp;R Committee for implementation of R&amp;R Plan of Pare H.E. Project. The Committee consists of the following members.</p> <ol style="list-style-type: none"> <li>1. Representative from Sopo, Jampa and Hoz Village,</li> <li>2. Project affected people,</li> <li>3. Women representative,</li> <li>4. NGO representative,</li> <li>5. Representative of D.C and</li> <li>6. Head of Project, Pare H.E. Project.</li> </ol> <p>a. The first meeting of the committee was convened on 18<sup>th</sup> March'2011 under the chairmanship of D.C Papumpare, wherein, it was resolved to look for a suitable land for implementation of R&amp;R. Subsequently, the District Authority had informed vide letter No. DC / LM / Govt. / 002 / 09 / 1173 dated nil Aug'2011 that there is no land available free of cost and land owners are asking for compensation of their land and other assets as per the prevailing market rates. It was further informed that next meeting on R &amp; R scheme will only be held after receipt of confirmation regarding payment of compensation of land and assets to be acquired for implementation of R &amp; R scheme.</p> <ul style="list-style-type: none"> <li>• As the provision in the DPR under the Head 'Land' at Sl.No.</li> </ul>	<p>As per clause No. 7.1.21 of R&amp;R policy'2008 of Govt. of A.P, the Administrator for rehabilitation and resettlement (Deputy Commissioner of the concern district) shall submit the draft scheme or plan for rehabilitation and resettlement to the state government for it approval. As such it is under jurisdiction of D.C and state Govt. However project authority is constantly pursuing the matter with D.C for finalisation and approval the RAP at the earliest.</p>

		<p>1 (i) against private land for R&amp;R scheme is too meagre, the financial involvement was required by the Corporation to examine and to take approval from the Competent Authority. Accordingly, the District Authority had been requested to finalise the land as well as the cost involvement and the forward the same for further needful by the Corporation. After vigorous persuasions, an estimate for land including approach road and other assets amounting to Rs 25650457.00 has been received from D. C., Papum pare on 5<sup>th</sup> Jan'2012. The proposal had duly forwarded to Shillong HQ vide U.O. No. 3077 dtd 01.03.2012 after duly obtaining Site finance vetting.</p> <ul style="list-style-type: none"> <li>• Subsequently, the proposal had been returned from Shilong HQ vide U.O. No. 85-86 Dtd. 09.04.2012 to initiate the Land Acquisition proceeding by the District Administration. Accordingly, HOP, PHEP has now requested D.C Papumpare vide letter NEEPCO /PHEP / HOP / T-87 / 12-13 / 44 dated 11.04.12 to initiate land acquisition proceeding so as to enable release the due amount.</li> <li>• Meanwhile District Administration has send one draft notification to Land Management Dept. , Govt. of A.P for issuance of land acquisition notification.</li> </ul>	
vi)	A monitoring committee should be constituted which must include representatives of project affected persons from SC/ST category and a woman beneficiary.	Representatives of project affected persons from SC/ST category and a woman beneficiary has been included in the R & R implementation committee.	
vii)	All the assurances /commitments given by the project authority in the public hearing must be honored in letter and spirit.	Shall be complied.	

viii)	Forest clearance should be obtained for acquiring forest land & submitted.	<p>Forest clearance has already been obtained vide letter no. FOR. 10-48/Cons/2006/20714-18 dated 13.07.2009.</p> <p>The following payments have been released to Forest Deptt.</p> <p>a) Compensatory Afforestation(CA)- Rs 83.64 lakhs</p> <p>b) NPV- Rs 303.13 lakhs</p> <p>c) Royalty against timber- Rs 97.88 lakhs.</p>	
ix)	During the lean season 10.52 cumecs water flow is available in the river. 10% of the available water should be released down stream of the dam for sustenance of aquatic life.	Action will be taken in due course.	
x)	Any other clearance from any other organization if required should be obtained.	Shall be complied.	

### Part-B General conditions

Sl. No.	Stipulations	Action taken	Status of compliance
i)	Adequate free fuel arrangement should be made for the labour force engaged in the construction work at project cost so that indiscriminate felling of trees is prevented.	Employees are using LPG for cooking purpose and for labourers free LPG is being provided for cooking purpose.	
ii)	Fuel depot may be opened at the site to provide the fuel (kerosene/LPG). Medical facilities as well as recreational facilities should also be provided to the labourers.	Gas distributor is available at Doimukh which is around 8-10 km from project site, as such no separate fuel depot is proposed. Free medical health check-ups are being done for the labourers engaged for construction activities. Necessary recreational facilities are also provided at the labour camps.	
iii)	All the labourers to be engaged for construction works should be thoroughly examined by health personnel and adequately treated before issuing them work permit.	Periodical health check-up camps are being organized at project site by NEEPCO Doctors as well as doctors from private hospital and doctors from package contractors.	
iv)	Restoration of construction area including dumping site of excavated materials should be ensured by leveling, filling up of burrow pits, landscaping etc. The area should be properly treated with suitable plantation.	The excavated materials are being dumped in the demarcated areas only, proper leveling and compaction are also done. Plantations are being done as per requirement.	
v)	Financial provision should be made in the total budget of the project for implementation of the above suggested safeguard measures.	Financial provision amounting to Rs 2091.82 lakhs has been kept for Environment & Ecology. <b>(Annex-III)</b>	
vi)	A multi disciplinary committee should be constituted with representatives from various disciplines of forestry, ecology, wildlife, soil conservation, NGO etc. to oversee the effective implementation of the suggested safeguard measures.	Multi- Disciplinary Committee has been constituted with representatives from various disciplines of forestry, ecology, wildlife, soil conservation, NGO etc. on 28.07.2010	
vii)	Six monthly monitoring reports should be submitted to the ministry and its regional office, Shillong, for review.	Six monthly monitoring reports are being submitted on time.	

**ANNEXURE-I****SALIENT FEATURES OF PARE H.E.PROJECT (110 MW), ARUNACHAL PRADESH.**

<b>NAME OF PROJECT</b>		<b>PARE H E PROJECT (110 MW)</b>	
<b>1</b>	<b>Location</b>		
	State	Arunachal Pradesh	
	District	Papum Pare	
	Village		
	Powerhouse	Sopo	
	Dam Site	Jampa	
	Access		
	Airport	North Lakhimpur, - around 55 km	
	Rail Head	North Lakhimpur (MG) - around 55 km	
	Road Head	Doimukh – 14 km	
	Geographical co-ordinates		
		Dam Site	Power House
	Latitude (N)	27 <sup>0</sup> 14' 13"	27 <sup>0</sup> 12' 46"
	Longitude (E)	93 <sup>0</sup> 48' 56"	93 <sup>0</sup> 48' 30"
	Elevation (msl)		
Map reference	Survey of India Topo-Sheets: 83E/3, 83E/4, 83E/7, 83E/8, 83E/11, 83E/12, 83E/15, 83E/16		
<b>2</b>	<b>Meteorology</b>		
	Average Rainfall	3800 mm	
	Atmospheric Temperature		
	Average Maximum Temp.	31.8 <sup>0</sup> C	
	Average Minimum Temp.	16.1 <sup>0</sup> C	
<b>3</b>	<b>Hydrology at Intake</b>		
	Catchment Area	824 sq. km of Dikrong river at Proposed Pare HEP Dam site	
	Flood flow (PMF)	5000 Cumec	
<b>4</b>	<b>Reservoir</b>		
	Maximum Water Level	246.215 MSL	
	Full Reservoir Level	245.15 MSL	
	Minimum Drawdown Level	240.00 MSL	
	Water Spread at FRL	111.6 Hectare	
	Gross Storage area at FRL	19.425 MCM	

<b>5</b>	<b>Dam</b>	
	Type of Dam	Concrete Gravity Dam
	Length of Dam	142.2 m
	Overflow	49.2 m
	Non-overflow	93 m
	Width at the Top of Dam	6 m
	Top Elevation of Dam	248.00 m
	Deepest Foundation Level of Dam	188.00 m
	River Bed Level (average)	200 MSL
	Upstream Slope	0.1:1 from El 235 for NOF Blocks 0.4:1 from 211.408 for OF Blocks
	Downstream Slope	0.8:1 from El 240.50
<b>6</b>	<b>Spillway</b>	
	Capacity	5000 Cumec (PMF)
	No. of Gates	3
	Size of Gates	10.4m(W) X 12 m(H)
	Crest Level	216 m
	Height of breast wall.	20 m
<b>7a</b>	<b>Headrace Tunnel</b>	
	Diameter	7.5 m
	Length	2819.00 m
	Design flow	185 cumec
	Size & Shape	7.5 m dia Modified horseshoe shaped
	Invert Level at Intake	El. 225.25 m
	Invert Level at Surge Shaft	El. 206.0 m
Adit Details	Two Nos of Adits. Adit-I- 113.0 m long & 7.5 m dia and Adit-II- 84.0 m long and 7.5 m dia.	
<b>7b</b>	<b>Diversion Tunnel</b>	
	Size & Shape	8 m dia horseshoe shaped
	Length	335.0 m ( Boring length- 265.0 m, Transition length- 7 m and cut & cover – 63 m )
	Discharge	430 Cumec
	Invert Level at Tunnel Inlet	197 m
	Invert level at Tunnel outlet	196 m
<b>8</b>	<b>Surge Shaft</b>	
	Type	Restricted Orifice, Non-Overflow
	Diameter and Height	18 m dia, 59 m Height (from El 214 to 273m)
	Orifice Diameter	3.0 m
<b>9</b>	<b>Pressure Shaft</b>	
	Diameter	6.4 m
	Length	197.50 m
	Bifurcated (penstock) Diameter	4.5 m

<b>10</b>	<b>Power House</b>	
	Type	Surface
	Design Head	67.36 m (net)
	Size of Power House	68m long, 23m wide
	Type of Turbine	Vertical Francis
	Installed Capacity	110 MW
	Turbine Floor Level	El. 169.50m
	Upper Generator Floor Level	El. 178.00 m
	Lower Generator Floor Level	El 173 m
	Service Bay Level	El. 181.65 m
	Tail Water Level (with one unit running)	El. 168.95 m
	Tail Water Level (at Full Load)	El. 169.82 m
<b>11</b>	<b>Tailrace Channel</b>	
	Details	Open Channel 60.62 m wide, 49 m long
<b>12</b>	<b>Electro-mechanical</b>	
	Turbine	
	No. and Type	2 nos. Vertical Francis, rated at 55 MW
	Speed	187.5 rpm
	Inlet Valve	Butterfly type with lattice structure (diameter 4.5 meters)
	Generator	
	Out put	55 MW rated output plus 10 % continuous overload
	Power factor	0.9 lagging
	Speed	187.5 rpm
	Voltage	11 kV
<b>13</b>	<b>Power</b>	
	Design discharge	185 cumec
	Rated net head at Design Discharge	67.36 m
	Installed Capacity	2 X 55 MW = 110 MW
	Annual generation in 90% Dep. Year	512.74 MU
	Annual generation in 90% Dep. Year at 95% Plant availability	506.42 MU
	Annual saleable energy	441.2 Mu
<b>14</b>	<b>Costs</b>	
	Project Cost	Rs. 573.99 Cr. at June' 07 PL (including IDC & FC) as per CCEA Clearance.
	Cost per MW	Rs. 5.22 Cr.
<b>15</b>	<b>Generation Cost and Tariff</b>	
	Tariff in First year with 14% Return on Equity	Rs. 2.38/ KWH
	Levellised Tariff	Rs. 2.01/ KWH

**SALIENT FEATURES  
OF  
ENVIRONMENTAL MANAGEMENT PLAN**

The EIA/EMP studies for Pare H.E. Project have been carried out by M/s Water and Power Consultancy Services (India) Ltd. (WAPCOS) a Govt. of India undertaking Enterprise under ministry of water Resources (MOWR).

An amount of Rs 2091.82 lakhs has been kept for Environment and Ecology.

### **1. ENVIRONMENTAL MANAGEMENT PLAN**

Environmental Management Plan (EMP) enumerating, sort of measures to be adopted to minimize the adverse impacts are as follows:

#### **Facilities in Labour Camps**

##### **Solid Waste Management**

Adequate facilities for collection conveyance and disposal of municipal waste generated from labour camps should be developed. A provision of Rs.20.00 lakhs has been kept for this purpose which includes one covered truck to collect the solid waste from the common collection point and transfer it to the disposal site.

##### **Sanitation facilities**

About 125 community toilets and 5 septic tanks are proposed to be constructed to ensure that there is no adverse impact due to sewage generation from labour camps. An amount of Rs. 17.25 lakhs has been earmarked for this purpose.

##### **Provision for Free Fuel**

It is proposed to make it mandatory for the contractor to provide community kitchen facilities to its labour. The fuel used for cooking in these kitchens shall be LPG or Kerosene.

##### **Landscaping and Restoration of Construction**

It is also proposed to develop nature parks, children parks, gardens, ornamental plantation and other recreation facilities near the project colony. It is proposed to earmark a provision of Rs.4.00 lakhs for this purpose.

##### **Maintenance of Water Quality**

The effluent thus generated in the tunnel contains high suspended solids and hence, it is proposed to construct a settling tank for removal of the suspended impurities. A provision of Rs.4.00 lakh has been earmarked for this purpose. In the project operation phase, a plant colony with 100 quarters is likely to be set up. It is proposed to provide a Aerated lagoon and secondary settling tanks for treatment of effluent from colony before disposal. A provision of Rs.5.00 lakhs be earmarked for this purpose. Thus, for maintenance of water quality, a total provision of (Rs 4.0 + Rs 5.0) Rs.9.00 lakhs shall be earmarked.

##### **Compensatory Afforestation**

The total forest land to be acquired for the project is about  $(35.17+3.439 = 38.609)$  ha. Compensatory afforestation is proposed in lieu of acquisition of forest land as per Forest

Conservation Act (1980). It is proposed to afforest the degraded forest patches of double the amount of forest land i.e.  $(2 \times 38.609) = 77.218$  ha. An amount of Rs 21.58 lakhs has been kept for compensatory afforestation for USF land acquisition.

### **Bio-Diversity Conservation Plan**

#### **Conservation plan for endangered species**

One rare species (*Lagestroemia minuticarpa*) is observed in the project area. It is proposed to afforest an area of 1 ha @ 1600 tree/ha, as a part of compensatory afforestation for the construction of this species. Although the identified rare species is also available in other tropical and subtropical forests of Arunachal Pradesh, the following measures by the project authorities would ensure their continued presence in the affected areas.

- (i) Institutions in Arunachal Pradesh such as SFRI, Tippi Orchid Research Centre, Arunachal University etc. should be supported to conserve the identified rare and threatened category of species.
- (ii) Small grants should be provided to the villagers in catchment areas to cultivate rattan species such as *Calamus flagellum* and *Calamus leptospadix* to ensure their conservation through cultivation. Total provision of Rs 25.40 lakhs has been earmarked for conservation of biodiversity.

#### **Wildlife conservation and Anti-poaching measures**

It is proposed to develop 2 check posts, which shall be operational during construction phase for controlling of poaching activities. Each check post will have 4 guards and a range officer and have appropriate facilities to control poaching.

### **Public Health Delivery System**

#### **Development of medical facilities**

It is recommended that one dispensary and two first aid posts be developed at two sites which are easily accessible from major construction sites and labour camps.

Total provision for implementation of various public health measures shall be about Rs.62.92 lakhs which includes various recurring and non-recurring costs.

#### **Stabilization of Quarry and Muck Disposal Sites**

The quarry slopes after excavation of the construction material as well as sites after muck disposal need to be stabilized. The quarry slopes be maintained at a slope 1:0.6 and stabilized with grass, herbs & shrubs etc. A provision of Rs.396.06 lakhs has been earmarked for the quarry slope muck disposal site stabilization works.

### **Sustenance of Riverine Fisheries**

#### **Provision of minimum flow**

The construction of the proposed project will lead to reduction in flow, downstream of proposed dam especially during dry months. In order to avoid possible loss of aquatic life a minimum flow of about 2.5 cumecs with the depth of 0.5 meter and velocity @ 0.25 m/s shall always be maintained. A provision of Rs 95.0 lakhs has been kept for the scheme.

## Green Belt Development

It is proposed to develop greenbelt around the perimeter of various project appurtenances, selected stretches along the reservoir periphery, etc. It is proposed to afforest about 35 ha of land as a part of Greenbelt Development Plan.

## Control Measure for Jhum Cultivation

Jhumming caters the basic requirement of tribes living in this area. Horticulture as an alternative and subsidiary occupation may be desirable and feasible, provided there is an adequate organization to cater to the production and marketing needs.

Free seeds may be provided @ 400 seeds/ha for 29 ha considering that 29 PAFs will get about 1 ha of land for Horticulture. A provision of Rs 1.2 lakhs has been kept for the scheme.

## Establishment of an Environmental Management Cell

It is recommended that an Environmental Management Cell (EMC) be established to evaluate implementation of environmental mitigatory measures Summary of Impacts and EMP

## 2. CATCHMENT AREA TREATMENT

Total catchment area of Pare H.E.P is 82400 Ha. An amount of Rs 1083.04 Lakh has been kept in the cost estimate under Head X- Environment and Ecology for treatment of the catchment area. The following Engineering and Biological measures have been suggested for the catchment area treatment.

### 1. Engineering measures

- a) Sausage wall
- b) Catch water drain

### 2. Biological measures

- a) Development of nurseries.
- b) Plantation/Afforestation
- c) Pasture development
- d) Social forestry
- e) Vegetative fencing.

As per clause No. 2 (part-A- Specific conditions) of Environmental clearance, the catchment area treatment should be completed within five years. The plan is reproduced below.

Sl. No	Item of work	unit	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> year	4 <sup>th</sup> Year	5 <sup>th</sup> year
<b>1. Engineering Measures</b>							
a	Sausage Wall	No	10	10	10	11	-
b	Step Drain	No	8	8	8	8	-
<b>2. Biological measures</b>							
a	Afforestation ( 1600 trees/ Ha)	Ha	75	75	76.1	-	-
b	Afforestation ( 800 trees/Ha)	Ha	500	500	500	500	498.5
c	Social forestry	Ha	100	100	100	42	-
d	Pasture Development	Ha	1000	1000	1000	1000	987
e	Nursery Development	No	10	10	5	-	-
f	Vegetative fencing	Km	3	3	3	1	-

As the catchment area treatment plan fall under the stipulation of forest clearance, therefore their implementations fall under the purview of State Forest Department. The project authority has to provide the necessary funds for the same.

As per Forest Conservation Act (FCA), 1980, a multi-disciplinary monitoring committee has to be formed for monitoring the implementation of the same.

### **3. DAM BREAK ANALYSIS AND DISASTER MANAGEMENT PLAN**

#### **3.1 Dam Break Analysis**

The National Weather Service's DAMBRK model developed by Dr. D.L. Fread has been used in the study. This model simulates the failure of a dam, computes the resultant outflow hydrograph and also simulates movement of the dam break flood wave through the downstream river valley.

The settlements falling within inundation area are Boka, Chipute, Midpu and Lekha which will be affected partially. Secondly, these falls within 25 km downstream of the proposed dam and time taken by peak flood to reach there is about five hours. Hence it does not leave any possibility of any evacuation. Preventive actions and emergency preparedness are the only solution.

#### **3.2 Disaster Management Plan (DMP)**

The DMP is briefly described in the following paragraphs: A provision of Rs 42.50 lakhs has been kept for implementation of this plan.

##### **Surveillance**

For the Project, rigorous and effective dam safety surveillance and monitoring programme, encompassing rapid analysis and interpretation of instrumentation and observation data along with periodic inspection and safety reviews and evaluation needs to be developed. Such programmes will have to be implemented during the following five critical phases in the life cycle of a dam:

1. Design and Investigation Phase
2. Construction Phase
3. First Reservoir Filling
4. Early Operation Period
5. Operation and Maintenance Phase

##### **Preparation of Inundation Map**

An inundation map depicts the downstream areas vulnerable to inundation by the flood generated in the event of dam break. The map so prepared serves as a guide for deciding the vulnerable areas where Emergency Action Plan (EAP) is to be executed.

##### **Emergency Action Plan (EAP)**

EAP shall present warning and notification procedures to follow during the monsoon season in case of failure or potential failure of the dam. The objective is to provide timely warning to nearby residents and alert key personnel responsible for taking action in case of emergency.

## **Preventive Action**

Once the likelihood of an emergency situation is suspected, action has to be initiated to prevent a failure. The point at which each situation reaches an emergency status shall be specified and at that stage the vigilance and surveillance shall be upgraded both in respect of time and level. At this stage a thorough inspection of the dam should be carried out to locate any visible sign(s) of distress.

Engineers responsible for preventive action should identify sources of equipment needed for repair, materials, labour and expertise for use during an emergency.

## **Communication System**

An efficient communication system and a downstream warning system are absolutely essential for the success of an emergency preparedness plan. The difference between a high flood and a dam-break situation must be made clear to the downstream population.

## **Evacuation Plans**

Emergency Action Plan includes evacuation plans and procedures for implementation based on local needs. These could be:

- Demarcation/prioritisation of areas to be evacuated.
- Notification procedures and evacuation instructions.
- Safe routes, transport and traffic control.
- Safe areas/shelters.

## **Functions and responsibilities of members of evacuation team.**

Any precarious situation during floods will be communicated either by an alert situation or by an alert situation followed by a warning situation. An alert situation would indicate that although failure or flooding is not imminent, a more serious situation could occur unless conditions improve. A warning situation would indicate that flooding is imminent as a result of an impending failure of the dam. It would normally include an order for evacuation of delineated inundation areas.

## **Evacuation Team:**

It will comprise of following official/Representative:

- i) D.M./his Nominated officer (To peacefully relocate the people to places at higher elevation with state administration)
- ii) Engineer in charge of the Project (Team Leader)
- iii) S.P./Nominated Police Officer (To maintain law & order)
- iv) C.M.O. of the area (To tackle morbidity of affected people)
- v) Sarpanch/Affected Village Representative to execute the resettlement operation with the aid of state machinery & project proponents.
- vi) Sub committees at village level.

The Engineer-in-charge will be responsible for the entire operation including prompt determination of the flood situation time to time. Once the red alert is declared the whole state machinery will come into swing and will start evacuating people in the inundation areas delineated in the

Inundation maps. For successful execution, annually Demo exercise will be done. DM is to monitor the entire operation.

### **Public Awareness for Disaster Mitigation**

In addition, guidelines that have to be followed by the inhabitants of flood prone areas, in the event of a flood resulting from dam failure, which form part of public awareness for disaster mitigation may also include following :

- i) Listen to the radio for advance information and advice.
- ii) Disconnect all electrical appliances and move all valuable personal and household goods beyond the reach of flood water, if one is warned or if one suspects that flood waters may enter the house.
- iii) Move vehicles, farm animals and movable goods to the higher place nearby
- iv) Keep sources of water pollution i.e. Insecticides out of the reach of water.
- v) Turn off electricity and gas one has to leave the house.
- vi) Lock all outside doors and windows if one has to leave the house.
- vii) Do not enter flood waters.
- viii) Never wander around a flood area

### **Notifications**

Notifications would include communication of either an alert situation or an alert situation followed by a warning situation. An alert situation would indicate that although failure or flooding is not imminent, a more serious situation could occur unless conditions improve. A warning situation would indicate that flooding is imminent as a result of an impending failure of the dam. It would normally include an order for evacuation of delineated inundation areas.

### **Notification Procedures**

Copies of the EAP that also includes the above described inundation map are displayed at prominent locations, in the rooms and locations of the personnel named in the notification chart. For a regular watch on the flood level situation, it is necessary that the flood cells be manned by two or more people so that an alternative person is available for notification round the clock. For speedy and unhindered communication, a wireless system is a preferable mode of communication. Telephones may be kept for back up, wherever available. It is also preferred that all the flood cells, if more than one, are tuned in the same wireless channel. It will ensure communication from the dam site to the control rooms. The communication can be established by messenger service in the absence of such modes of communication.

## **4. ENVIRONMENTAL MONITORING PROGRAMME**

Environmental Monitoring Programme for the project construction and operation phase has been suggested and a provision of Rs 49.50 lakhs has been kept for this purpose.

## **5. REHABILITATION AND RESETTLEMENT PLAN**

A suitable plan has been drawn for physical and socio-economic rehabilitation of the project affected people. The R&R Plan for the displaced project affected families has been formulated as per provision and guide lines of existing National policy on R&R-2007 (NPRR-2007) formulated by the department of land resources, Ministry of Rural Department, Govt of India and R&R policy-2008 formulated by Govt. of Arunachal Pradesh.

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## X- ENVIRONMENT &amp; ECOLOGY

Estimated Cost			
Sr. No.	Description	Amount as proposed in EIA Report	Approved Amount
		Lakh Rs	Lakh Rs
1	Solid waste collection and disposal system	42.30	20.00
2	Sanitary facilities in labour camps	26.30	17.25
3	Fuel distribution to labours during construction	37.35	37.35
4	Landscaping and Restoration of construction area	4.00	4.00
5	Bio-diversity conservation	53.30	25.40
6	Maintenance of water quality	9.00	9.00
7	Public health/Health delivery system	116.20	62.92
8	Stabilization of quarry & muck disposal sites ( <b>unit rate of boulder collection modified from Rs 800/cum to Rs 387.50 per cum as per analysis of rate</b> )	815.84	396.06
9	Sustenance of riverine fisheries	95.00	95.00
10	Greenbelt development ( <b>provision already made under M-Plantation &amp; K-Buildings</b> )	13.70	0.00
11	Control measures for Jhum cultivation	1.20	1.20
12	Rehabilitation & Resettlement Plan ( <b>Rs. 384.75 Lacs considered under 'B' Land</b> )	0.00	0.00
13	Catchment Area Treatment Plan (CAT) ( <b>Rate revised</b> )	1416.30	1083.04
14	Disaster Management Plan (DMP)	42.50	42.50
15	O& M Cost @Rs 14.70 lakh per year for 4 years with 10% escalation every year ( <b>Provision modified being on higher side</b> )	140.20	68.23
16	Implementing monitoring programmes @ Rs 9.9 lakh/yr for 5 years	49.50	49.50
17	Treatment of effluent for septic tank @ 4 lakh/yr for 4 years ( <b>Provision modified being on higher side as well as duplicate</b> )	33.60	16.00
18	Compensatory Afforestation for USF land acquisition ( <b>contingency modified to 3%</b> )	27.43	21.58
19	NPV on USF Land	142.79	142.79
	<b>Total</b>	<b>3066.51</b>	<b>2091.82</b>