

**REPORT ON MONITORING THE IMPLEMENTATION OF ENVIRONMENTAL SAFEGUARD OF
PARE H.E.PROJECT (110 MW), ARUNACHAL PRADESH
For the Period of 1st April 2018 to 30th September 2018.
Monitoring Report (Part-I)**

(Data sheet)

1.	Project Type: River-Valley/Mining/ Industry/Thermal/ Nuclear/Other (Specify)	River Valley
2.	Name of the Project	Pare H.E. Project.
3.	Clearance letter (s) OM No. and Date	No. J-12011/12/2006-IA-1, Dated 13/9/06 No. J-12011/12/2006-IA-1, Dated 19/9/06
4.	Locations:	
	a) District(s)	Papum Pare.
	b) State (s)	Arunachal Pradesh.
	c) Latitudes/Longitudes	Dam site: Latitude (N) 27°14'13" Longitude (E) 93°48'56"
		Power House site: Latitude (N) 27°12'46" Longitude (E) 93°48'30"
5.	Address of Correspondence:	
	a) Address of Concerned Project Chief Engineer. (With Pin Code & Telephone/Telex/Fax Nos.)	Head of Project, Pare H.E. Project, NEEPCO Ltd, Doimukh, Arunachal Pradesh, Pin Code – 791 112 Fax No:- 0360-2660253 E-mail : pare_project@rediffmail.com
	b) Address of Executive Project Engineer/Manager (With Pin Code & Telephone/Telex/fax Nos.)	---Do---
6.	Salient Features:	
	a) Of the Project	As enclosed in ANNEXURE-I
	b) Of the Environmental Management Plans	As enclosed in ANNEXURE-II
7.	Break-up of the Project Area (Forest & Non-Forest):	
	a) Submergence area (Forest & Non-Forest)	111.6 Ha at FRL.

	b) Others	86.88 Ha.
8.	Break-up 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.
	Total	277 Nos.
	a) SC, ST/Adivasis	277 PAFs
	b) Others	Nil
9.	Financial Details	
	a) Project cost as originally planned and subsequent revised estimates and the years of price reference	Rs 573.99 Cr at June'07 PL including IDC & FC as per CCEA Clearance. Revised cost estimate at May 2018 PL – Rs 1754.81 Crs including IDC & FC - not yet approved.
	b) Allocation made for Environmental Management Plans, with item-wise and years –wise break-up	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 1659.85 cr as on 30.09.2018.
	f) Actual expenditure incurred on the Environmental Management plans so far.	Rs 20.55 Cr as on 30.09.2018.

10.	Forest land Requirement:	
	a) The status of approval for a diversion of forest land for non forestry use.	<p>(i) Final notification for diversion of 35.17 ha of forest land was accorded on 13th 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.</p> <p>(ii) Final approval for diversion of 3.439 ha of forest land was accorded by the Chief Conservator of Forests (Cons) & Nodal Officer (FC), Govt. of Arunachal Pradesh, Itanagar vide letter NO.FOR. 242/CONS/2009/ 13547-49 dated 9th August, 2010.</p> <p>(iii) Final approval for diversion of 6.431, 4.8735 and 3.674 Ha of forest land for construction of LILO lines was accorded by the PCCF (P&D), Env & Forest, Govt. of Arunachal Pradesh, Itanagar vide letter NO.FOR. 520/CONS/2013/1613-17 dated 16.11.2015, NO.FOR.537/CONS/2013/1618-22 dated 16.11.2015 and NO.FOR. 542/CONS/2013/1623-27 dated 16.11.2015 respectively.</p>
	b) The status of compensatory afforestation, if any	An amount of Rs 155.63 Lakh has already been paid to State Forest Dept. Govt. of Arunachal Pradesh for implementation of the Compensatory afforestation plan for conversion of forest land for project, 33 KV line and LILO lines.
	c) The status of clear felling	The same shall be carried out through State Forest Department in areas where felling of trees is absolutely necessary.
	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.	The status of clear felling in non-forest areas (such as submergence area of reservoir, approach roads), if any, with quantitative information.	The trees from reservoir area have been cleared by State Forest Department before impounding of Reservoir.
12.	Status of Construction:	
	a) Date of commencement (actual and/or planned)	31.08.2009.

	b) Date of completion (actual and /or planned)	Commissioned on i) 1 st Unit- 28 th May 2018. ii) 2 nd Unit- 21 st May 2018.
13.	Reasons for the delay if the project is yet to start.	The Project has been commissioned.
14.	Date of Site Visits:	
	a) The dates on which the project was monitored by the regional office on previous occasions, if any	13 th February, 2012, by Mr. S.C. Katiyar, Joint Director, MoEF, Shillong. 25 th April, 2012, by Dr. H. Tynsong, Scientist C, MoEF, Shillong. 14 th December 2016, by Dr. H. Tynsong, Scientist C, MoEF, Shillong.
	b) Date of site visit for this monitoring report	
15.	Details of correspondence with Project authorities for obtaining action plans, information & status of compliance to safeguards.	The status of compliance of the conditions stipulated by MoEF while granting environment clearance to the project is stated in PART-II.

PART-II
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	Status of compliance
i)	<i>Lagerstromia minuticarpa</i> 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 execution of the work, tendering under process.
ii)	Catchments Area Treatment Plan as has been proposed should be completed in five years.	The matter was taken up with the Principal Chief Conservator of Forests cum Principal Secretary, Department of Environment & Forests, Govt. of Arunachal Pradesh. As per instruction of the Department, an amount of Rs 10.83 Cr has been released to Compensatory Afforestation Fund (CAF-Arunachal- CA-1601) of Govt. of Arunachal Pradesh, Department of Environment & Forests for implementation of the Scheme. The works of CAT Plan has been initiated by Forest Deptt. Afforestation, Social Forestry, Nursery Development, Vegetative Fencing and Engineering Measures (construction of sausage wall & catch water drain) are being taken up in Sagalee Forest Division.
iii)	Clearance from National Committee of Seismic Design Parameters (NCSDP) of CWC should be obtained.	Accorded in the 21 st 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, breeding of mosquito and resulting malaria or mosquito borne diseases can increase. If such situation arises, it will be the	All precautionary measures have been taken to control the mosquito borne diseases. In general, the flow of the river is very fast. However, as and when required, the river is channelized to stop the formation of small pools poodles. NEEPCO is providing medical facilities to all employees through the project dispensary. Free medical camps are being regularly organised in the project affected areas.

	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.	
v)	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>Full compensation to all the 277 families has already been paid amounting to Rs 16.408 Cr. for their loss of land, house, agriculture, horticulture and plantation etc.</p> <p>The Govt. of Arunachal Pradesh has constituted the R&R Committee for implementation of R&R Plan of Pare H.E. Project. The Committee consists of the following members.</p> <ol style="list-style-type: none"> 1. Representative from Sopo, Jampa and Hoz Village, 2. Project affected people, 3. Women representative, 4. NGO representative, 5. Representative of D.C and 6. Head of Project, Pare H.E. Project. <ul style="list-style-type: none"> • Necessary payment amounting to Rs 2.56 Cr has been released by NEEPCO to the District Authority towards land and other assets compensation for implementation of R&R scheme and subsequently, the land has been acquired and handed over to NEEPCO by the District Administration on 1st June, 2012. • NEEPCO has already released Rs 15.65 Cr. to the Deputy Commissioner, Papum Pare District (Administrator for R&R) for implementation of R&R Scheme against the PAFs on the notified and acquired land for Pare H.E. Project at Sopo Village under Doimukh circle. Total expenditure for R&R including land is Rs 18.21 Cr. • The R&R scheme has been completed in all respect and the rehabilitation cottages have been allotted to the eligible PAFs by the Deputy Commissioner Papum Pare district on 28th October 2015 vide allotment order No. DC/PP/NEEPCO/PC/2015/9280.
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 honoured in letter	NEEPCO honoured the assurance/ commitments given in the Public Hearing. NEEPCO extended all possible help to the

	and spirit.	<p>project affected families.</p> <ul style="list-style-type: none"> • All efforts are being made to employ locals wherever necessary. • NEEPCO has already recruited 32 nos. of local tribal people against the C&D categories job. • Offering scholarships to the eligible candidates from the affected families. • All works (except of the specialised jobs) are awarded to local contractors. • Conducting Capacity Building training programmes for Unemployed Educated Youths. • 50 numbers of candidates from PAFs are given vocational training at ITI and they have been given permanent appointed in NEEPCO. • Cluster development livelihood project – Mushroom cultivation for 50 numbers of families residing in the vicinity of the project has been implemented by NEEPCO under CSR & S scheme.
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 and NO.FOR. 242/CONS/2009/13547-49 dated 09.08.2010.</p> <p>The following payments have been released to Forest Deptt.</p> <p>a) Compensatory Afforestation (CA)- Rs 155.23 lakh</p> <p>b) NPV- Rs 398.23 lakh</p> <p>c) Royalty against timber- Rs 97.88 lakh.</p>
ix)	During the lean season 10.52 cumecs water flow is available in the river. 10% of the available water should be released downstream of the dam for sustenance of aquatic life.	Design provisions have been kept in the concrete gravity Dam structure to release the adequate water in the downstream of dam during lean season.
x)	Any other clearance from any other organization if required should be obtained.	<p>Are being complied.</p> <p>Renewed the consent to establish/operate the Pare H.E. Project granted by the Arunachal Pradesh State Pollution Control Board (APSPCB) upto Sept 2018. Applied for renewal of the consent which is under process.</p>

Part-B: General conditions

Sl. No.	Stipulations	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.	Centralised mess facilities are being provided for the workers at Sopo & Jampa by the contractors. The LPG is being used in the mess as a fuel.
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 opened. The major contractors are providing required fuel, medical facilities as well as recreational facilities to the labourers. NEEPCO has medical & recreational facilities for all the employees.
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.	NEEPCO is providing medical facilities to all employees through the project dispensary. Periodical health check-up camps are being organized at project site by experienced Doctor available in the Project. The package contractors are also providing medical facilities to the labourers as and when required.
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.	Already done.
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 lakh has been kept for Environment & Ecology (Annexure-III).
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. Scientist C, MoEF, NERO, Shillong visited the Project on 25.04.2012 to oversee the effective implementation of the suggested safeguard measures.
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.

SALIENT FEATURES OF PARE H.E. PROJECT (110 MW), ARUNACHAL PRADESH

NAME OF PROJECT		PARE H E PROJECT (110 MW)	
1.	Location		
	State	Arunachal Pradesh	
	District	Papum Pare	
	Village		
	Powerhouse	Sopo	
	Dam Site	Jampa	
	Access		
	Airport	North Lakhimpur, - around 55 km	
	Rail Head	Upiya/Naharlagun - around 20 km	
	Road Head	Arunachal Transhighway upto Project site.	
	Geographical co-ordinates		
		Dam Site	Power House
	Latitude (N)	27° 14' 13"	27° 12' 46"
	Longitude (E)	93° 48' 56"	93° 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	
2.	Meteorology		
	Average Rainfall	3800 mm	
	Atmospheric Temperature		
	Average Maximum Temp.	31.8° C	
	Average Minimum Temp.	16.1° C	
3.	Hydrology at Intake		
	Catchment Area	824 sq. km of Dikrong river at Proposed Pare HEP Dam site.	
	Flood flow (PMF)	5000 Cumec	
4.	Reservoir		
	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
5.	Dam	
	Type of Dam	Concrete Gravity Dam
	Length of Dam	134.275 m
	Overflow	49.2 m
	Non-overflow	85.075 m
	Width at the Top of Dam	8 m
	Top Elevation of Dam	248.00 m
	Deepest Foundation Level of Dam	185.00 m
	River Bed Level (average)	200m MSL
	Upstream Slope	0.1:1 from El 235 for NOF Blocks 0.4:1 from EL 211.408 for OF Blocks
	Downstream Slope	0.8:1 from El 240.50
6.	Spillway	
	Capacity	5000 Cumec (PMF)
	No. of Gates	3
	Size of Gates	10.4 m(W) x14 m (H)
	Crest Level	216 m
	Height of breast wall.	18 m
7a.	Headrace Tunnel	
	Diameter	7.5 m
	Length	2828 m
	Design flow	185 cumecs
	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 Adit. Adit-I- 113.0 m long & 7.5 m dia and Adit-II- 83.0 m long and 7.5 m dia.
7b.	Diversion Tunnel	
	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 Cumecs
	Invert Level at Tunnel Inlet	197 m
	Invert level at Tunnel outlet	196 m
8.	Surge Shaft	

	Type	Restricted Orifice, Non-Overflow
	Diameter and Height	18 m dia. 59 m Height (from El 214 to 273m)
	Orifice Diameter	2.9 m
9.	Pressure Shaft	
	Diameter	6.40 m
	Length	254.0 m
	Bifurcated (penstock) Diameter	4.5 m
10.	Power House	
	Type	Surface
	Design Head	67.36 m (net)
	Size of Power House	68 m long, 31 m 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
11.	Tailrace Channel	
	Details	Open Channel 30.32 m wide, 53 m long
12.	Electro-mechanical	
	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
13.	Power	
	Design discharge	185 cumecs

	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
14.	Switchyard	
	Type	Outdoor
	Size	99 m X 72 m
	No. of Bays	8 nos. of 132 kV Bays (2 nos. of GT Bays, 1 no. each of station Transformer and Bus Coupler bay and 4 nos. of line bays)
15.	Power Evacuation	LILO of existing 132 kV Ranagnadi H.E Project – Nirjuli single circuit line at Pare Project LILO of 132 kV RHEP Itanagar.
16.	Costs	
	Project Cost	Rs 573.99 Cr. at June' 07 PL (including IDC of Rs 67.66 Cr. & Financing Charges of Rs 0.40 Cr.) as per CCEA Clearance. Revised cost estimate at January 2016 PL amounting to Rs 1581.04 Crs is under active consideration at Ministry of Power, Govt. of India.
	Cost per MW	Rs5.22 Cr. (Original) , Rs 14.37 Crs (Revised)
17.	Generation Cost and Tariff	
	Tariff in First year with 14% Return on Equity	Original Rs 2.38/ KWH (Original) , Revised - Under finalisation.
	Levellised Tariff	Original - Rs 2.01/ KWH (Original), Revised - Under finalisation.

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 lakh 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 lakh 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.

Provision of water supply

The water for drinking purpose is collected from the rivers or streams flowing upstream of the labour camps. The water is stored in tanks and supplied for use. Efforts should be made that septic tanks be placed far from water resources. The settlements of the population likely to migrate in the area to provide various allied activities should be placed far from the drinking water sources.

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 `17.25 lakh has been earmarked for this purpose.

Provision for Free Fuel Distribution

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 Areas

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 `4.00 lakh for this purpose.

Compensatory Afforestation

The total forest land to be acquired for the project is 198.48 ha and out of which about 163.31 ha is the Private/non forest land. 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. 70.50 ha. An amount of Rs 155.63 lakh has been released for compensatory afforestation for USF land acquisition to Forest Department.

Bio-Diversity Conservation Plan

Conservation plan for Threatened 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 lakh has been earmarked for conservation of biodiversity.

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 lakh be earmarked for this purpose. Thus, for maintenance of water quality, a total provision of (Rs 4.0 + Rs 5.0) Rs 9.00 lakh shall be earmarked.

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 `62.92 lakh which includes various recurring and non-recurring costs.

Control of air pollution

It is proposed to make it mandatory for the contractor involved in crushing activities to install cyclone in the crusher. The fine aggregates staked after crushing needs to be staked till the time it is consumed. It is suggested that these stakes should be regularly sprayed with water to prevent the entrainment of fugitive emissions.

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 lakh 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 1.52 cumecs will be released during dry season as per Environmental clearance.

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 lakh has been kept for the scheme.

Establishment of an Environmental Management Cell

It is recommended than an Environmental Management Cell (EMC) be established to evaluate implementation of environmental mitigatory measures.

2. CATCHMENT AREA TREATMENT

Total catchment area of Pare H.E. Project is 82400 Ha. An amount of Rs 1083.04 Lakh has been released to State Forest Department for implementation of CAT Plan. 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 st Year	2 nd Year	3 rd year	4 th Year	5 th year
1. Engineering Measures							
a	Sausage Wall	No.	10	10	10	11	-
b	Step Drain	No.	8	8	8	8	-
2. Biological measures							
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 lakh 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 Rs49.50 lakh 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.

X-ENVIRONMENT & ECOLOGY

Estimated Cost			
Sl. No.	Description	Amount as proposed in EIA Report	Approved Amount
		Rs in Lakh	Rs in Lakh
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 (unit rate of boulder collection modified from Rs 800/cum to Rs 387.50 per cum as per analysis of rate)	815.84	396.06
9	Sustenance of riverine fisheries	95.00	95.00
10	Greenbelt development (provision already made under M-Plantation & K-Buildings)	13.70	0.00
11	Control measures for Jhum cultivation	1.20	1.20
12	Rehabilitation & Resettlement Plan (Rs 384.75 Lakh considered under 'B' Land)	0.00	0.00
13	Catchment Area Treatment Plan (CAT) (Rate revised)	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 (Provision modified being on higher side)	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 @ Rs 4 lakh/yr for 4 years (Provision modified being on higher side as well as duplicate)	33.60	16.00
18	Compensatory Afforestation for USF land acquisition (contingency modified to 3%)	27.43	21.58
19	NPV on USF Land	142.79	142.79
	Total	3066.51	2091.82