

Dated Killar, the 24-7-2023

From: -

Divisional Forest Officer,  
Pangi Forest Division, Killar

To: - Chief Conservator of Forests (T)  
Chamba Circle Chamba (HP)

Subject: -

**Diversion of 211.8427 hectare of forest land for the construction of Dugar 500 MW Hydro Electric Project in favour of NHPC, within the jurisdiction of Pangi Forest Division, District Chamba (HP).**

Memo:-

Kindly refer to Government of India Ministry of Environment, Forests and Climate Change letter No. 8-15/2022-FC dated 26-06-2023 on the subject cited above.

2. The point wise observations raised vide your office memo under reference is attended as under:-

- 1. Point No. i:** The status of 04 CA sites namely Phindpar and Rogi falls under Demarcated Protected Forest vide notification No. 3.3.74/74-SF(Part.II) dated Shimla, the 15<sup>th</sup> October, 1976 under sub-section (3) of section 29 of the Indian Forest Act, 1927(copy enclosed). Whereas according to working plan of Pangi Forest Division Killar Dhar-1 and Killar Dhar-2 falls under Gahars and Dharas (copy enclosed), which is Un-Demarcated Protected Forests (UPF).
- 2. Point No. ii:** As stated by the user agency NOC for mining activities of the Project has been obtained form Mining Department vide letter dated 28.10.2023(copy enclosed as **Annexure-1**). For meeting the requirement of coarse and fine aggregates, three rock quarry sites such as Dugar Rock Qurries (DRQ) have been identified and marked as DRQ-01 (Quarry site 1:- Upstream of Punto Hasku Bridge), DRQ-2 (Quarry site 2:- Downstream of Punto/Husku Bridge), and DRQ-6 (Quarry site 3:- Near village Dharwas ) and two River shoal deposits/Barrow area (FAS-01 Near Tail Race Outfall and FAS-02 Tail end of Reservoir near Findru village) are proposed for quarrying of construction materials. For this purpose, total of 8.625 ha. Quarry area and 3.880 ha. Borrow area have been proposed for diversion of forest land under this forest proposal. The EIA/EMP studies has been carried out by independent Environment consultant and landscaping restoration plan of quarry area has been proposed under EMP. The EIA/EMP study was appraised/examined by Expert Appraisal Committee (EAC) of MoEF&CC, New Delhi in meeting held on 29-08-2022, where-in EAC has recommended for grant of Environment Clearance. For approval of Mining Plan of above quarry sites and Barrow areas from Government of Himachal Pradesh on-line mining application has been submitted by Project to Geological wing, Department of Industries, Govt. of HP. After examination of the proposal, State Geologist vide letter dated 26.09.2022 has framed a Committee comprising of officer from Forest, PWD, IPH, HSPCB and Mining under the Chairmanship of SDM, Pangi for joint Inspection. The joint site inspection for

approval of mining plan has been conducted by the Committee on 02.06.2023. therefore, approval of Mining Plan of above quarry sites and Borrow areas form Government of Himachal Pradesh is under progress and will be submitted as soon as approval has been obtained from competent authority.

3. **Point No. iii:** The mitigation plan for restoration of quarry sites has been proposed under EIA/EMP study. After excavation of the required material, these quarry sites will be restored using various engineering, bioengineering and biological measures. The copy of Mitigation and Restoration measures proposed in EMP is enclosed as **Annexure-II**. The EIA/EMP report was appraised/examined b Expert Appraisal Committee (EAC) of MoEF&CC, New Delhi in meeting held on 29.08.2022, where-in EAC has recommended for grant of Environment Clearance. Hence, Mitigation Plan will be implemented to avoid the adverse impact on ecology and environment of the area due to mining.
4. **Point No. iv:** The saplings mentioned in Part-II has been reviewed and revised/rectified according to enumeration list (copy enclosed as **Annexure-III**). The large – sized trees of Girth Class 121-150 cm and >150 cm have been recorded in Part –II and properly filled as per category of Girth Class on Parivesh portal. The small –sized sampling/poles of Girth Class 0-30 cm (0-10 cm DBH) has not been recorded due to very small size, negligible importance and its Class, Rate, Volume factor are not determined/given in Working Plan of Pangi Forest Division.
5. **Point No. V:** The Cost Benefit ratio of the project has been revised & enclosed as **Annexure-IV** and same has been uploaded on Parivesh portal.
6. **Point No. Vi:** The cost of the project has been rectified to Rs. 398734 lac as per CEA, Ministry of Power's letter No. CEA-SY-25-44/3/2020-PAC Division/74-115 dated 26.04.2022 on Parivesh portal.
7. **Point No. Vii:** Need full has been done according to revised rates of NPV prescribed vide letter dated 06.01.2022 and same has also been uploaded on Parivesh portal as additional information.
8. **Point No. VIII:** Pangi area is habitant of unique endemic tree species of Pinus geradina and Corylus spp. Plantation of these unique endemic species will be encouraged under Compensatory Afforestation Plan, Catchment Area Treatment Plan, Green belt development plan etc. which are proposed with appropriate financial provision under Environment Management Plan of the project.

9. **Point No. IX:** It is intimated that due to hearing in Hon'ble Court at Chamba, the site was not inspected with IRO Shimla. However, concerned Forest Guard was present during the site inspection.

**Submitted for favour of information and further necessary action under FCA-1980 please.**

Encl: - As above

  
**Divisional Forest Officer,**  
**Pangal Forest Division, Killar**  
**Killar 176323**

# APENDIX-IX

(Notifications of new D.P.F.s)

## FOREST DEPARTMENT

### NOTIFICATION

Simla-2, the, 15th October, 1976

No3.3.74/74-SF (Part.II)—Whereas the nature and extent of the rights of the Government and private persons on or over the forest land and waste land comprised in the schedule hereto appended have been enquired in to and recorded under sub-section (3) of section 29 of the Indian Forest Act, 1927.

And whereas the forest land and wasteland shown in the aforesaid schedule are the properties of the Government or the Government has proprietary rights therein or the Government is entitled to the whole or any part of the produce thereof.

Now, therefore in exercise of the powers conferred by sub-section (1) of section 29 of the said Act the Governor of Himachal Pradesh is pleased to declare that the provisions of Chapter IV of the said Act shall apply to the land and wasteland which shall hereafter be called a Protected Forest.

### SCHEDULE

Range: Kilar Division: Paifgi Tehsil: Pangl District: Chamba

Case file No.	Sl. No	Name of Forest	Name of Mohal	Khasra No.	Area in Acres	Cardinal Boundaries
842	1	Digrehi I	Dharwas  Chaloli	400, 402, 398, 396, 401  1, 74	150	N Lands of mohal Kuthah and mohal Chaloli. S D.P.F. Pinchho, nala bhujal. E lands of mohal Chaloli. W Lands of mohal Dharwas.

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Divisional Forest Officer  
Pangl Forest Division  
Kilar 176323

Case file No.	Sl. No	Name of Forest	Name of Mohal	Khasra No.	Area in Acres	Cardinal Boundaries
870	29	Mindhhal	Mindhhal	1, 2, 3/1, 130, 211/1, 363/1, 364, 365/1, 366.	217	N Boundary of mohal Findpaar and D.P.F. Findpaar. S Lands of mohal Mindhal and D.P.F. Barneu. E boundary of River Chander Bhaga. W Boundary of Dhar Bhasennu and D.P.F. Barneu.
871	30	Barneu	Mindhhal	258, 260, 261, 271, 272, 273, 279/1, 298/1, 305, 316/1, 326, 333, 355, 360, 361, 274, 326/1, 359.	460	N Boundary of Nala Mindhal. S Boundary of Nala Kalul and R.F.Kulal. E Boundary of River Chander.Bhaga. W Boundary of Dhar Bhasennu (Mindhal).
872	31	Phindpaar	Phindapaar	1, 2, 3, 4, 4/1, 225/1, 252, 421, 146/1, 43, 47, 47/1, 36, 36/1, 97/1/1, 102, 103/1, 104/1, 146, 147, 226, 226/1, 250, 251, 253, 352, 369, 413, 416/1, 418, 419, 420, 422, 423.	788	N R.F.Kagal. S Boundary of Mindhal and D.P.F. Mindhal. E Boundary of River Chander Bhaga and land of Panhot and Pindapaar. W Boundary of mohal Dhar Bhasennu and Dhar Chachiot.

Case file No.	Sl. No	Name of Forest	Name of Mohal	Khasra No.	Area in Acres	Cardinal Boundaries
878	37	Chium.I	Gowari  Findru	1, 71/1, 91, 93/1, 102/1, 226/1, 92.  1/1, 39/1, 43/1, 168/1, 169, 170.	574	N Boundary of land of mohal Gowari. D.P.F. Sidh-Ka-Dehra and D.P.F. Chium II. S Boundary of land of mohal Findru. E Boundary of D.P.F. Chium II and land of village Gowari. W Boundary of R.F. Sidh-Ka-Dehra and land of village Gowari.
879	38	Dhar Bhusenu (Mindhal)	Dhar Bhusenu	1, 2	2331	N Boundary of mohal Dhar Chachlot. S Boundary of Dhar Chachlot. E Mohal Findpaar and Mindhal. W Boundary of mohal Trakkar Kharundi.
880	39	Rogi	Chacharwas	17, 191/176, 178, 180, 181, 197/183, 198/183, 200/184, 201/184, 190/176, 196/183, 199/184.	551	N Boundary of mohal Takwas. S Boundary of D.P.F. Sidh-ka-Dehra. E Boundary of mohal kothi Kriuni. W R.F. Chhatwani, R.F. Kagal.

S.No.	Name of Forest	Total area (ha.)	Area under Selection W.C. (ha.)	Area under Protection -cum- Rehabilitation W.C. (ha.)	Area under Afforestation -cum-Pasture Improvement W.C.(ha.)
(1)	(2)	(3)	(4)	(5)	(6)
14.	Satsara	124	--	124	--
15	Seli I ✓	40	--	40	--
16.	Seli II ✓	59	--	59	--
17.	Sidh-ka-Dera	93	--	93	--
18.	Bhiun Seri ✓	27	--	27	--
19.	Bindrabani	129	--	129	--
20.	Jhala	28	--	28	--
21.	Patialu	66	--	66	--
22.	Pregraon	22	--	22	--
23.	Punto	38	--	38	--
24.	Rangi ✓	140	--	140	--
25.	Gahr Biana ✓	322	--	--	322
26.	Dhar Kalhotru	47	--	--	47
27.	Gahr Daru ✓	3777	--	--	3777
28.	Gahr Chanchalperi	364	--	--	364
29.	Gahr Jalla-Jhalund	518	--	--	518
30.	Gahr Chara	681	--	--	681
31.	Gahr Bagotu	1575	--	--	1575
32.	Gahr Garhnali	3738	--	--	3738
33.	Gahr Sushar	885	--	--	885
34.	Gahr Charo-Patialla	887	--	--	887
	<b>TOTAL</b>	<b>15106</b>	<b>243</b>	<b>1398</b>	<b>13465</b>
<b>UNDEMARCATED PROTECTED FORESTS</b>					
1.	Dhain	20	--	20	--
2.	Kankialu	40	--	40	--
3.	Sural Bhatori	805	--	805	--
	<b>TOTAL</b>	<b>865</b>	<b>--</b>	<b>865</b>	<b>--</b>
<b>GAHRS AND DHARS</b>					
1	Dharwas Dhar	3240	--	--	3240
2	Kariuni Dhar	202	--	--	202
3	Kharu Gahr	729	--	--	729
4	Kilar Dhar	1620	--	--	1620
5	Kumar Dhar	810	--	--	810
6.	Parmar Dhar	2725	--	--	2725
7	Shinkel Dhar	1795	--	--	1795
	<b>TOTAL</b>	<b>11121</b>	<b>--</b>	<b>--</b>	<b>11121</b>

Req d  
"Annex-I"

NO:Ind/Bhu/Chamba/ Misc- 499  
Office of the Mining Officer, Chamba  
District Chamba (H.P)

Chamba

Dated: 28-10-2020

To

The General Manager  
Dugar HE Project (NHPC)  
Parbati Complex P.O. Nagwan  
Distt. Mandi (H.P)

Sub:

Regarding NOC for Dugar HE Project, Tehsil Pangi Distt. Chamba.

Sir,

In reference to your office letter no. NH/DHEP/HOP-02/2020-21-120-22 dated 25.7.2020 on the subject cited above.

In this context, it is submitted that this office have no objection regarding mining activities in the mentioned area during the construction of Dugar HE Project (449 MW) at Tehsil Pangi District Chamba except the area having Kh.no. 266/1 measuring to 1-10-00 bighas in Mohal/Mauza Sach in Tehsil Pangi, which have already been auctioned by the department for collection of minor mineral to meet out the requirement of development activities in sub division.

Mining Officer  
District Chamba (H.P)

शंकर प्रकाश

28/10/20

महाप्रबंधक  
General Manager  
दुगार जल विद्युत परियोजना  
Dugar Hydro Electric Project  
नगवान, जिला मण्डी (हि.प्र.)-175121  
Nagwan, Distt. Mandi (H.P.)-175121

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appropriate size and transport of the aggregates, and transport of materials to the nearby drainage channels. The quarrying for rock material in the proposed project would lead to the removal of vegetation cover, topsoil and leave the area barren. After the completion of mining activity, these areas will be restored to their normal habitat conditions.

Similarly, excavation and transportation of fine aggregates from the riverbed will cause visual impact because of the removal of a significant part of the riverbed. The extraction of construction material from riverbeds may also affect the river water quality due to an increase in the turbidity levels. This is mainly because the dredged material gets released during one or all the operations mentioned below:

- Excavation of material from the riverbed
- Loss of material during transport to the surface
- Overflow from the dredger while loading
- Loss of material from the dredger during transportation

The cumulative impact of all the above operations will lead to an increase in turbidity levels. Good dredging practices can, however, minimize turbidity. It has also been observed that slope collapse is the major factor responsible for the increase in turbidity levels. If the depth of cut is too high, there is the possibility of slope collapse, which releases a sediment cloud. This will further move outside the suction radius of the dredged head.

#### 10.2.6.2.1 Mitigation and Restoration Measures

Quarrying for construction materials will require **12.505 ha** area (see Table below). Frequent trips for blasting, excavation will also disturb the adjoining forests in the proposed quarry and borrow areas.

S. No.	Facility	Area (ha)
1	Quarry area	8.625
2	Borrow Areas	3.880
	<b>Total</b>	<b>12.505</b>

As seen from **Figures 10.14, 10.15, and 10.16**, the exposed face of three proposed rock quarries viz. DRQ-01, DRQ-02, and DRQ-06 are characterized by steep gradients/slopes varying between 35% and 70% at certain places. The main rock is quartzite schist with pegmatite and schist at DRQ-01 and DRQ-02 while at DRQ-06 it is gneiss with bands of pegmatite and schist.

The general plan to minimize the degradation of the area due to mining for construction material would be as follows:

- Photographically record quarry faces before excavation.
- Building of garland drains around quarry site to capture the runoff and divert the same to the nearest natural drain.
- Construction of concrete guards to check the soil erosion of the area.
- The pit formed after excavation be filled with small rocks, sand and soil.

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राजीव  
 महाप्रबंधक  
 General Manager  
 डगर सहायता प्रकल्प  
 Dugar Hydro Electric Project  
 नर्मदा, विना प्रकल्प  
 Narmada, Dist. Bilaspur (R) 757121

- Grass slabs to be placed to stabilized and to check the surface runoff of water and loose material.

The traditional measures adopted for landscaping of the quarry sites after quarrying are:

#### a. Filling of depressions

Removal of rocks from quarry sites for different construction works will result in the formation of depression and/or craters. The depressions are to be filled by the dumping materials consisting of boulders, rock, gravel, and soil from nearby plant/working sites, followed by compaction to prevent subsidence, porosity, and permeability, and to increase the capacity of fill on site. Compacted inert waste material helps retarding percolation to the quarry base and the adjacent watercourse.

#### b. Laying of the topsoil

The depressions/ craters filled up with rock aggregates will be covered with topsoil. The topsoil will then be covered with geo-textiles like coir, jute, or other locally available bio-degradable material.

#### c. Construction of breast walls

Breast walls are generally constructed at the base of filled-up depressions of quarry sites to provide the necessary support, particularly where there are moderately steep slopes. At the top of the fill, cast concrete strip foundation and erect a random dry-stone rubble wall along the established and/or designed location of field boundaries; place the subsoil simultaneously on the lower sides of the terraces.

#### d. Diversion of runoff

Provision of an effective drainage system to avoid the infiltration of run-off and surface waters into the ground of quarry sites.

Though the above described are broadly recommended for rehabilitation of quarries after the mining operation of over at the site, however, it is recommended that the project proponent undertake detailed site surveys and formulate appropriate engineering measures after ascertaining the steepness of the slope and extent of depression formed after the excavation.

However, during quarrying operations, standard mitigation measures against erosion and sedimentation, noise, and air pollution will be taken, especially for the use of explosives. The most important mitigation measure during blasting and excavation will be to keep noise and dust levels under control by installing noise dampeners, use of sprinklers, and controlled blasting. At the end of the exploitation, quarries will be rehabilitated.

Generally, rehabilitation includes re-establishment of vegetation, restoration of natural watercourses, avoidance of flooding of the excavated areas, achievement of stable slopes, and avoidance of features, which would otherwise constitute a risk to health and safety or a source

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महासंचालक  
General Manager  
डुगर हाइड्रो इलेक्ट्रिक प्रोजेक्ट  
Dugar Hydro Electric Project  
नागवाई, जिला नगवाई-175121  
Nagwaia, Dist. Nagwaia-175121

of environmental pollution. However, revegetation of bare slopes does not seem feasible in these quarries owing to steep slope face and almost complete absence of any soil cover which is a prerequisite for the establishment of any vegetation cover.

After the quarrying activity is over, the site will be splattered with the leftovers of rocks and boulders. These boulders and rocks can support the growth of mosses and lichens, which will act as ecological pioneers and initiate the process of succession and colonization. The boulders of moderate size will be used to line the boundary of a path.

As the tentative cost of landscaping and restoration of quarry sites covering a total area of 8.625 ha (with an average total width of 229 m and length of 1034 m) cannot be estimated till a detailed engineering plan to stabilize the disturbed area of three quarries is formulated by the project proponent to be prepared during pre-construction activities a lumpsum amount of Rs.50.00 lakh have been earmarked for the same.

### 10.2.6.3 Construction Areas & Project Colonies

The proposed Dugar HEP would involve the construction of the dam, powerhouse, adits, diversion tunnel, residential and staff colonies, roads, batching plants, etc. These activities will result either in the modification or destruction of the existing landscape of the area. It is therefore imperative that after the project work and related activities are over restoration work should be carried out in these disturbed areas to bring them back to their similar or near-similar pre-construction conditions and land use. 8.78 ha will be disturbed due to the acquisition of land for the construction of colony area, office colony, and construction facility area.

#### 10.2.6.3.1 Aggregate Processing and Batching & Mixing (BM) Plant

To meet the total requirement of aggregate to produce the concrete for the project 2 nos. of Aggregate Processing Plants (APP) of capacity 120 TPH & 240 TPH for crushing, screening, and washing of coarse and fine aggregate have been proposed. Considering the total quantum of concrete about 11.3 lakh cum including shotcrete two batching & mixing plants, one of 90 cum/h capacity for Powerhouse, TRT areas, etc. and other of 180 cum/h are proposed to be used for catering the concrete production requirement of Dam, Plunge pool, etc. of the project. The Aggregate Processing Plant (APP) and Batching & Mixing (BM) Plants have been proposed to be located on the right bank on the d/s of Dam area as shown in Figures 10.12 & 10.13.

#### 10.2.6.3.2 Workshops

Several workshops for construction-related activities have been proposed on the right bank of Chenab River downstream of the dam and their location on the map is shown in Figure 10.12.

##### i. Heavy Equipment Maintenance (HEM) workshop

Since servicing and repairing facilities are not available near the project area, a fully equipped self-sufficient Heavy Equipment Maintenance (HEM) workshop shall be established to provide

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25/11/21  
 महाप्रबंधक  
 General Manager  
 डुगर जल विद्युत परियोजना  
 Dugar Hydro Electric Project  
 नगरपालिका, जिला मंडल (H.P.)-175121  
 Nagwa, Dist. Mandi (H.P.)-175121

**DUGAR HYDRO ELECTRIC PROJECT (500 MW)**

Pangl at Killar, District Chamba, HP.

(Annexure - III)

Species - wise local / scientific names and girth-wise enumeration of trees at FRL

Abstract of trees									
S. No.	Local Name	Scientific Name	0-30 (cm)	31-60 (cm)	61-90 (cm)	91 - 120 (cm)	121-150 (cm)	>150 (cm)	Total Nos.
1	Akhrot	<i>Juglans regia</i>	0	27	17	19	22	42	127
2	Ash/Shunu	<i>Fraxinus floribunda</i>	0	52	40	35	18	11	156
3	Badah/Willow	<i>Willow/Salix</i>	0	747	206	33	7	3	996
4	Bakharu	<i>Lonicera</i>	0	95	10	5	1	0	111
5	Bhujpatra	<i>Betula utilis</i>	0	0	1	3	0	0	4
6	Chilgoza	<i>Pinus gerardiana</i>	0	331	272	173	82	80	938
7	Deodar	<i>Cedus deodara</i>	0	390	253	253	182	552	1630
8	Fir / Spruce	<i>Pecia simithiana morinda</i>	0	5	3	3	0	6	17
9	Goon	<i>H c natt</i>	0	232	197	188	167	256	1040
10	Jammu	<i>Prunus padus</i>	0	2	1	1	0	0	4
11	Kail	<i>Pinus wallichiana</i>	0	128	54	29	20	63	294
12	Kainth	<i>Pires pisia</i>	0	8	11	8	7	10	44
13	Khadak	<i>Cettris australice</i>	0	559	431	341	149	144	1624
14	Killar	<i>Parrotis Jacquemontiana</i>	0	8963	756	39	1	2	9761
15	Mandar / Mapple	<i>Acer Caesium</i>	0	417	185	97	16	7	722
16	Maral	<i>Almus</i>	0	58	66	42	29	51	246
17	Poplar/Safeda	<i>populus alba</i>	0	19	19	12	5	5	60
18	Payakh	<i>alnus nitida / alder</i>	0	488	442	361	156	182	1629
19	Pingyath	<i>Crataegus</i>	0	32	15	1	1	0	49
20	Robinia	<i>Robinia spedeuocacia</i>	0	2	1	3	0	0	6
21	Sanjal	<i>Fraxinus xynthozeloides</i>	0	677	248	93	14	1	1033
22	Thangi	<i>Corylus Columa</i>	0	111	73	44	25	33	286
	Total Nos of trees at FRL		0	13343	3301	1783	902	1448	20777

  
 (Range Officer)  
 Range Forest Officer  
 Killar Forest Range  
 KILLAR

  
 (Divisional Forest Officer)  
 Fungi Forest Division  
 Killar 176323

**DUGAR HYDRO ELECTRIC PROJECT (500 MW)**

Pangi at Killar, District Chamba, HP.

Species - wise local / scientific names and girth-wise enumeration of trees at FRL - 2 M

Abstract of trees									
S. No.	Local Name	Scientific Name	0-30 (cm)	31-60 (cm)	61-90 (cm)	91 - 120 (cm)	121-150 (cm)	>150 (cm)	Total Nos.
1	Akhrot	<i>Juglans regia</i>	0	27	17	19	21	41	125
2	Ash/Shunu	<i>Fraxinus floribunda</i>	0	52	40	35	18	11	156
3	Badah/Willow	<i>Willow/Salix</i>	0	739	204	31	7	3	984
4	Bakharu	<i>Lonicera</i>	0	95	10	5	1	0	111
5	Bhujpatra	<i>Betula utilis</i>	0	0	1	3	0	0	4
6	Chilgoza	<i>Pinus gerardiana</i>	0	326	269	172	81	77	925
7	Deodar	<i>Cedus deodara</i>	0	381	241	245	181	547	1595
8	Fir / Spruce	<i>Pecia simithiana morinda</i>	0	5	3	3	0	6	17
9	Goon	<i>H c natt</i>	0	232	197	187	167	256	1039
10	Jammu	<i>Prunus padus</i>	0	2	1	1	0	0	4
11	Kail	<i>Pinus wallichiana</i>	0	123	50	29	20	61	283
12	Kainth	<i>Pires pisia</i>	0	8	11	8	7	10	44
13	Khadak	<i>Cettris australice</i>	0	551	425	337	146	142	1601
14	Killar	<i>Parrotis Jacquemontiana</i>	0	8946	752	38	1	2	9739
15	Mandar / Mapple	<i>Acer Caesium</i>	0	413	184	94	16	7	714
16	Maral	<i>Almus</i>	0	57	64	40	29	51	241
17	Poplar/Safeda	<i>populus alba</i>	0	18	19	12	5	4	58
18	Payakh	<i>alnus nitida / alder</i>	0	481	430	355	151	180	1597
19	Pingyath	<i>Crataegus</i>	0	32	15	1	1	0	49
20	Robinia	<i>Robinia spedeuocacia</i>	0	2	1	3	0	0	6
21	Sanjal	<i>Fraxinus xynthozeloides</i>	0	671	241	92	14	1	1019
22	Thangi	<i>Corylus Columa</i>	0	110	69	44	25	33	281
	<b>Total Nos of trees at FRL -2 M</b>		0	13271	3244	1754	891	1432	20592

  
 (Range Officer)  
 Range Forest Officer  
 Killar Forest Range  
 CHAMBA

  
 (Divisional Forest Officer)  
 Pangi Forest Division  
 Killar 176323

**DUGAR HYDRO ELECTRIC PROJECT (500 MW)**

Pangi at Killar, District Chamba, HP.

Species - wise local / scientific names and girth-wise enumeration of trees at FRL - 4 M

Abstract of trees									
S. No.	Local Name	Scientific Name	0-30 (cm)	31-60 (cm)	61-90 (cm)	91 - 120 (cm)	121-150 (cm)	>150 (cm)	Total Nos.
1	Akhrot	<i>Juglans regia</i>	0	27	17	19	21	40	124
2	Ash/Shunu	<i>Fraxinus floribunda</i>	0	51	39	35	18	10	153
3	Badah/Willow	<i>Willow/Salix</i>	0	730	200	29	7	3	969
4	Bakharu	<i>Lonicera</i>	0	95	10	5	1	0	111
5	Bhujpatra	<i>Betula utilis</i>	0	0	1	3	0	0	4
6	Chilgoza	<i>Pinus gerardiana</i>	0	319	266	171	79	75	910
7	Deodar	<i>Cedus deodara</i>	0	368	232	234	180	536	1550
8	Fir / Spruce	<i>Pecia simithiana morinda</i>	0	5	3	3	0	6	17
9	Goon	<i>H c natt</i>	0	232	197	187	167	256	1039
10	Jammu	<i>Prunus padus</i>	0	2	1	1	0	0	4
11	Kail	<i>Pinus wallichiana</i>	0	118	46	29	18	59	270
12	Kainth	<i>Pires pisia</i>	0	8	11	8	7	10	44
13	Khadak	<i>Cettris australice</i>	0	548	424	336	145	140	1593
14	Killar	<i>Parrotis Jacquemontiana</i>	0	8919	747	37	1	2	9706
15	Mandar / Mapple	<i>Acer Caesium</i>	0	411	183	94	16	7	711
16	Maral	<i>Almus</i>	0	57	64	40	29	51	241
17	Poplar/Safeda	<i>populus alba</i>	0	18	19	12	4	4	57
18	Payakh	<i>alnus nitida / alder</i>	0	472	427	348	150	178	1575
19	Pingyath	<i>Crataegus</i>	0	32	15	1	1	0	49
20	Robinia	<i>Robinia spedeuocacia</i>	0	2	1	3	0	0	6
21	Sanjal	<i>Fraxinus xynthozeloides</i>	0	656	234	88	14	1	993
22	Thangi	<i>Corylus Columa</i>	0	108	65	42	24	33	272
	<b>Total Nos of trees at FRL - 4 M</b>		0	13178	3202	1725	882	1411	20398

  
 (Range Officer)  
 Killar Forest Range  
 KILLAR

  
 Divisional Forest Officer  
 Pangi Forest Division  
 Killar 176323

## COST-BENEFIT ANALYSIS of DUGAR HEP

Table-A: Cases under which a cost-benefit analysis for forest diversion are required

SN	Nature of Proposals	Applicable/Not Applicable	Remarks
1	All categories of the proposals involving forest land upto 20 ha in plains and upto 5 ha in hills	NA	These proposals are to be considered on case to case basis and value judgment
2	Proposal of defense installation purposes and oil prospecting (prospecting only)	NA	In view of National priority accorded to these sectors, the proposals shall be critically assessed to help ascertain that the utmost minimum forest land and above is diverted to for non-forest use
3	Habitation, establishment of Industrial units, tourist lodges/complex and other building construction.	NA	These activities being detrimental to protection and conservation of Forests, as a matter of policy, such proposals would be rarely entertained
4	All other proposals involving forest land more than 20 ha in plains and more than 5 ha in hills including roads, transmission lines, minor, medium and major irrigation projects, hydel projects mining activities, railway lines, location specific installation like micro-wave stations, auto repeater centres, TV tower etc.	Applicable	These are cases where a cost benefit analysis is necessary to determine when diverting the forest land to non-forest use in overall public interests.

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Table-B: Estimation of cost of forest diversion

SN	Parameters	Remarks
1	Ecosystem services losses due to proposed forest diversion	Economic value of loss of eco-system services due to diversion of forests land determined by State Forest Department as a Net Present Value (NPV) is <b>Rs. 23.16 Crore</b>
2	Loss of Animal husbandry productivity including loss of fodder	<b>Rs. 2.31 Crore</b> (i.e. 10% of NPV Cost)
3	Cost of Human resettlement	No displacement
4	Loss of public facilities and administrative infrastructure (Roads, building, School, dispensaries, electric lines, railways etc) on Forest land, or which would require forest land if these facilities were diverted due to the project	None of the public facilities and administrative infrastructure will be affected due to the project.
5	Possession value of forest land diverted	<b>Rs. 6.94 Crore</b> (i.e. 30% of NPV Cost)
6	Cost of suffering to oustees	None of the oustees will suffer from project establishment.
7	Habitat Fragmentation Cost	The relationship between fragmentation and forest goods and services is complex, for the sake of simplicity the cost due to fragmentation has been taken as <b>Rs. 11.58 Crore</b> (i.e. 50 % of NPV applicable as a thume rule)
8	Compensatory Afforestation and Soil & moisture conservation cost	The actual cost of compensatory afforestation and soil & moisture conservation and its maintenance is determined by State Forest Department is <b>Rs. 13.27 Crore.</b>
	<b>Grand Total</b>	<b>73.32 Crore</b>

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Table-C: Existing guidelines for estimating benefits of forest-diversion in CBA

SN	Parameter	Nature of Proposal
		Hydroelectric Project
1	Increase in productivity attributable to the specific project	<p>1. Net design energy (Annual) = 1758.40 GWH Cost of saleable net design energy @ 4.43 / kWh (Levelised tariff) Rs. = 778.97 Crore Assuming O&amp;M life as 62 years, Hence <math>778.97 \times 62 = \text{Rs. } 48296.14</math> crore i.e. <b>Rs. 48296.14 cr. – 6278.49 cr. (13% benefit to State Govt.) = Rs. 42017.65 crore</b></p> <p>2. Sixteen Revenue villages would gain better road connectivity and the travel time would be reduced by an average of one hour Total population of 4500 will be benefitted and with saving of 1 hr/day. Therefore, <math>4500 \times \text{Reduced time in travel by } 1 \text{ hr} \times 30 \text{ days} \times 12 \text{ month} \times 70 \text{ years} @ \text{Rs } 35 \text{ per man hr} = \text{Rs } 396.90 \text{ Crore.}</math></p> <p>3. Population of 4500 person will be benefitted and gain of at least 60 man days/ year due to the better development of the hospital in the project area, Hence <math>365 \text{ days} \times \text{saving of } 60 \text{ man days} \times 70 \text{ years} @ \text{Rs } 300/\text{day} = \text{Rs } 45.99 \text{ Crore.}</math> <b>Rs. 42017.65 + 396.90 + 45.99 = 42460.54 Crore</b></p>
2	Benefits to economy due to the specific project	<p><b>Benefits to the State Economy</b> The estimated cost of the project is Rs 3987.34 crores and all necessary finances for the implementation of the project through loans, debentures, its own income from previous projects or such other sources. As per the Memorandum of Understanding (MoU) and Implementation Agreement (IA), Government of Himachal Pradesh will get the Royalty Free Energy in the shape of free power @4% from 1<sup>st</sup> to 10<sup>th</sup> year, @8% from 11<sup>th</sup> to 25<sup>th</sup> year, 12% from 26<sup>th</sup> to 40<sup>th</sup> year &amp; 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.</p> <p>NHPC Limited shall be liable to deposit an equivalent amount of 100 units of electricity, per month for a period of 10 years, as per applicable subsidized tariff determined by Himachal Pradesh Electricity Regulatory Commission (HPERC) from time to time, with respective Local Area Development Committees (LADCs) of the districts and the balance amount equivalent to the quantum of subsidy with the State Government.</p> <p>NHPC Limited shall contribute 1.5 % of the cost of the project towards pre-commissioning Local Area Development Fund (LADF). In addition to this, NHPC shall also run Community Development Schemes and Corporate Social Responsibility programs for the villages within / around the Project site, entwined to cater to local area development including capacity / skill development of affected population, as per the objectives and policies.</p> <p><b>Benefits to the Local Economy</b></p> <p>NHPC Limited shall contribute 1.5 % of the cost of the project (Rs 3987.34 Crores) = <math>3987.34 \times 0.015 = 59.81 \text{ Crore}</math> towards pre-commissioning Local Area Development Fund (LADF).</p>

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		<p>In addition to this, NHPC shall also run Community Development Schemes and Corporate Social Responsibility programs for the villages within / around the Project site, entwined to cater to local area development including capacity / skill development of affected population, as per the objectives and policies.</p> <p>720000 Man days (1000 Man power for 24 months) would be generated due to the direct employment of labors including locals during pre-construction stage @ 400/Man day= <math>720000 \times 400 = \mathbf{28.80 \text{ Crore}}</math>.</p> <p>5,550,000 Man days (2500 Man power for 74 months) would be generated due to the direct employment of labors including locals in the construction of the project. <math>5,550,000 \times 500 = \mathbf{Rs 277.50 \text{ Crore}}</math></p> <p>80 labors/month will get the employment during O&amp;M stage to fulfill the requirement of various casual jobs for 62 years assuming average @600/day= <b>Rs 107.13 Crore</b></p> <p>Local contractors will be engaged for suitable jobs and 20% of the Construction cost will be carried out by them. Assuming 15% as their profit margin for the contract works, <math>\text{Rs } 3987.34 \times 20\% \times 15\% = \mathbf{Rs 119.62 \text{ Crore}}</math></p> <p>Local Transport vehicles will be utilized during construction period, Assuming 1% as the total value and 20% as the profit margin, the total benefits would be <b>7.97 Crore</b></p> <p><b>Indirect Employment</b>  Indirect Employment to locals in terms of the Support business to satisfy the needs of manpower deployed in the project during Pre-Construction, Construction and Operation and Maintenance periods:  Pre-Construction: Rs 4000/- per month from 1000 labors for 2 years- <b>Rs 9.60 Crores</b>  Construction: Rs 4000/- per month from 2500 labors for 6 years- <b>Rs 72 Crores</b>  O&amp;M: Rs 4000/- per month from 80 labors for 62 years- <b>Rs 23.80 Crores</b></p>
3	No of Population benefited due to specific project	4500, considering direct and indirect benefits
4	Economic benefits due to of direct and indirect employment due to the project	<p>6120000 Mandays during Pre-construction (1000 Man power for 24 months) and at construction stage (2500 Man Power for 74 months)</p> <p>2232000 Mandays during operation stage. (80 Man power as casual labors for 744 months)</p> <p><b>Indirect Employment</b>  Indirect employment to locals in terms of the support businesses to satisfy the needs of manpower deployed in the project during Pre-construction, Construction and Operation and Maintenance (O&amp;M) periods.</p>
5	Economic benefits due to Compensatory afforestation	The forest area which required to be diverted for the project is 211.842 hectare. The compensatory afforestation will be done on the area of approx. 423.684 hectare, where about 466000 plants will be planted at a cost of Rs. 13.27 Crore. Due to this

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4/10/22  
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afforestation, not only green cover will increase but the density of forest will also increase. The money spent on compensatory afforestation will lead to indirect benefits to the local population as they will be employed for the plantation and thereafter maintenance of the afforestation area. Due to this afforestation decrease the pollution levels and increase the carbon credits.

#### Benefits from Project

LADF	Rs Crores	59.81
Increase in Productivity	Rs Crores	42460.54
Pre-Construction Labour Cost	Rs Crores	28.80
Construction Labour Cost	Rs Crores	277.50
Operation and Maintenance casual jobs	Rs Crores	107.13
Local Contractor Profit	Rs Crores	119.62
Local Vehicles Profit	Rs Crores	7.97
Indirect Employment in Pre-Construction	Rs Crores	9.60
Indirect Employment in Construction	Rs Crores	72.00
Indirect Employment in O&M	Rs Crores	23.80
Benefit to the State of Himachal Pradesh	Rs Crores	6278.49
$(1758.40 \times 10^6 \times 4.43 = 778.97 \text{ Cr./yrs})$ $(778.97 \text{ Cr} \times 62 \text{ yrs} = 48296.14 \text{ Cr})$ $(48296.14 \text{ Cr} \times 13\% = \text{Rs. } 6278.49 \text{ Cr})$		
<b>Total Benefits</b>	Rs Crores	49445.26

#### Benefit/Cost Ratio:

Total Benefit	49445.26 Crore
Total Project Cost	3987.34 Crore
Benefit cost ratio	12.40

#### Benefits to the Environment

The project would replace the carbon emissions to the extent of power generation, which is equivalent to the estimated energy generation of 1758.40 MU in 90% dependable year.

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Dugar Hydro P  
नगर, जल  
Nagran, P

Full Title of the Project:- **Dugar Hydro Electric Project**

File No.:-

Date of Proposal:-

**NET PRESENT VALUE OF FOREST LAND**

Construction of 500 MW Dugar Hydro Electric Project in Pangti Valley under Forest Conservation Act, 1980

State : Himachal Pradesh  
District : Chamba  
Division : Pangti Forest Division

**NPV CALCULATION DETAILS**

Area of Forest Land Proposed for Diversion (ha)	211.842
Classification of Forest Land	Eco Class VI
Rate for Eco value for Class VI – Very Dense Forest (Rs.)	15,16,230/-
Rate for Eco value for Class VI – Dense Forest (Rs.)	13,72,410/-
Rate for Eco value for Class VI – Open Forest (Rs.)	10,69,470/-
Area of Forest land under Very Dense Category (ha)	11.30
Area of Forest land under Open Category (ha)	200.542
Net Present Value of Forest land proposed for diversion of non-forestry purpose (Rs.)	(i) $15,16,230 \times 11.30 = 1,71,33,399/-$ (ii) $10,69,470 \times 200.542 = 21,44,73,653/-$ <b>Total = 23,16,07,052/-</b>
<b>Rupees Twenty Three Crore Sixteen lac Seven thousand and Fifty Two only</b>	

  
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