RAURA HYDRO ELECTRIC PROJECT
(12 MW)

CATCHMENT AREA TREATMENT PLAN

DEVELOPER

DLI POWER (INDIA) PRIVATE LIMITED
BLDG. NO. 2/RH-1, VISAVA ENCLAVE
D. P. ROAD, AUNDH, PUNE – 411 007

PREPARED BY

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HPFD-G06/5/2023-CAMPA-HIMACHAL PRADESH FOREST DEPARTMENT

I/332292/2024

CERTIFICATE

The **CAT Plan document,** containing pages 1 to 192, formulated in connection with diversion of **4.20 ha.** of forest land for the construction of **12 MW Raura HEP** in favour of DLI (DLI Power India Private Limited) within the jurisdiction of Kinnaur Forest Division of Himachal Pradesh, with total CAT plan cost of **Rs.1.43 crores** having project cost of **Rs. 94.91 crores,** is hereby approved.

Signed by
Girish C Hosur
Date: 30-01-2024 16:29:24
Chief Executive Officer
H.P State Authority CAMPA

Principal CCF (HoFF),
Himachal Pradesh.

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CATCHMENT AREA TREATMENT PLAN FOR RAURA HEP (12 MW).

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ABBREVIATION	FULL FORM
APO	Annual Plan of Operation
BO	Block Officer
BOQ	Bill of Quantity
BRO	Border Roads Organization
CAT	Catchment Area Treatment
CCAT	Comprehensive Catchment Area Treatment
CF	Conservator of Forests
DFO	Divisional Forest Officer
DPF	Demarcated Protected Forest
Eco Hut	Eco Tourism Hut
FGD Hut	Forest Guard Hut
FRH	Forest Rest House
GOI	Government of India
GHNP	Great Himalayan National Park
Ha	Hectare
HDPE	High Density Poly Urethane
HEP	Hydro Electric Project
HPFD	H.P. Forest Department
HPPCL	Himachal Pradesh Power Corporation Ltd.
HPPWD	Himachal Pradesh Public Works Department
Hort.	Horticulture
HERC	Himachal Pradesh Electricity Regulatory Commission
HPSEB	Himachal Pradesh State Electricity Board
JFMC	Joint Forest Management Committee
LULC	Land Use Land Cover
MW	Micro Watershed
NGO	Non-Government Organization
NTFP	Non-Timber Forest Produce
NERIL	Naik Environmental Research Institute Ltd.
PA	Protected Area
PES	Payment for Environmental Services
PF	Protected Forest
RF	Reserved Forest
RFO	Range Forest Officer
RR	Random Row
SMC	Soil & Moisture Conservation
TD	Timber Distribution
UPF	Un-demarcated Protected Forests
WL	Wildlife

EXECUTIVE SUMMARY & CAT PLAN AT A GLANCE

1.1 Introduction. The work of "Preparation of Catchment Area Treatment Plan for Raura Hydro Electric Project (12 MW)" was allotted to Naik Environment Research Institute Ltd. (NERIL) by DLI Power (India) Private Limited (A DLZ Company), Registered Office: 6, Shiv-Wastu, Tejpal Scheme, Road No. 5, Vile Parle (East), Mumbai- 400 057 vide their letter No. SV/HP-RAU/483/20 dated 30th September, 2020. The productive life of a hydroelectric project depends on the rate at which siltation causes reduction of the live storage of the reservoirs. In order to increase the productive life of the plant, it is necessary to minimise the silt flowing into the reservoir. The best means of achieving this objective is by ensuring good vegetation in the catchment to hold the soil in its place together with other soil and moisture conservation measures.

1.2 The Notification issued vide Government of Himachal Pradesh, Department of Forests, Notification No. EFE-B-F-(5)-9/2017 dated 21st November 2019 stipulates that the CAT Plan size should be 1.5% of the total project cost. In case of Raura HEP the total project cost is Rs. 9491.43 lacs and thus the CAT Plan cost @ 1.5% of the project cost works out to Rs. 142.37 lacs**.** The primary objective of the Catchment Area Treatment Plan is to arrest the soil loss and degradation of the area by putting an effort to reduce the runoff and soil, which is getting eroded.

1.3 The 8 MW Raura Hydro Electric Project is a run-of-the river type functioning HEP on Raura Khad, a tributary of Satluj River, in Kinnaur Distt. MoEF Clearance for this 8 MW project was accorded in favour of DLI Power (India) Pvt. Ltd. on 03.01.11 and construction was started. During construction, the project capacity was enhanced to 12 MW. TEC approval for 12 MW Raura HEP was accorded vide Government of Himachal Pradesh, Department of Energy Office Order No. DOE/ CE/TEC-Raura/2015/6508-16 dated 8.10.2015. and SIA was signed on 01.0-2.2018. The prevalent Govt. instructions as well as provisions of FCA 1980 envisage preparation of CAT Plans and their approval from the Govt. of Himachal Pradesh/ Govt. of India for all the projects beyond 10 MW capacity. The scheme consists of diversion of Raura Khad inflows by constructing a diversion weir at El 2144.5 m. The diverted inflow is carried through conveyance tunnel to an underground de-silting tank, which is designed to exclude all silt particles down to 0.20 mm size and above. The silt free water is carried to adjoining underground forebay. Stored water in forebay shall be conveyed through a steel pipe/ penstock to underground powerhouse with Pelton type turbine driven three generating units of 4.0 MW capacity each.

1.4 The project is situated on Raura Khad near Choling where Raura Khad joins Satluj River in Kinnaur District of Himachal Pradesh. The project is located at about 220 KM distance from State Capital Shimla. The nearest broad-gauge rail head is at Kalka (Haryana) and airport is at Jubberhatti near Shimla. The scheme is located near villages Meeru and Choling located at about 3 KM from Tapri. The project falls in Kalpa Range of Kinnaur Forest Division. Three Beats namely Runang, Tapri and Urni of Sub Catchment No. 10 and 12 of Kalpa Forest Range fall under this project. The three beats comprise of 9 villages namely:

Miru, Runang, Choling and Rangle in Runang Beat.
Chagaon, Tapri and Janakpuri in Tapri Beat; and
Yulla and Urni villages in Urni Beat.

1.5 Extent of Field Work and Interaction with HPFD: This task involved meeting with HPFD Authorities at Division level, reconnaissance survey of the catchment area, followed by field visits by NERIL team for collection of primary and secondary data and Range Level meetings with HPFD in the Project Catchment area. While preparing the CAT Plan for Raura HEP, it was necessary to keep the provisions already made for Afforestation and Soil & Moisture Conservation works in the Comprehensive Catchment Area Treatment Plan for Satluj River Basin which is a highly specialized document already stands approved by the State Government. It is worth mentioning here that although the actual requirements under Afforestation SMC measures are on the higher side, the projections under Raura HEP are limited to the permissible limits/ percentages only.

1.6 The Format of CAT Plan: The CAT Plan is prepared in two Sections. Section I contains Chapter 1 to 10. Information on the contents of each Chapter is briefly stated hereunder.

1.6.1 Chapter1: Provides objectives of the CAT Plan. The primary objective continues to be to arrest the soil loss and degradation of area due to soil erosion. Several other secondary objectives and the scope of work is also provided in this Chapter. The leading particulars of Raura HEP are stated briefly for better understanding of the project parameters. Full details are given subsequently in Chapter-3**.**

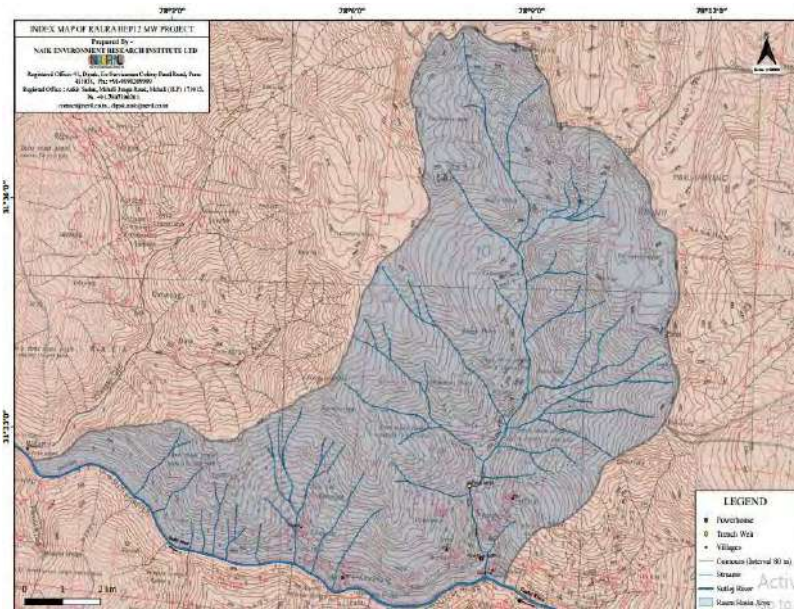
1.6.2 Chapter 2: The HPFD vide Notification No. FEE-B-F-72/2004 Pt-II dated 30.9.2009 (as amended vide Notification No. FFE-B-F (5)9/2017 dated 21.11.19) has issued guidelines and directives regarding preparation of CAT Plans. Information on these and a brief description of how the Consultants proceeded with the task of preparation of the CAT Plan is described in this Chapter. It also provides the basis of aligning this CAT Plan with the Comprehensive Catchment Area Treatment Plan for Satluj River Basin as well as aligning with the instructions issued by Nodal Officer CAT Plan.

1.6.3 Chapter 3: Chapter 3 provides the description of the Project Components and the Catchment. These are based on the data obtained from the Project Authorities. The description of the effective Catchment of Raura HEP is given. The Beat-wise allocation of the percentage of funds is tabulated in this Chapter.

1.6.4 Chapter 4: This CAT Plan adheres to the percentage criteria promulgated by HPFD for each Component. Allocation of funds is apportioned based on the effective Catchment for each Range falling within the catchment area.

1.6.5 Chapter 5: Every CAT Plan needs a ready reckoner of the Guidelines for the Field Officers to follow. Considering that the implementing and monitoring authorities should not be required to refer to multiple publications and orders, NERIL has provided these guidelines collectively in Chapter 5. These details also help in understanding the rationale behind the period and procedure for maintenance in subsequent years to ensure better survivality, causes of failures of different forest plantation types and the techniques of bringing up healthy plantation of all types of forests including pastures, Silvi Pastoral Developments, herbs, shrubs, energy plantations, enrichment and new plantations. In view of the pressing requirement of HPFD staff, maintenance support for plantations is provided for 7 years.

1.6.6 Chapter 6: The soil and moisture conservation measures are equally important part of the CAT Plan. The various methods and procedures to execute the soil conservation works



in the field and drainages are given in detail in this Chapter.

1.6.7 Chapter 7: The Catchment area comprises of the Forest as well as non-Forest lands. It is important to provide for ensuring People's Participation in the process of conservation. Guidelines in respect of socio-economic intervention as well as Payment for Environment Services are provided in Chapter7.

1.6.8 Chapter 8: The CAT Plan contains a provision for construction of a new Forest Guard Hut at Runang.. As per the latest guidelines from Govt. of India, funds to be provisioned for infrastructure development have been reduced to 5%. However, in case of this CAT plan, due to the peculiar conditions of Runang Beat, an exception is made by allowing higher percentage for construction of a Beat Guard hut in Runang beat.

1.6.9 Chapter-9: As decided in the CAT Plan Review Committee Meeting held at HPFD HQs. Shimla on 15.7.23. this chapter is renamed as "Wildlife Protection, Micro Planning and Abundance Study". A provision of Rs. 10 lacs for Wildlife Abundance Study through Wildlife Institute of India or some other reputed institute is also made in the CAT Plan as decided in the CAT Plan Review Committee Meeting. In keeping with the guidelines in force, this Chapter was submitted earlier to the Pr. CCF (WL), and the suggestions given by him are incorporated. (Pr.CCF (WL) letter No. / WL (Misc.)-60/HEP/Vol.XI/1012 dated 25.5.2022 refers in this regard). There is no wild-life sanctuary in these three Beats of Kalpa Range. However, wildlife such as ibex, Ghoral, Leopard etc. is often sited in Territorial Forests in these Beats. During discussions with Field staff, it revealed that forest fires are quite common which endangers the wildlife and their habitat. Moreover, there is a need for creation of water storage facilities in the forests which would serve the dual purpose; one for easy availability of waterhole for wild-life and another for the use of water storage facilities to control forest fires.

1.6.10 Chapter 10: This Chapter reproduces the existing mechanism for monitoring and evaluation as applicable under State CAMPA. The composition of various Committees and their functions are also listed for ready reference.

1.7 Section II: This Section comprises of Beat wise Action Plans with Costs for all the three beats of Kalpa Range from Chapter 11to 14. Each activity of the CAT Plan is further given in detail with hectarage/ location and cost thereof. The activity wise costs are linked in the Consolidation Sheet for each Beat. HPFD Cost norms for the year 2021-22 are applied.

1.8 CAT Plan Outlay: The total CAT Plan out lay for Raura HEP is to the tune of Rs.1,43,00,000/- which is 1.5% of the total project cost. The Consolidated projections for Kalpa Range of Kinnaur Division along with Beat wise projections for Runang, Tapri and Urni Beats are given in Chapter-14.

1.9 Range. A.P.Os. for Kapa Range are given in Chapter 15.

1.10 CAT PLAN - AT A GLANCE: A summary of provisions made under each Beat is provided as a ready reckoner to refer to the specific figures of the 'CAT Plan- At a Glance', hereunder:

RAURA HEP (12 MW)- AT A GLANCE:

Sl.No.	Particulars	Remarks
1	Project site	Choling on Raura Khad in Dist. Kinnaur
2	Latitude	31°31'20" N
3	Longitude	78°08'22.48" E
4	Latitude of Weir Site	31°32'23.96" N
5	Longitude of Weir Site	78°08'09.12" E
6	Total Installed Capacity	12 MW
7	Estimated Cost	Rs. 9491.43 lacs
8	Forest divisions in Project Catchment	1 Kinnaur Division
9	Total Number of Ranges	1 Kalpa Range
10	Total Number of Beats	3 (Runang, Tapri and Urni).
11	No. of Sub Catchments	1 Sub Catchment No.10.
12	CAT Plan Outlay @ 1.5%	Rs. 142.371 lacs
13	Actual amount of the CAT Plan	Rs. 143.00lacs.

Component wise Allocation of funds:

Sl.No.	Component	Runang Beat (Rs.)	Tapri Beat (Rs.)	Urni Beat (Rs.)	Total (Rs.)
1	Afforestation	8,72,754	16,81,598	9,91,658	35,46,010
2	Soil & Moisture Conservation Measures	8,51,790	8,54,400	8,74,800	25,80,990
3	Research, Training & Capacity Building	2,40,000	2,40,000	2,39,000	7,19,000
4	Payment for Environment Services	4,75,000	4,74,0000	4,74,0000	14,23,000
5	Infrastructure & Forest Protection	17,50,000	1,50,000	1,50,000	20,50,000
6	Wildlife Protection, Micro Planning and Abundance Study				
	Water holes	1,04,000	0	1,04,000	2,08,000
	Protection equipment	5,02,000	0	1,02,000	6,04,000
	Salt Licks	14,000	12,000	14,000	40,000
	Wildlife Abundance Study through WLII	10,00,000	Consolidated amount shown in Runang Beat.		10,00,000
	Total:	**16,20,000**	**12,000**	**2,20,000**	**18,52,000**
7	Eco Tourism	0	0	0	0
8	Monitoring & Evaluation	2,37,000	2,37,000	2,37,000	7,11,000
9	Contingencies	4,75,000	4,75,000	4,70,000	14,20,000
Total:		**65,21,544**	**41,23,998**	**36,56,458**	**1,43,02,000 or say Rs. 1,43,00,000/-**

Beat wise allocations under Research Training & Capacity Building, Payment for Environment Services, Wildlife Protection, Micro Planning & Abundance Survey and Monitoring & Evaluation are to be clubbed together and controlled from CCF / Division Office keeping in view the actual requirements.

CHAPTER 1. INTRODUCTION, OBJECTIVE &SCOPE

1.1 Rivers possess a delicate ecology that depends on a regular cycle of variations within certain tolerances. The plant and animal communities that inhabit the river and its margins, have evolved to adapt to their river's own peculiar pattern of flood and drought, slow and fast pattern of current. Dams disrupt this ecology. The first effect of a dam is, it alters the topography on which the plants and animals of a river depend. Many aquatic animals coordinate their reproductive cycles with annual flood seasons. Floods provide shallow backwater areas on vegetated and shaded riversides. However, in case of Raura Project no alteration to topography or impoundment of water is required as will be seen later.

1.2 Himachal Pradesh Forest Department has embarked upon major initiatives to improve the catchment areas of all the major rivers in the state. The approach of HPFD is expressed in a document published by the department in 2012. It is pertinent to quote this approach and objectives in the current context. HPFD is the first State in the Country to initiate and complete Basin Level CAT Plans for the four major rivers in the State. The Basin Level Comprehensive Catchment Area Treatment Plan for Satluj and the Satluj Catchment Information System are the base of preparation of this CAT Plan. The field visit and information caters for the changes made necessary due to the passage of time between making of the CCAT Satluj and making of Raura HEP location specific CAT Plan**.**

1.3 The government of Himachal Pradesh aims to become a leading power generating state by utilization of its hydrological potential. Himachal Pradesh has an achievable potential of producing more than 27,000 MW of power. The Government of Himachal Pradesh, Department of Energy vide its Office Order No. DOE/ CE/TEC-Raura/2015/6508-16 dated 8.10.2015 **(Appendix E**) has awarded the work of development of the Raura HEP (12.00 MW) on Raura Khad, a tributary of Satluj river, District Kinnaur, Himachal Pradesh to M/s DLI Power (India) Private Limited, 6-Shiv Wastu, Tejpal Scheme, Road No.5, Vile Parle (East) Mumbai-400057 at an estimated cost of Rs. 9491.43 lacs (Rupees nine thousand four hundred ninety one lac and forty three thousand) only including Interest during construction (IDC), Escalation, Financial Charges (FC) and LADC @ 1.50% of total project cost. Undertaking from DLI Power (India) Pvt. Ltd. to the effect that in case there is any revision in the TEC and the project cost in future, the difference of the same will be suitably deposited with the Forest Department by DLIPL furnished vide Reference No. DLI/RAU/21 dated 6.7.21 is placed at **(Appendix-F).**

1.4 OBJECTIVE OF CAT PLAN: The main objective of the preparation of CAT Plan for the individual project is to identify and devise measures in the catchment area, that reduces silt load problems for hydro- electric projects and also to buffer the flow of water by reducing storm water peaks and increasing dry season flows through better infiltration. Minimising the adverse ecological impacts of the project construction in its immediate vicinity and upstream, is also one of the major objectives of the preparation of CATPlan.

1.4.1 The primary objective: The primary objective of the Catchment Area Treatment Plan is to arrest the soil loss and degradation of the area by putting an effort to reduce the runoff and soil, which is getting eroded.

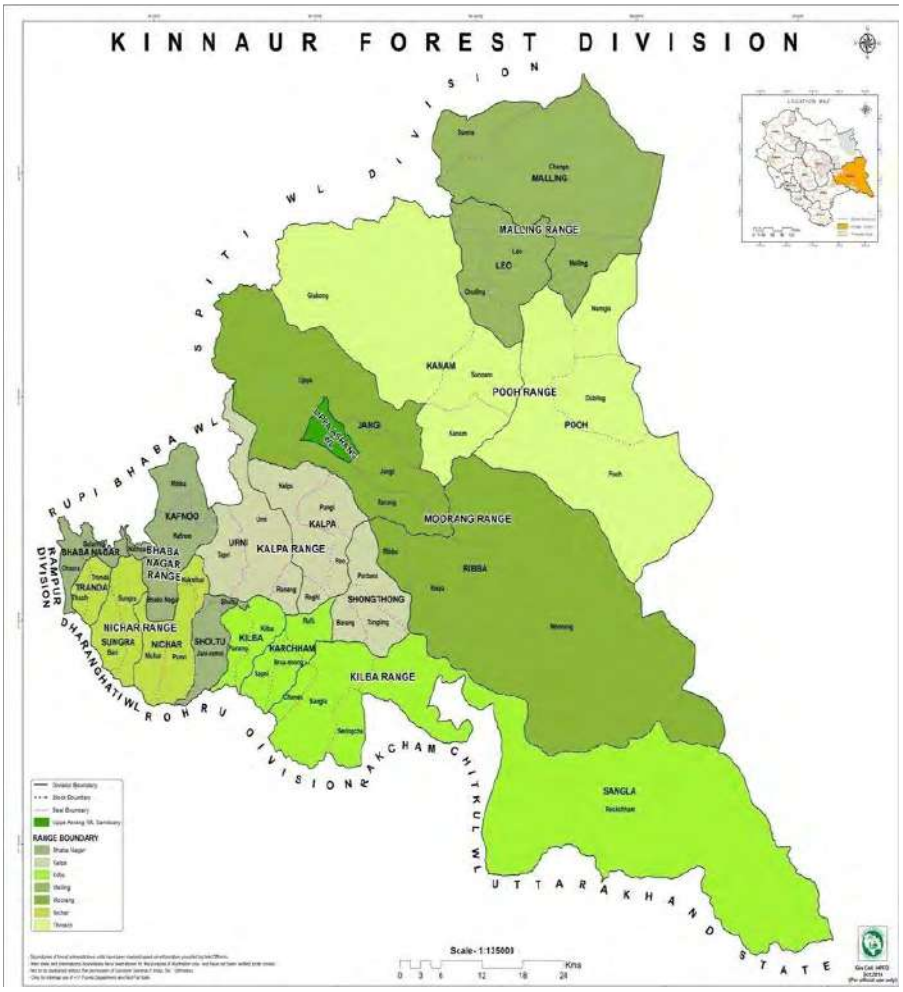
1.4.2 The other objectives of the CAT Plan: These are as follows:

- Achieve sustainable development through improvement of forests and wildlife habitat.
- Conservation of soil and reduction of the erosion of soil in the watersheds of the project and its immediate vicinity to ensure its longevity.
- Minimise the silt load and improve the quality of Raura Khad water.

- Minimise the land slides, land slips and erosion of soil.
- Rehabilitate the degraded forest areas by using measures like afforestation, natural regeneration of plants and pasture development.
- Enhance community participation.
- Increase vegetative cover.
- Augment Forest Infrastructure for Eco tourism.

1.5 INTRODUCTION TO RAURA HYDRO ELECTRIC PROJECT (12 MW) .

Himachal Pradesh is located in the Western portion of the Great Himalayan Mountain range of North India., bounded by the state of J&K to the North, Tiben to the East and plains of North India to the South and West. The proposed project is in Kinnaur District of Himachal Pradesh near Choling village, a place on NH 22 near Tapri village. The project is located at about 220 KM distance from State Capital i.e. Shimla. The nearest broad-gauge rail head is at Kalka (Haryana) and airport is at Jubberhatti near Shimla. The location plan of the project is shown at Figure No: 1.1. The project falls in Kalpa Range of Kinnaur Forest Division. The Catchment of this project covers three Beats of Kinnaur Divison in Kalpa Range namely Runang, Tapri and Urni. The area falls under Satluj Sub Catchment No.10 as the All-India Survey Nomenclature. The three beats comprise of 9 villages. These are Miru, Runang, Choling and Rangle in Ronang Beat; Chagaon, Tapri and Janakpuri in Tapri Beat and Yulla and Urni in Urni Beat.



1.5.1 The 12 MW Raura Hydro Electric Project is a run-of-the river type functioning HEP on Raura Khad, a tributary of Satluj River, in Kinnaur dist. The scheme consists of diversion of Raura Khad inflows by constructing a diversion weir at El 2144.5 m. The diverted inflows are carried through conveyance tunnel to an underground desilting tank, which is designed to exclude all silt particles down to 0.20 mm size and above. The silt free water is carried to an adjoining underground forebay. Stored water in forebay shall be conveyed through a steel pipe/ penstock to underground powerhouse with Pelton type turbine

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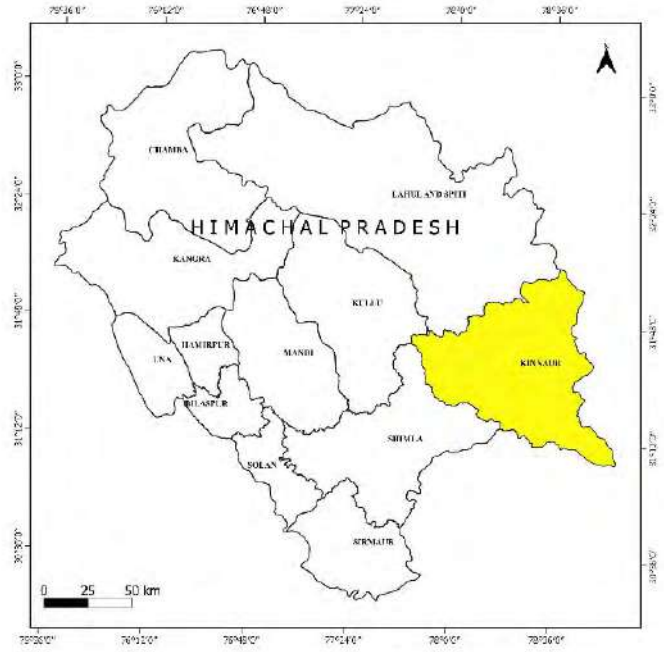
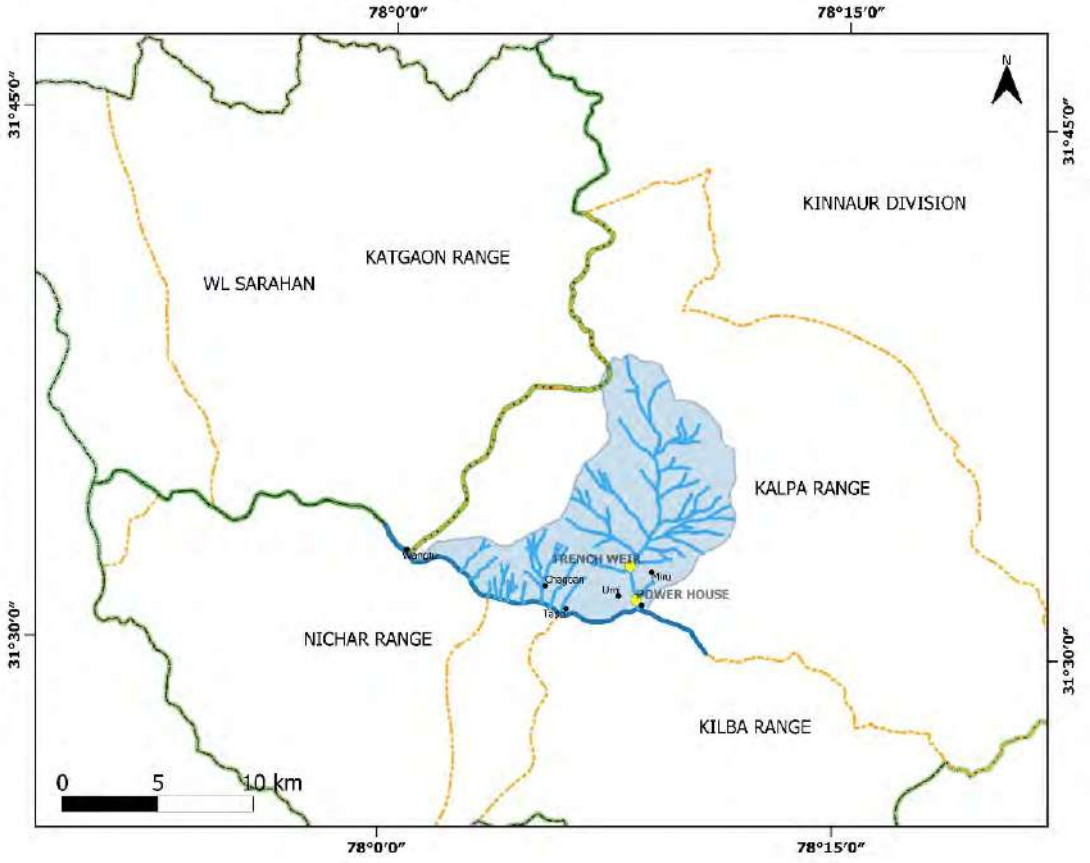


LOCATION MAP OF RAURA HEP 12 MW PROJECT



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CHAPTER 2: COMPLIANCE OF HPFD GUIDELINES & DIRECTIVES

2.1 Background: Raura HEP is a functioning Hydro Electric Project for 8 MW capacity. The installed plant and machinery is capable of increasing the production to 12 MW capacity. As per the laid down norms, "all projects of power production capacity of 10 MWs or more are required to prepare the Catchment Area Treatment Plan and to provide 1.5% of the project cost for its execution". The DLI Power (India) Pvt. Ltd. received such a sanction for enhancement of the capacity of the project from 8 MW to 12 MW vide H.P. Energy Department letter No. DOE/CE/TEC-Raura/2015- 6508-16 dated 8.10.2015 and have suo-motto decided to prepare a CAT Plan and to provision funds required for its execution.

2.2 The Award Letter for allotment of work of preparation of CAT Raura Small Hydro Electric Project (12 MW) was issued to Naik Environment Research Institute Ltd. (NERIL) vide DLI Power (India) Private Limited (A DLZ Company) vide letter No. SV/HP-RAU/483/20 dated 30th September 2020. The Acceptance letter from NERIL was issued vide No. NERIL/Raura HEP/CAT Plan/2/2020 dated Ist October 2020. The Government of Himachal Pradesh Department of Forests, vide Notification No. EFE- B-F-(5)-9/2017 dated 21stNovember 2019 has restricted the CAT Plan size to minimum 1.5% of the total project cost in respect of the Catchment Area Treatment Plans to be submitted by the User Agencies to the Forest Department on or after the date of issue of the *ibid* Notification *(Appendix-I)*. The total cost of the project is Rs. 9491.43 lacs. Thus, the CAT Plan outlay cost at 1.5% works out to Rs.1,42, 37,145. The total CAT Plan projections are made to the tune of Rs. 1,43,00,000/- under the present CAT Plan.

2.3 After receipt of the Work Order from Raura HEP authorities, NERIL team (headed by Cdr. D.D. Naik, Chairman & Managing Director), started the field visit of Project Catchment w.e.f. 7th October 2020 onwards. Firstly, a meeting was held with Dr. Chaman Lal, Divisional Forest Officer, Kinnaur at Kalpa on 8th October 2020 to brief him about the project and the CAT Plan Components. This was followed with another meeting on 8.10.2020 itself with Sh. Hira Singh Thakur, Range Officer, Kalpa wherein Block Officer Kalpa and the three Beat Guards of Runang, Tapri and Urni also participated in the discussions. Field visits were undertaken on 8th, 9th and 10th October, 2020. It revealed that the Catchment of Raura HEP falls in three Forest Beats i.e. Runang, Tapri and Urni in Kalpa Forest Range of Kinnaur Forest Division.

2.4 Since the CCAT Plan is designed to cater for 100% of the catchment and the cost of doing so will far exceed the available funds under the Raura HEP CAT Plan, it is necessary to identify the areas of Afforestation and SMC needs by a field visit to respective Range Offices.

2.5 The forest infrastructure needs have changed in the last nine years and hence current requirements of forest infrastructure are required to be funded from the Raura HEP, which are identified upwards from Beat level to Range Level. The cost of treatments for Afforestation as well as SMC measures has also changed considerably and the cost, as applicable, to the present time, is taken into consideration. In view of these circumstances, NERIL's Approach to the work process adopted following steps:

- NERIL culled out Sub Catchment Nos. 10 the areas of which drain into Raura Khad from Comprehensive Catchment Area Treatment Plan for Satluj River Basin.
- Identified the Beats, Range and Division to which these Sub Catchments belong.
- Held discussions with the Divisional Forest Officer, Kinnaur to understand the requirements.
- Visited the Range Headquarter for discussions with R.O. and the required field staff regarding the requirements as per field conditions.
- Conducted a few sample survey with the Beat Guards in order to confirm the quantum of work.
- Prepared a CAT Plan as per guidelines of HPFD for submission to the Divisional Forest Officers through the Project channel and coordinate for its approval for the same.
- After approval by the D.F.O. Kinnaur and C.F. Rampur, the CAT Plan will be submitted in the required number of copies for final clearance of HPFD authorities through proper channel.

2.4. Discussions as well as site visits revealed that the Catchment areas of the project, by and large, consist of well stocked forests i.e., Broadleaf and conifers offering lesser scope for new plantations. Still there were areas needing enrichment plantation and energy plantation. Provisions for Pasture development was also identified. Stress is laid on up-gradation of existing Nurseries. In all there are 3 Beat Level nurseries in the project catchment but due to limited funds availability under Raura HEP, provision for modernization of Kakasthal nursery only is made. Under Payment for Environment Services lump sum amount is earmarked for the various PES activities to be identified in accordance with instructions issued by Government of Himachal Pradesh from time to time. These could include distribution of power saving devices, solar lights, reward schemes; construction of water ponds, community storage tanks etc. under PES and JFMC components. The funds under PES will be utilized as per instructions of Government from time to time. Under Infrastructure and Forest Protection, provisions are made for construction of one Forest Beat Guard Hut at Runang. Under Monitoring & Evaluation checking percentages at various levels i.e. monitoring to be done at Field level by the Forest Guards, Range Officers, and A.C.Fs. and Divisional Forest Officers is laid down.

2.5. There are no Wildlife Sanctuaries in the Catchment area of Raura HEP Project Catchment. Wildlife is found in all the areas irrespective of the fact whether areas are specifically reserved for habitat improvement of wildlife or otherwise. Instances of Human wildlife conflict are negligible. Provisions are made for construction of Water Harvesting Structures/ Ponds for wildlife and for prevention of forest fires to save the wildlife.

2.6. Considering that greater benefit must reach the poor people of the Region, separate provision for pastures is made under the Afforestation plan. After discussions with the Range Officers, areas needing treatment under the CAT Plan were identified by associating the concerned Field Guards. The beat wise details of the activities so identified are given in the Action Plan **(Chapter 11 to Chapter 14).**

2.7. Thecausesoffailureandinjuriestoforestcropswereascertainedafterdiscussionswiththe Forest Guards, people of the surrounding areas and the working plan. Remedial measures suggested in the CAT Plan to prevent injuries to forest crops and grass lands are identified as follows: -

a. **Encroaching and foraging in the Forest to obtain firewood and fodder: -** The CAT Plan provides necessary quantum of energy plantation of fuel and fodder species in areas between villages and the forests. Energy Plantation on 5 hectares of land with a financial provision of Rs. 5,94,520/- is provided in the CAT Plan.

b. **Denuding ground cover due to excessive grazing and damage to the topsoil by hooves**: - The CAT Plan provides for 13 Ha. for Silvi Pastoral Development and Pasture development with financial provision of Rs. 8,44,220/- to meet the requirement of domestic animals and to leave the soil binding grass cover undisturbed.

2.8 **Aligning the CAT Plan with CCP Satluj and directives of Nodal Officer-**It is worth mentioning here that the forestry and SMC needs of the catchment of Raura HEP are well covered under the Comprehensive Catchment Area Treatment Plan for Satluj River Basin, prepared by NERIL. This is a highly specialized document which is already approved by the State Government. During our discussions with authorities in HPFD, it was decided to first select the areas for plantation and SMC measures from the project areas given in the CCAT, Satluj River Basin in consultation with Forest Field Staff. However, in case some additional new areas need forestry and SMC treatments due to natural calamities or otherwise, those should also be included. NERIL Team undertook the field visits and meetings with Divisional Forest Officer, Kinnaur, Range Forest Officer, Kalpa and other field Officers, to identify the areas needing plantation, forest areas and nallas needing SMC works and to ascertain the Infrastructure & Forest Protection and PES requirements of H.P. Forest Department.

2.9 Field Visits and Range Level Consultations: Field visits were carried out by NERIL to ascertain Forestry and SMC measures as well as the infrastructure requirements of Forest Department. All the three Beat Guards and Range Officer were consulted with respect to the Beat under their charge. The limitations of financial outlay were explained to the field staff. Priorities and budgetary provisions were discussed with D.F.O. Kinnaur, R.O. Kalpa and the concerned HPFD Field Staff. After ascertaining the ground realities and detailed discussions with the Forest Staff, all the field requirements to be met with under the proposed CAT Plan were consolidated Beat wise for Kalpa Forest Range along with physical and financial projections and their cost norms. These are given in Chapter11 to Chapter 14 of this CAT Plan. The HPFD Plantation Norms including nursery cost of plants for 2021-22 are applied. The cost norms are provided in **Appendices 'A' 'B' 'C' and 'D'.** The photographs of the proposed interventions are in **Appendix-'G'.**

Details of meetings are as follows:

8.10.2020: Meeting with Divisional Forest Officer, Kinnaur at Kalpa.

8.10.2020: Meeting with R.O. Kalpa, B.O. Kalpa, Beat Guards Runang, Urni and Tapri,

9 and 10.10.2020: Field Data collection along-with Beat Guards.

10.10.2020: Visit to Project site, Weir site and meeting with Project Authorities at Choling and Miru.

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CHAPTER 3 DISCRIPTION OF PROJECT, CATCHMENT AREA & WORKINGPLAN

3.1 **TYPE OF PROJECT**:

The proposed Raura Small HEP is a run of river type scheme on Raura khad, a tributary of Sutlej River, located in Distt. Kinnaur. The project envisages the construction of trench weir across Raura khad, conveyance tunnel, underground de-silting tank, underground forebay comprising of tank and shaft, penstock to be laid in in a tunnel to carry water to the underground powerhouse at EL 1825m having 12 MW installed capacity located on the right bank of the Raura khad as well as Satluj river. Powerhouse shall have three generating units of 4 MW each along with auxiliary facilities such as cooling water /portable water supply system, firefighting system, compressed air supply, oil system, ventilation, and air conditioning system.

3.2 LOCATION

Raura small hydro power projects is planned on – a small tributary of river Satluj which joins it on the right bank about 3 km upstream of Tapri village on Indo-Tibet NH-22. originates at an elevation of about 5000 m and its entire catchment lies in Kinnaur district. The khad flows in the south direction with steep gradient. The Trench Weir is located at Miru at 31^{0}– 32'- 23.96" N 78^{0}- 08'- 09.12" E. The powerhouse is near Choling at 31^{0}– 31'- 27.20" N and 78^{0}- 08'- 22.48" E

3.3 **ACCESS**

The scheme is located near village Choling in Nichar tehsil of Kinnaur district and is approachable by an all-weather motorable road (NH-22). The project is at about 90 km from Rampur Bushahr and about 210 km from the state capital Shimla, which is connected with all-weather road and rail links with the rest of the country. Shimla is connected by a narrow-gauge railway line with Kalka about 82 km away and Kalka in turn is connected with the rest of country by broad gauge line (Northern Railway). Kalka is about 298 km from capital of India Delhi. The nearest broad-gauge rail head is at Kalka and nearest airport is at Shimla. The scheme is located near village Choling located at a distance of about 3 km from Tapri, a small transit town in District Kinnaur. The project components are approachable by a road going from Choling village to Urni village. The powerhouse site is nearby the Nation Highway – 22 at distance of about 300 meters from the road. The NH-22, Ambala Kaurik National highway runs on the right bank of Satluj river near project site. The weir site is approachable by foot path from steel bridge over the existing at elevation about 2100 m. The weir site is at distance of about 100 meter from this steel bridge. From Tapri town, an alternative road also exists which first goes up to Urni village and thereafter comes down to Choling village. Weir site from this road is at a distance of about 14 km from Tapri village. The distances of the proposed powerhouse site from important towns are as under:

From	To	Distance
Shimla	- Powerhouse	210 km
Power house	- Rampur Bushahr	90km

3.4 CLIMATE

The climate of the basin is harsh and during winter and is pleasant during summer season. The catchment gets rainfall from Southwest monsoon and snowfall in winter due to Western Disturbances. Normal annual rainfall in the region is about 900 to 1200 mm. The temperature falls below (-) 5º C during winter and rises to 30º C during summer. No part of the catchment is above permanent snowline and upper part is covered with dense forests.

3.5 TOPOGRAPHY

The project area lies in Middle Himalayas. The hills are generally steep and covered with pine forest. The hill slopes are covered with boulders and are mostly not suitable for cultivation. There are, however, terraces near the riverbanks with soil cover that are cultivable. Rocky outcrops and exposures are frequently encountered on both the banks. The Survey of India topographic sheet in 1:50,000 scale is available for the project area. Topo sheet No. 53 I/2 cover the project area as well as catchments area of the project.

3.6 BACKGROUND

3.6.1 Electric energy has a vital and significant role to play in the economy of any state. In fact requirement of power and its availability has been recognized as the surest index of a country's overall economic growth, as it is one of the basic inputs for industrial as well as agricultural development. Himachal Pradesh has a vast hydro potential. As per hydroelectric potential re- assessment studies carried out by HPSEBL, it has been estimated that about 21000 MW of hydro power potential (at 60% PLF) can be exploited in the state by constructing various major, medium and small hydro power projects on the five river basins. Out of the above estimated potential, about 4000 MW are presently under different stages of development. Realizing the importance of development of the huge hydro power potential in the overall development of the state, hydro power development has been accorded top priority by the government from the sixth plan onwards. The installed generating capacity of hydro plants in the state sector has risen from about 112 MW in 1980-81 to about 487 MW in March, 2014. In the field of rural electrification, the state has attained remarkable achievements. Despite being a late entrant in the field of rural electrification and located in difficult terrain, the state has been able to electrify all of its 16,807 inhabited villages. Due to limited resources available with the central and state Governments, the Govt. of India has now approved the participation of the private sector in the generation, supply and distribution of electricity in the country in order to overcome the anticipated power shortage. As a result, the Himachal Pradesh Govt. decided to allow private sector participation in respect of hydroelectric projects.

ALTERNATIVES

3.6.2 Alternative I: Originally project was proposed as a left bank alternative with a diversion structure on at elevation 2144 m, surface desilting tank, open channel, surface penstock and a surface powerhouse near Government school at Choling. However, this layout runs in unstable area

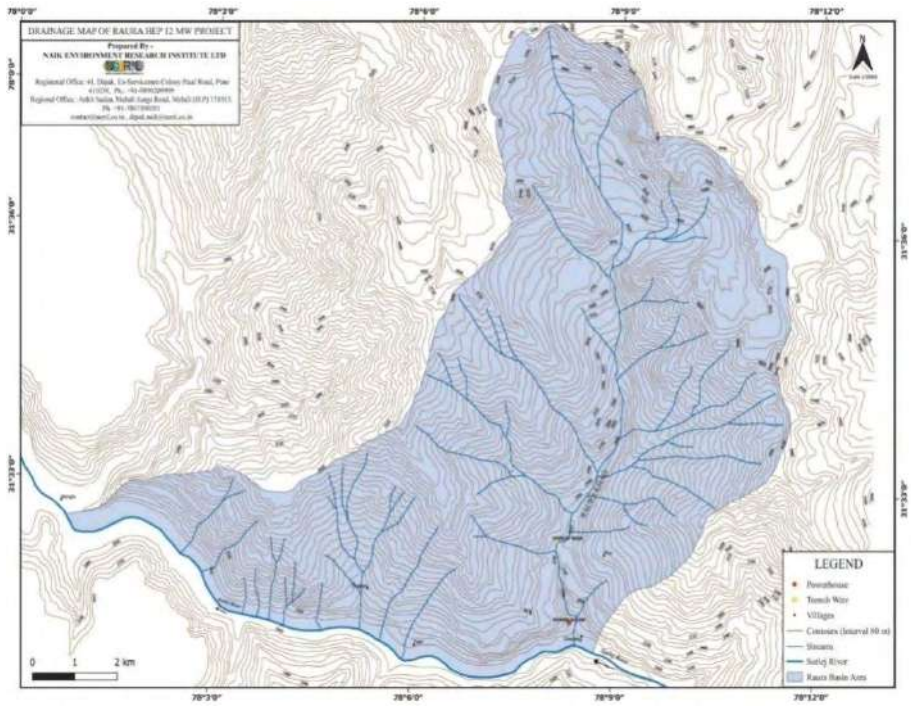
in many portions, and it has to cross two slide zones. Open channel was to pass through private land and near few houses where blasting was not possible. Therefore, this proposal was rejected.

ALTERNATIVE II: This alternative envisages construction of diversion structure on Raura Khad at El 2145 m. The left bank has exposed rocky strata at diversion site. Desilting tank is located underground near the intake and thereafter underground fore bay with a shaft 45-meter depth has been proposed. From the bottom of shaft, a D-shaped tunnel of 2.75-meter size has been proposed up to powerhouse. Penstock is proposed to be located inside this tunnel. Powerhouse is also proposed underground on the right bank of at El. 1825 m. In this alternative though head is less than alternative I but whole project is in massive gneisses type rock and no damage to project features is anticipated due to landslides or falling boulders. All geological problems in this alternative have been tackled and project has become feasible.

3.6.4 In view of the advantages offered by the alternative II, it has been taken up for construction. However, during construction phase water availability in the khad was observed and studies regarding energy generation were carried out. These studies show that generation of 12 MW of power is possible in this scheme and project is economically attractive and a viable one. Hence, revised project report for 12 MW capacities has been prepared and submitted for approval to the Government of Himachal Pradesh.

3.7 NATURAL RESOURCES OF THEREGION

The project lay out lies between EL 2145 m to El 1820 m on and there is no aquatic life.15% of available water is released back into the Khad as environmental flow and 85% of available water is used for power generation.



Map no.1: Drainage Map

3.8 LAND REQUIREMENT

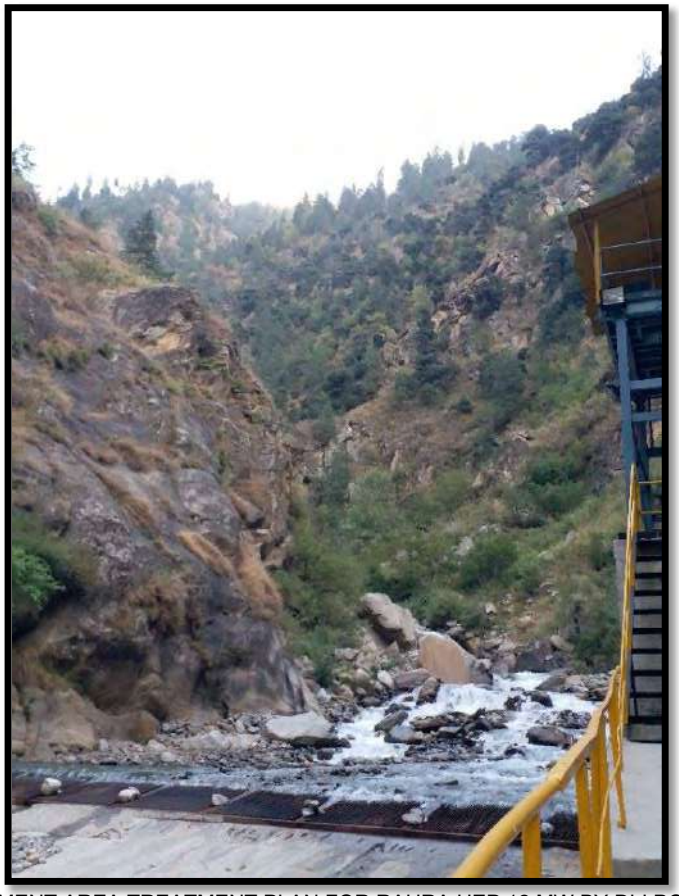
Raura HEP is a run of the river scheme and thus results in no submergence. The land required for the execution of various project components is Government / forest land. This land already stands diverted. Land for infra structure a facility is mainly forest land and some the private land required during construction stage has been taken on rent. The acquired land for the project is finalised based on prevailing design and the necessary acquisition process is complete.

3.10 POPULATION AFFECTED

Raura HEP has no storage reservoir and so no submergence case is involved. In the lay out of project components no habitat is to be affected. As such no population is affected by the execution of this project.

3.11 ENVIRONMENTAL ASPECTS

Raura hydroelectric project is being envisaged as run-of- the river type development without any storage of water. The flow conditions in the khad are left undisturbed except the diversion of design discharge at diversion weir site for the purpose of power generation requirement. Flows diverted for power generation shall be led to the powerhouse through tail race channel. Raura khad does not support aquatic life. The scheme shall not endanger the species of flora and fauna in the area as fish ladder shall be provided at the diversion weir and adequate provision shall be made that the sufficient water is left in the river. The components of the project are proposed on barren land and no area of the cultivable land is required for the project. The construction of project facilities also does not involve felling of any tree. The danger of erosion and disturbance to hill slopes is minimal. No major construction of road is required. The construction of roads and project components will not involve felling of neither any tree nor lead to deposition of excavated material in the khad to affect environment adversely. Since the local labour will be deployed only skilled and specialists would be brought from outside and thus a small colony shall only be needed.



3.12 SALIENT FEATURES- RAURA HYDRO ELECTRIC PROJECT (12 MW)

LOCATION:

I.	State	Himachal Pradesh
II.	District	Kinnaur,
III.	Tehsil	Nichar at Bhabanagar
IV.	Village	Choling, Meeru, Tapri
		Weir site on Raura khad at EL ± 2145 m w.r.t. suspension bridge EL ± 2122.60 m on Meeru Road below the proposed trench weir location and powerhouse at EL±1825 m
V.	Name of stream	Raura khad, a tributary of Satluj river
VI.	Nearest rail head	Kalka (BG) / Shimla (NG)
VII.	Access	Ambala – Kaurik National Highway-22, about 220 km from Shimla
VIII.	Geographical Coordinates	
	Trench Weir:	Latitude:31°32'23.96" N Longitude:78°08'09.12" E
	Powerhouse:	Latitude:31°31'27.20" N Longitude:78°08'22.48" E

SOI Topo sheet 53 I/2

1. HYDROLOGY

i)	Gross Catchment area at diversion site	67.5 Sq.km
ii)	Design flood discharge at diversion site	743cumecs
iii)	Type of Stream	Perennial
iv)	Minimumflow1.11cumecs	
v)	Peak Flow (Normal)8.8cumecs	
vi)	50 years return period flood discharge 300 cumecs	
vii)	The annual rainfall	
	50%dependability	708mm
	75%dependability	651mm
	90%dependability	570mm

2. DIVERSION WORK

I.	Type Trench Weir	
II.	Weir Elevation (Top2145 m	
III.	H.F.L2148.0m	
IV.	Discharge carrying capacity.	
	(including discharge for flushing)	7.06 cumecs (4.61 cumecs design discharge and discharge for flushing, overload) Lining Details RCC lining for trench weir with U/S and D/S protection.
V.	Size of Weir	
	Width	2m
	Depth	Varies from 1.2 m to 2.8m

	Length	21m
VI.	Bed Slope	1 in13
VII.	Intake Gate	2.0 m x 2.0m
VIII.	Shingle flushing Gate	1.5 m x 1m
IX.	Design Flood	743cumecs

3. INTAKEWELL

I. Shape Rectangular
Size: Length5.0 m; Width7.3m; Height6.8 m.

II. Shingle Flushing Arrangement

Size	1.5 m x 1.8 m D shaped tunnel.
Length	50m
Water Channel	Rectangular along one side of tunnel for flushed Water.

III. INTAKE/ CONVEYANCE TUNNEL:

Type: D shaped tunnel Size: Height 2m Length 27 m

4. DESILTING ARRANGEMENT (underground)

I.	Full Supply Elevation	2144.50m
II.	Length	60.00m
III.	Depth	5 m deep and hoppers of varying depth
IV.	Width	7.5m
V.	Discharge for flushing	1.1cumecs
VI.	Flow through Velocity	0.2m/sec
VII.	Particle size to be removed	0.20 mm and above.

5. ESCAPE CUM SPILLTUNNEL

I.	Location	RD 50 m
II.	Crest Elevation	El. 2144.5m
III.	Crest Length	8m
IV.	Depth of flow above crest	0.7 m
V.	Length of tunnel	41m

6. FOREBAY AND VERTICALSHAFT (underground)

Bed Width	7.5m
Height	6.5m
Full Supply Level	2144.5m
Length	39m
Vertical shaft diameter	5m
Shaft height	35m
Centre of shaft R.D.	130.22m

7. HEAD RACE TUNNEL FORPENSTOCK

Type &size	2.75m
Slope	Varying from 1 in 7 to 1 in 11, inclined portion of 44m and 100m in 55-degree slope.
Type	D-shaped, to house penstock 1500 mm diameter

8. PENSTOCK

I.	Centre-line El. At Fore bay shaft	2109m
II.	Number of main penstocks	One
III.	Number of branch penstock	Three
IV.	Diameter (Main)	1500 mm
	(Branch)	900mm
V.	Flow Through Velocity	2.6m/s
VI.	Plate Thickness	Varies from 10 mm to 36mm.
VII.	Penstock Plate Grade	ASTM- A – 537 Class A
VIII.	Y–Pieces	3No
IX.	Design Discharge	4.6m^3/sec
X.	Length of main branch penstock	1645m

9. POWERHOUSE

I.	Type	Underground
II.	Length	45 m
III.	Width	13.5 m
IV.	Height	20 m
V	Centreline of Machine Level	1826.5 m
VI.	Max TWL	1824.5 m
VII.	Min Tail Water Level	1822.5 m
VIII.	Max. Gross Head up to fore bay	318 m
IX.	Net Head (Design) 307 m	
X.	Capacity of OH Crane	50/8Ton
XI	Installed Capacity3 x 4000 kW	
XII.	Hydraulic Losses in Penstock& Fore-bay fluctuations 11 m	
XIII	Type of generating unit and number	3 nos. Horizontal Axis Pelton Turbines coupled with synchronous generators.

10. SWITCH YARD (SURFACE)

Size	50 m X 25 m in two benches
Elevation of lower bench	1895 m

11. ELECTRO-MECHANICALEQUIPMENT

A. TURBINE

I.	Type of Turbine	Pelton Turbines coupled with synchronous generators.
II.	Number of Turbines	3Nos.
III.	Rated capacity of each turbine	4MW

IV.	Rated Head	307m
V.	Minimum discharge	1.11cumecs
VI.	Maximum Pressure Rise	20%
VII.	Maximum Speed Rise	25%

B. GENERATOR

Type of Generator: Synchronous

I.	Number of Generators	3 Nos.
II.	Rated capacity of each Generator	4 MW
III.	Power Factor	0.9
IV.	Rated Voltage	6.6 kV
V.	Frequency	50 Hz

12TAILRACES

I. Shape D- shaped tunnel and Rectangular R.C.C. Box

Size of tunnel 2.5 m

II. Length of tunnel 3.5 m

III. Size of R.C.C Box Structure

Width 2.5 m

Depth 2.5 m

Length 50 m

13. POWER AND ENERGY GENERATIONS

I. Energy generatedin75% dependable yield 66.3 MU

II. Energy available for 1% auxiliary consumption transformation losses and 2% Transmission losses and 12% royalty, free power for capacity enhancement 55.44MU

14. COST ESTIMATE (Rs in Lac)

I.	Civil works	5563.74lac
II	Electro- mechanical works	1966.52lac
III	Transmission	214.56 lac

IV. Total project cost 7744.82 lac

V. Interest during construction (IDC) 1121.85 lac

VI. Financial charges 68.23 lac

VII. Escalation during construction 416.27 lac

VIII. LADC charges 140.26 lac

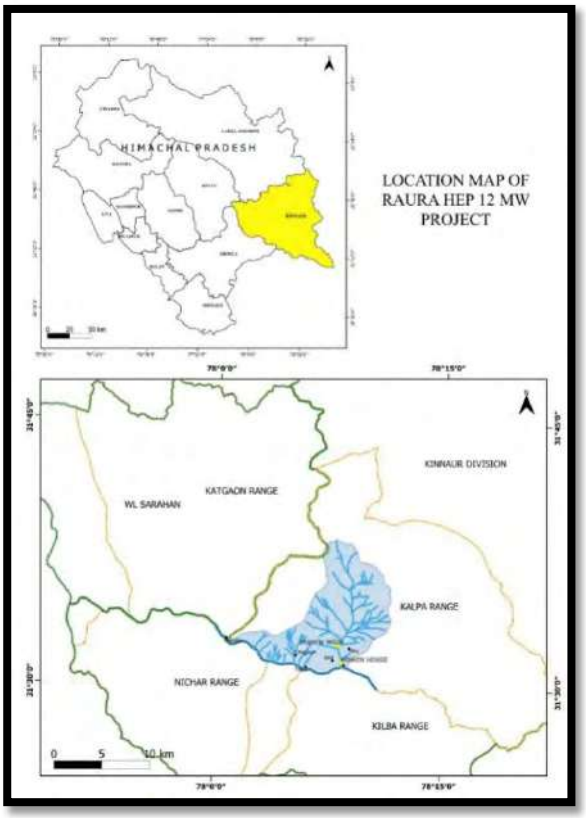
IX. Project completion cost 9491.43 lac

15. FINANCIAL ASPECTS

I. Project completion cost Rs 9491.43lac

II. Cost of generation per KWh2.91 levelized tariff for 7.5% dependable yield per year

16. LOCATION MAPs



Map No 2. Location Map of Catchment Area

3.25 Beat wise Fund Allocation: The Beat wise Fund Allocation percentage is tabulated below:

Beat wise Fund Allocation percentage:

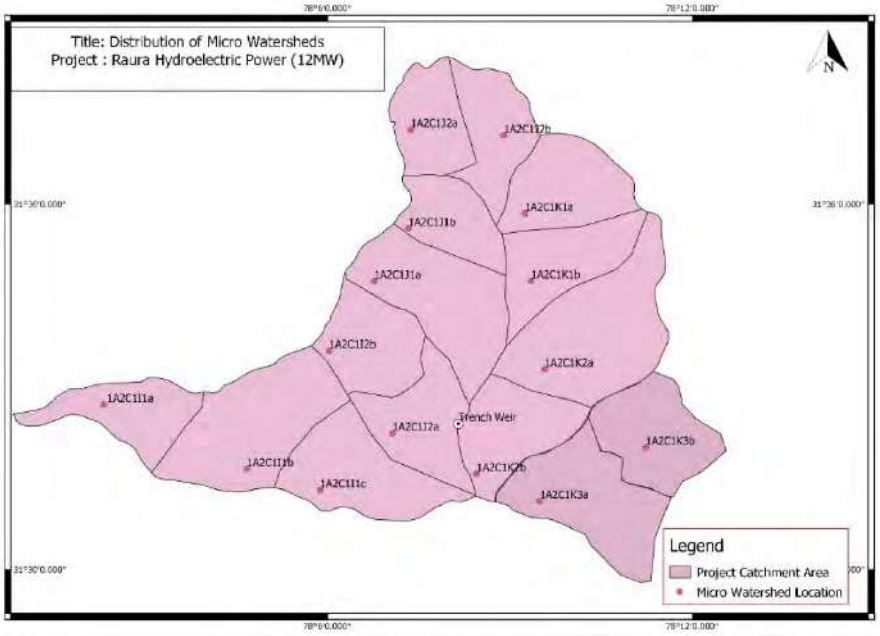
Name of Beat	Percentage of Funds
Runang Beat	65,21,544(45.60%)
Tapri Beat	41,23,998 (28.83%)
Urni Beat	36,56,458 (25.57%)
Total:	1,43,02,000 or say 1,43,000/- (100%)
Funds to be controlled from Circle/Division level for Research, Training & Capacity Building, PES, Purchase of Fire Fighting Equipment, Wildlife Protection, Micro Planning & Abundance Study, Monitoring & Evaluation and Contingencies Components.	65,75,000 (45.98%)

3.26 Treatable Area of the Project Catchment

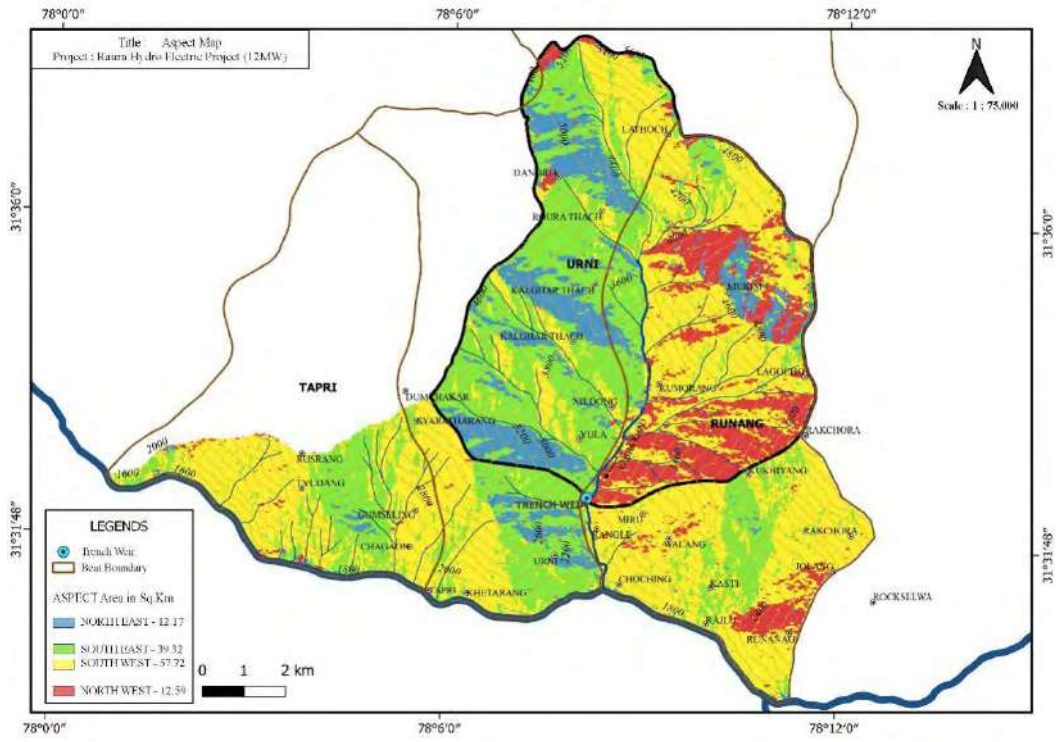
Raura HEP falls under Sub Catchment No. 10 comprising of Runang, Urni and Tapri Beats. It is stated that the directly draining area of Raura HEP up to weir house is very small i.e. 8 MWs in the effective catchment. The directly draining area is 67.5 Sq. KMs out of which treatable area, after excluding areas having elevation of more than 3200 meters, slope more than 45^{O}, settlements, water bodies, agricultural land and perma-frost works out to 5.5 Sq. Kms only which is 8% of the effective catchment. Therefore, the total project catchment area is considered as all the 15 MWs falling in Runang, Tapri and Urni Beats having an area of 161 Sq. KMs. Out of this 161 Sq. KMs area, net treatable area after excluding the area having elevation of more than 3200 meters, slope more than 45^{O}, settlements, waterbodies, agricultural land and perma-frost areas, is **40.2 Sq.KM** in 15 MWs which is 25**%** of the total project catchment.

Details of Micro-watersheds in the project catchment along with the maps depicting LULC, Aspect, Elevation, Slope and treatable area are given below:

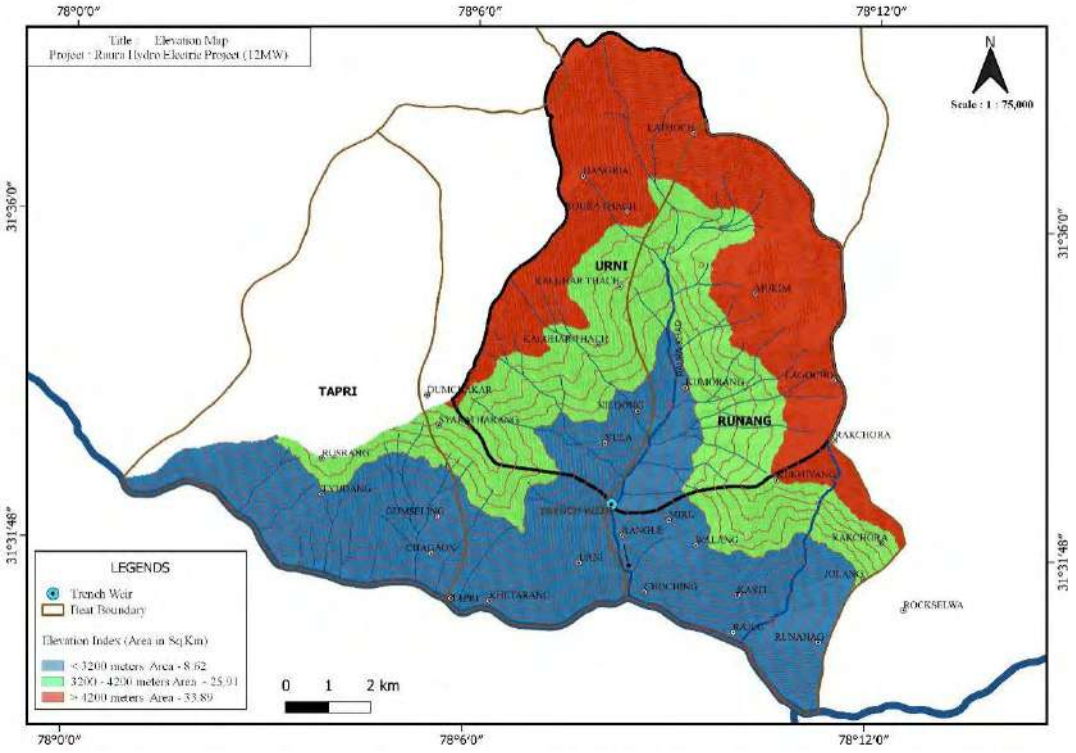
Sl.	Beat	Micro-water shed No.
1	Runang Beat	1A2C1K3a, 1A2C1K3b,
2	Urni Beat	1A2C1I1c, 1A2C1I2a, 1A2C1K2b, 1A2C1J1a, 1A2C1K2a, 1A2C1K1b, 1A2C1J1b, 1A2C1K1a, 1A2C1J2b, 1A2C1J2a
3	Tapri	1A2C1I1a, 1A2C1I1b, 1A2C1I2b,



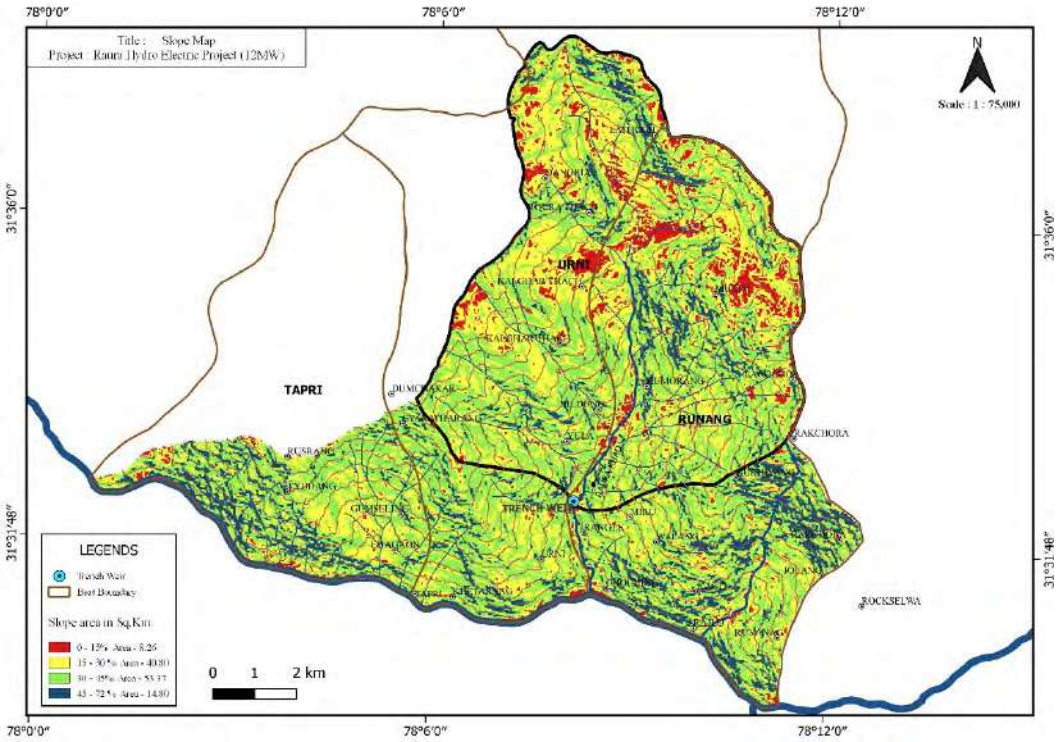
Map No 3. Micro Watershed Distribution in Project Area



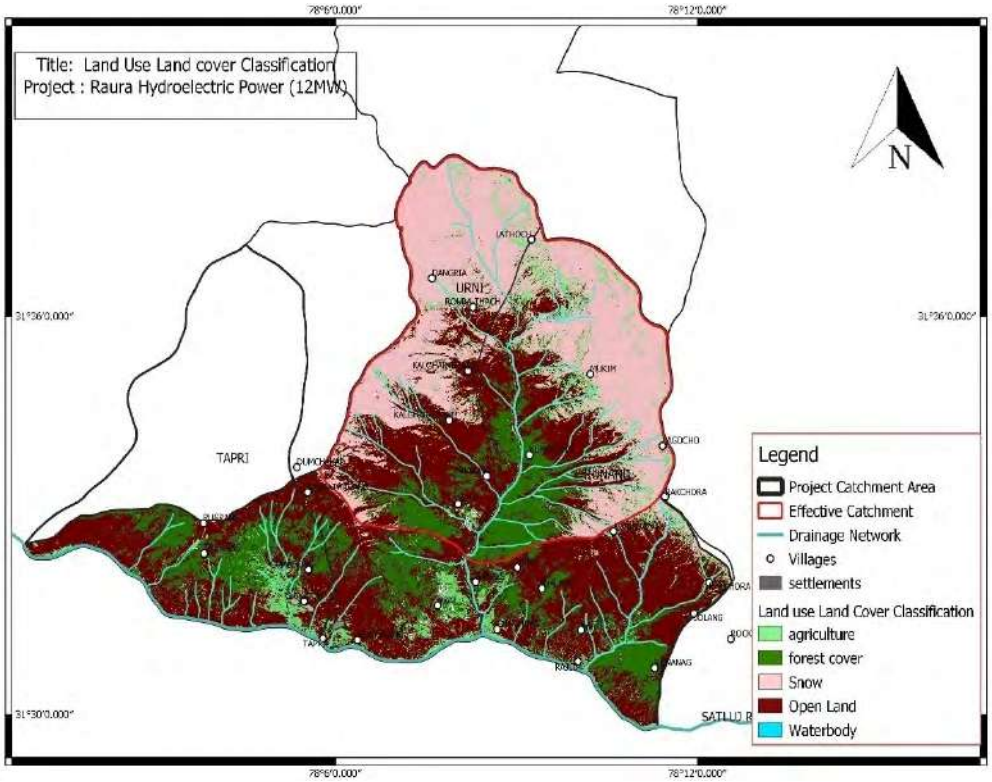
Map No. 4 Aspect Map



Map No .5 Elevation Map



Map No 6 Slope Map



Map No 7 Land use Land Cover Map

3.27 PRIORITISATION OF MWS FORTREATMENT:

This CAT Plan is relatively for a small area comprising of only three Beats in Kalpa Range. It, therefore, does not require prioritization of works. All the works in all three beats will commence simultaneously.

EXTRACTS FROM (CHAPTER I) FROM WORKING PLAN OF KINNAUR DIVISION ARE QUOTED HEREUNDER:

1.3.1 Configuration on the Ground: *The crests of the three mountain ranges that encompass Kinnaur, the Zanskar Range, the Great Himalayan and the Dhauladhar lie generally in perpetual snow with many peaks raising between 5180 m and 6770 m. The highest two peaks in Kinnaur, Leo Pargial 6770m. and the other peak? 6608 m are in the Zanskar Range. The third and the fourth highest peaks, 6593 Raldang, 6473 m.? Rise in the Great Himalaya. The Peaks of the third mountain range, the Dhauladar are, somewhat, lower ranging generally from 4877m. To 5791m.*

1.4 Geology and Rock: *-The tract lies in Western Himalayas. The main rock types are Mica, Schist and Quartzite Schist with Gneiss, Granite, Phyleites, Slates, Shale and Quartzite. The geology and rock effect the vegetation of a place by influencing the moisture regime, texture and drainage of the soil. The known geological formation in the area is as follows: -*

(i) Pre-cambrain schists, gneisses, granites, quartzites (Vaikrita system)
(ii) Late pre-cambrain Himanta system- phylities, quartizites, contomerates, shales and slates.
(iii) Silurian, Karol limestone quartzite.
(iv) Carboniferous-quartzite's state dolomite limestone.

Soils: *-Soil types found in the area are: -*

I. ***Forest Soil:*** *-This is mainly of two types (a) Acidic Soil with low base status and (b) Neutral Soil with high base status. Forest soils are by and large rich in humus.*

II. ***Alluvium Soil:*** *-At very few places in this tract, this type of soil is found, mostly along the river. In areas, having adequate forest cover, especially of Deodar, Kail, Fir and Spruce, the soils are generally deep to very deep. In Deodar and Kail forest, the soil has adequate organic matter, whereas, in Fir and Spruce forests humus layer is thick. However, soil, in Chil forest is poor in organic matter due to repeated fire and thus, vulnerable to erosion. Oak forests are generally accompanied by mature soils of good depth and possess high water holding capacity and acidic in reaction.*

1.6 Climate: *- By virtue of elevation, the tract may be set to have a temperate zone climate with winter from November to April, and summer from May to October, which includes the rainy season from July to September the Wet Zone only. The transition period from April to May and from September to October, correspondent, to the spring to autumn season of the temperate zone. Broadly speaking, three season viz. Winter, summer and rainy are discernible in the tract.*

1.6.1 Winter: *- Through, the duration of winter season depends on the altitude, it generally last from November to April, in most parts of the tracts. It is characterized by heavy frost in the lower areas and fairly heavy snowfall at higher elevation. Rain and snow during winter season come from northwestern air currents, and snowfall starts at higher elevation toward the end of the November or early in December. The snow comes down to 1300 m. Elevation, but it seldom lies long below 2000 m. In normal year, snow disappears before the middle of May; all the areas are clear of snow, except the shady localities on northern faces and the nalas. Snow lies almost permanently above 4500 m.*

1.6.2 Summer: *- This is the driest period and is characterized by frequent showers in the moist or wet zone, while in the dry zone, snowfall as late as May and June has taken place at Kalpa in 1957 and in 2013. This period is of intense phonological activity at the higher elevations can be termed as spring. At this time of the year, the lower valleys are hot. Hot winds blowing up the Sutlej and hot sun in arid and semi-arid parts allow only in short spring.*

1.6.3 Rain: *- It starts with the advent of monsoon, towards the end of the June. Or early in July or lasts till middle or sometime in the end of September. The bulk of rainfall is received during this period in the wet zones. In the inner valley beyond Wangtoo, the rainfall shows a progressive decline followed by an enhanced snowfall. So much, so that at Pooh, there is higher snowfall and absolutely no rains. The distribution of rainfall is, however, not regular. Sometimes, it rains*

exceptionally heavy for few days and rest of the rainy season may go erosion landslides and floods. The scars of landslides caused by such unusual cloudbursts take several years to heal.

1.6.4 *After the rainy season, the sky becomes clear and there is very little rain, if any, during October to November. In these months, the diurnal range of temperature is quite marked. The soil losses moisture very rapidly. There is another dry period during the months of October and November. All the areas above about 1200-M. Elevation experience severe frost especially in the depression.*

3.7 Rain Fall: -The climate of the Satluj valley shows a gradual alternation from the heavy monsoon of the outer Himalayas to the arid Tibetan type with the winter snowfall and practically, no summer rain. The Monsoon clouds advancing from the plains of India are combed out by the outer ranges of the hill, where most of the rain falls, so that the inner valleys get a good deal of clouds, but no steady perception. The snow falls is also heavier in the Himalayas that it is on the Tibetan plateau, but, the zone of heavy snowfall includes the whole of Kinnaur and it is only beyond the Tibetan border and up in Spiti valley, that the snow falls shows any marked decline. The monthly and average RH in percentage data of rain fall as procured from India Meteorological Department, Meteorological Centre Bibra House, Cliff-end Estate, Shimla- 171001 for the last 10 years is tabulated on Table No. 11. And 1.2 respectively.

Table-1.1 Monthly Rainfall Data of Kinnaur (Kalpa) (in mm)
(Source: Dept. Of Meteorology, Shimla)

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2010	50.2	101.1	62.7	132.3	127.2	61.2	130.1	84.7	208.3	28.8	5.2	85.8
2011	63.1	151.1	84.9	70.3	49.3	44.6	75.9	128.0	24.8	4.2	0.0	8.8
2012	105.7	152.4	89.4	62.9	10.1	11.4	24.8	64.7	38.0	0.6	1.5	18.1
2013	150.7	244.7	89.4	57.2	31.4	335.4	25.4	25.5	76.8	5.5	8.4	9.4
2014	80.9	132.9	111.7	99.6	56.0	7.8	70.5	24.7	26.9	5.5	0.6	52.0
2015	89.9	236.0	245.2	15.7	59.3	54.7	50.4	29.0	45.5	4.0	5.8	15.0
2016	23.2	38.2	105.7	116.4	21.6	12.6	42.3	58.5	30.8	2.4	0.0	5.0
2017	159.0	49.2	89.6	132.2	24.8	42.4	42.4	26.8	87.6	0.2	37.0	27.0
2018	3.0	49.8	64.8	52.0	53.5	42.0	85.2	34.6	116.0	0.0	45.4	34.0
2019	131.0	180.2	124.4	-	-	-	-	-	-	-	-	-

Table-1.2

Monthly Avg RH at 0830 HRS (in Percentage) of Kalpa from April 2009 to March,2019												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2010	49	46	50	34	37	48	71	67	62	53	44	55
2011	68	72	54	55	55	74	86	89	79	54	41	48
2012	79	80	68	75	58	69	83	87	82	45	50	50
2013	NA	NA	56	54	59	76	84	84	80	80	47	55
2014	57	70	71	61	72	76	83	82	81	78	53	47
2015	54	62	60	41	54	67	80	80	70	58	53	58
2016	64	61	58	54	57	64	87	89	74	47	36	39
2017	75	63	53	49	54	70	90	87	79	59	60	60
2018	68	68	41	49	50	67	87	87	74	48	54	63
2019	78	89	59	-	-	-	-	-	-	-	-	-

(Source: Deptt. Of Meteorology, Shimla)

1.7.1 It is clear from the description of the climate and figure of the rainfall, that the tract covered by the plan can be divided into three climate zones of fairly marked climate characteristics. These may be called Wet, Dry and Arid Zones. On the above basis, the entire Bhabanagar, Katgaon and Nichar ranges falls in the wet zone, the Kilba ranges fall in wet and dry zone, in almost equal proportion, while the Kalpa

range falls entirely in dry zone. The whole of Pooh, Moorang and Malling Ranges falls in Dry & Arid zone. These climate zones evince considerable interest among the foresters for reasons of their peculiar problems of silviculture management.

1.8Temperature: -Due to great variation in altitude, the temperature also varies considerably. Minimum temperature goes down up to 1°C during winter and maximum temperature exceeds 25-30°C in the lower areas during the summer. The temperature in the different parts of the tracts varies according to the elevation. Temperature begins to rise rapidly from the end of February, till June which is the warmest month. The temperature remains high during July and August in the Arid zone, because it lies beyond the reach of monsoon. The weather is cool and pleasant in the summer season, except in the deep valleys. With the onset of the Southwest monsoon by the end of the June, the temperature begins to decrease gradually. However, the temperature drop is rapid only after October. January is the coldest month. In association with the passage of Western disturbance in the cold season, the tract experience spells of cold weather, when the temperature often goes down several degrees below the freezing point. Frost occurs from October to May. The monthly average maximum and minimum data of Kalpa Station is available which has been procured from India Meteorological Department, Meteorological Centre Bibra House, Cliff-end Estate, Shimla – 171001 and is tabulated in Table No. 1.4 and 1.5.

Table-1.4

Monthly Avg. Max Temperature (in Deg C)of Kalpa w.e.f April 2009 to March,2019

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2010	7.2	8.4	16.1	18.8	20.4	21.1	20.9	21.5	19.4	18.2	15.9	10.2
2011	2.9	4.9	12.4	15.2	21.9	22.0	21.8	21.8	22.0	19.6	16.7	11.5
2012	3.4	4.5	12.1	16.5	21.1	23.8	22.9	21.5	22.1	18.0	14.2	9.3
2013	3.6	1.9	9.7	16.6	21.7	22.3	23.6	22.5	21.3	19.2	14.0	10.2
2014	4.5	4.2	8.8	15.3	19.8	24.1	22.7	23.1	22.2	19.3	16.1	9.4
2015	5.3	5.6	10.4	18.1	21.4	22.0	23.5	23.2	22.6	19.2	15.0	10.6
2016	9.5	10.7	13.8	17.7	22.2	24.7	22.7	21.9	23.4	20.5	16.7	14.1
2017	3.9	8.4	12.0	17.7	21.5	21.7	22.6	23.1	21.4	20.2	13.4	9.9
2018	10.8	10.7	14.4	18.1	25.8	23.7	22.1	23.0	21.1	17.9	12.7	9.2
2019	3.2	4.2	10.0									

Table No:-1.5

Monthly Avg. Min Temperature (in Deg C)of Kalpa w.e.f April 2009 to March,2019

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2010	-4.3	-4.2	3.3	5.4	7.3	8.9	13.1	13.9	10.1	4.6	2.1	1.4
2011	-5.0	-2.1	1.1	3.5	7.7	10.8	13.7	13.5	10.4	5.3	2.6	1.5
2012	-4.9	-3.1	0.6	3.7	6.4	10.1	13.8	13.4	10.9	3.4	0.6	1.0
2013	-5.1	-4.8	0.7	3.5	8.3	12.0	14.6	13.9	9.5	6.4	0.9	1.7
2014	-3.1	-3.4	-0.2	2.8	6.4	10.7	13.7	12.9	9.8	5.0	2.1	0.8
2015	-4.5	-6.6	-3.9	3.3	7.0	9.1	13.4	13.4	9.0	5.3	2.4	0.7
2016	-1.9	-0.8	1.7	4.9	7.9	11.9	13.9	12.7	9.5	4.6	2.2	1.2
2017	-3.8	-0.9	0.4	5.0	7.0	10.1	14.3	13.5	9.5	5.3	1.0	0.2
2018	-2.2	-0.8	1.5	4.7	6.9	11.1	14.1	14.1	9.5	3.1	0.9	2.3
2019	-4.9	-4.4	-0.6									

(Source: Deptt. Of Meteorology, Shimla)

1.9 Effects of Climate on Forest Growth: -

a) Heavy rains in monsoon or pre- monsoon, sometimes, cause havoc to trees growth which result in soil erosion, landslides, and floods.

b) From April to June, when temperature is high, the probability of forest fires is very high in lower areas. Young plants in the nurseries and plantations suffer from persistent drought and large-scale mortality is noticed in areas with sandy and dry soils. The natural springs run dry, thus, causing a problem of water for raising nurseries.

c) Autumn (September –October) are relatively dry months.

d) All the areas above 1000 m, experience severe frost, especially in the depressions during winter.

e) High hill areas experience snow, during November to February; many plants are uprooted or broken. In young regeneration areas, roots lifting due to frost is also noticed. However, snow is very helpful for augmenting ground water and is also utilized by the plants.

1.11 Distribution of Area: -Nine nos. UPFs have converted/notified into new DPFs during the period of Working Plan under revision and are included in the plan. Out of 9 newly notified DPFs, and Govt. waste land i.e. other land as defined by the Supreme Court, which includes Charagah Drakhtan, Charagah Bila Drakhtan, Ghasnies, Pasture land except Gair Mumkin Land, etc. are included in the plan incompliance of the *Hon'ble Supreme Court's order dated 12-12-1996,* for application of Forest (Conservation) Act, 1980 only, as these Govt. waste land were declared, in general, as 'Protected Forests' by the Govt. notification dated 25th February, 1952, which were out of the scope of the previous Working Plan. Some of the unlisted UPFs, culturable waste land which includes Charagah Drakhtan and Charagah Bila Drakhtan land (except *"Gair mumkin"* land including refractory area) are included in the Plantation (overlapping) Working Circle for afforestation including Compensatory Afforestation in lieu of the forest land diverted for non-forestry purpose. At present these forest land i.e. Govt. waste land, throughout the tract, have not been defined boundaries on the ground. Similarly, record of rights admitted in these forests is to be prepared and notified under Section 29 (3) of the Act and to be notified in the official gazette.

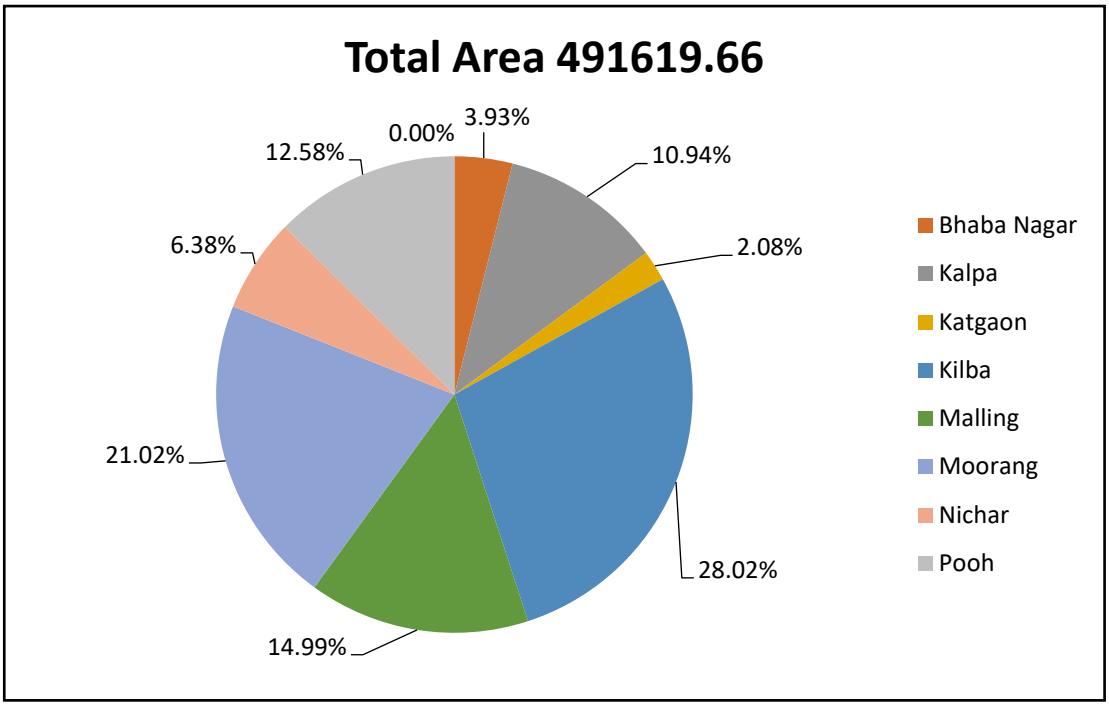
The total geographical area of the tract covered by Rajiv's plan was **4764.23** km^2 and **1788 .77** km^2 was covered by the Wildlife Division, Saharan, which is an independent unit. But due to issuanance of final Notification of Wildlife Sanctuaries, **12558.33**hac, of area has been transferred to Kinnaur Forest Division. Beside this, some Forest areas were not included in the previous plan that too has also been incorporated in the current plan. Therefore, the total geographical area of the tract covered by this plan is **4916.20** Km^2. The major portion of the tract is uninhabited. The Demarcated Protected Forests and listed Un-demarcated Protected Forest covers **24771.08** ha and **10705** ha, respectively, which contributes to only **7.22** percent of the total geographical area. Forests from long belts between 2130 to 3600 m, elevation on both sides of Sutlej, the continuity of which, however, is often more apparent than real. In Kalpa Range and Pooh Range, however, there are isolated patches of forests. The names of the forests remain the same as given in the notification of Protected Forests and Bushahr State Forest Settlement Report of H.M. Glover. The Demarcated Protected Forests have been divided into **266**compartments/ sub-compartments. Similarly, there are **41** numbers of Listed Un-demarcated protected forests and **Nil** Unlisted Un-Demarcated Protected Forests.

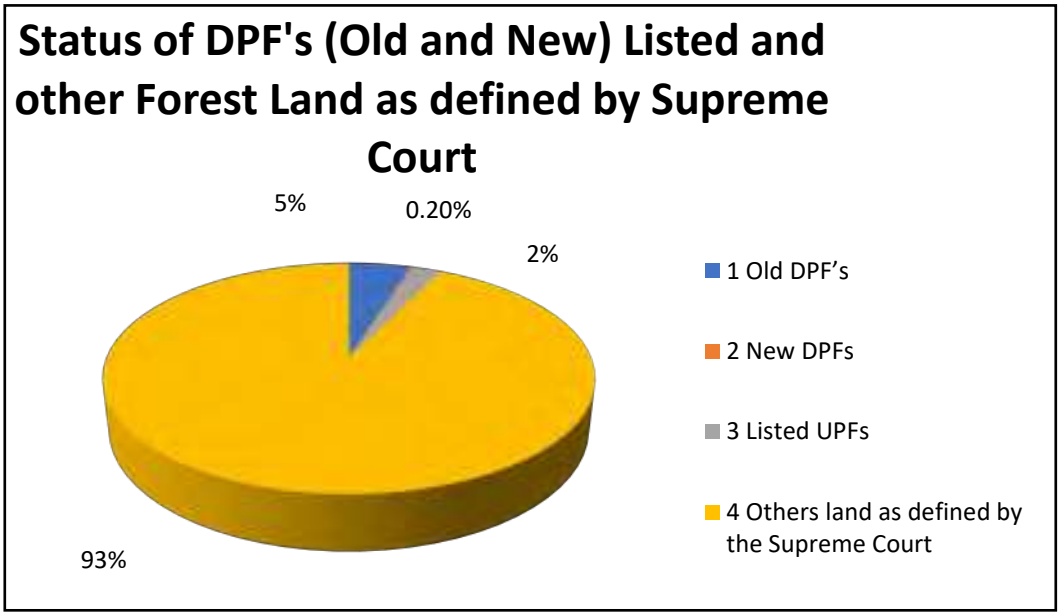
The Range wise statement of the forest area is tabulated in Table No: -1.6.

Table No. 1.6

Sr.	Name of Range	Reserve Forest (RF)	Protected Forests			Other Forest land as defined by the Supreme Court	G. Total
			Old DPF's	New DPFs	Listed UPFs		
1	Bhaba Nagar	0	2407.88	0	2375	14517.17	**19300.05**
2	Kalpa	0	5281.13	0	445	48050	**53776.13**
3	Katgaon	0	1232.92	0	1740	7277.08	**10250**
4	Kilba	0	3943.91	971.45	2408	130700.76	**138024.12**
5	Malling	0	0	0	0	73681	**73681**
6	Moorang	0	3966.42	0	0	99387.45	**103353.87**
7	Nichar	0	5579.51	0	3737	22050	**31366.51**
8	Pooh	0	1387.86	0	0	60480.12	**61867.98**
	Total		**23799.63**	**971.45**	**10705**	**456143.6**	**491619.66**

(Source: Working Plan Kinnaur Forest Division)





3.28 THE EXTRACT OF CHAPTER -II A FROM THE WORKING PLAN FOR KALPA FOREST DIVISION ON *'FOREST FLORA'* IS REPRODUCED BELOW

2A.1Introduction: *-The distribution of vegetation follows an altitudinal zonation similar to that in the outer Himalayas but on account of the marked variation in the annual precipitation along the entire length of Sutlej valley the tract can be divided into three main climate zones as under:-*

(i) ***Wet Zone:*** *- This zone comprises of the lower or outer valley, extending from Maneoti dhar in Nichar to Kilba along the north and up to Wangtu along the southern aspects. It includes all forests of Bhaba Nagar Range, Nichar Range, Katgaon Range, and Part of Kilba Range. This zone receives the bulk of rainfall during rainy season from southwest monsoon and heavy snowfall in winter.*

(ii) ***Dry Zone:****-This zone lies between Kilba and Purbani on the left bank of the Sutlej and Kalpa on the right bank of Sutlej. It extends over parts of Kilba and Kalpa Ranges. The rainfall shows a progressive decline, as we go eastwards. The snowfall during the winter is heavy.*

(iii) ***Arid Zone:****-This zone lies beyond Purbani and Kalpa extending to the Indo-Tibetan border. This zone does not get practically any rainfall. The winter is severe and the tract experiences heavy snowfall during winter. Snow melts by the end of the May and thereafter the tract is practically dry for the rest of the year.*

3.29 THE EXTRACT OF CHAPTER -II B FROM THE WORKING PLAN FOR KALPA FOREST DIVISION ON *'FOREST FAUNA'* IS REPRODUCED BELOW

2B.1 Introduction: *-India is recognized as one of eighteen mega diverse countries and has four identified bio-hotspots. They are the Himalayas hotspots which have diverse eco-systems ranging from alluvial grass lands, sub-tropical broad leaf forests to alpine meadows. Second hotspot in India is in the North East of India and part of Indo-Burma comprising an aggregate of 2 million Km². The third hotspot is in the rain forests of the Western Ghats and is home to a rich endemic assemblage of plants, reptiles and amphibians. Fourth, the Andaman & Nicobar Island chain forms the biological hotspot in India that is closely allied on the Sundal and hotspot of Southeast Asia. It is home to 7.6% of all mammalians, 12.6% of all avian, 6.2% of all reptilian, 4.4% of all amphibian, 11.7% of all fish, and 6.0% of all flowering plant species. This diversity becomes even more remarkable given that* ***our country, with only 2.4 percent of the total land area of the world, contributes 8 per cent to the known global biological diversity, while also being the second largest populous nation in the world, with over 1.2 billion***

people. *It is this unique diversity that the people of India hold in great esteem, are very proud of and have strong cultural and social bonds with.*

This deep rooted historical and cultural association with wildlife is central to India and its people. In modern times, burgeoning human population and the consequent exploitation of land and forest resources along with hunting and trapping for trade, food and sport has threatened the survival of many species - from charismatic and well-known species to many other lesser-known animals and plants whose status is harder to determine.

Post-Independence, there has been a growing concern about the decline of wildlife populations and the necessity of conservation and preservation of India's wildlife. This led to the enactment of the Wildlife (Protection) Act, 1972. By an amendment in 2003, the objective of the WLPA, reads as follows, ***"An Act to provide for the protection of wild animals, birds, plants and for matters connected therewith or ancillary and incidental thereto with a view to ensuring the ecological and environmental security of the country."***

Thus, wildlife conservation is acknowledged as integral part to ecological and environmental security of our country, rather than being limited to conservation of certain species of plants, animals and birds or their habitats.

(a) Mammals: *-A variety of fauna is found in the tract due to variation in altitudes, topography, climate and vegetation. The important fauna is Leopard or Panther (Panthera pardus), Snow Leopard (Panthera uncia) Himalayan Black Bear (Selenarctos thibetanus), Brown Bear (Ursus arctos isabellinus), Jungle Cat (Felis chaus), Leopard Cat (Felis bengalensis). Himalayan Pine Marten (Martes flovigula), Jackal (Canisaureus) Red Fox (Vulpes vulpes), Ghoral (Nemorhaedus goral), Blue Sheep,* **(***Pseudois nayaur), Ibex (Capra ibex), Musk Deer (Moschus moschiferus), Barking Deer (Muntiakcus muntjac), Indian Wild Boar (Sus scorfa), Monkey (Macaca mulatta), Langurs (Presbytis entellus), The Giant Indian Flying Squirrel (Petaurista petaurista), Indian Hare (Lepus nigricollis) etc.*

(b) Birds and Pheasants: *- Himalayan Griffon Vulture (Gyps himalayansis), Golden Eagle (Aquila Aquila chrysaetos), Monal (***Lophophorus** *impejanus), Snowcock (Tetraogallus himalayensis) Chakor (Electors chukor), Koklas (Pucrasia macrolopha), Western Tragopan (Tragopan melanocephalus), Wood Cock (Scolopax rusticola) etc.*

(c) Reptiles: *- Himalayan Pit Viper (Ancistrodous Himalayanus), Common Indian Krait (Bungarus Caerules), Rat Snake (Ptyas mucosus), Common Indian Monitor (Varanus Monitor), Rock Lizard (AgamoTuberculata), Blood Sucker (Techydrmous Spp.) etc.*

(d) Fishes: *- Trout Fish (Oncorhynchus mykiss), Mahseer Fish (Tor chelynoides).*

Blue Sheep (Pseudois nayaur)

2B.2 Injuries to which the Fauna is Liable: *-The fauna of the tract is decreasing due to reduction of the habitat as a result of ongoing development activities. The biggest enemy of wildlife is man himself. The other hazards to the fauna are epidemics, atmospheric influences, animals, and fires. The need of growing population is the cause of animal-human conflict. The normal living conditions of the wildlife are disturbed which is a matter of concern. The following are the hazardous influences threatening the wild life:-*

i) Habitat Destruction: *-The extraction of many species is often associated with the denudation of their natural habitats, owing to ever increasing biotic pressure forestry operations, and development activities like construction of roads and buildings etc. taking place in the natural habitats of wildlife. Roads restrict the movement of fauna. Corridors connecting two vegetation zones gradually vanish due to various developmental activities, which again restrict the movement of Wildlife especially bigger herbivores. The shrinkage of corridors has resulted in the confinement of these herbivores in a particular territory, which was not so in the past. The fragmentation of the Forests has also been causing problems to the avian fauna, mega carnivores and lesser carnivores. Crop raiding and human causalities due to the attack of Wild Beer, macaques, leopards, etc are the main consequences which villages are experiencing.*

ii) Environmental and Ecological Factors: *-Environmental factors are food, water and shelter, which are most important components in a habitat. The shortage of the above components is often associated with the habitat destruction. Plant life, upon which animal subsist has an important role in the wellbeing of the animals. Where grazing has been a real problem, the available food has to be shared by the wild fauna and cattle population. Water is another component which determines the existence of fauna. Water source in the wild are also competed upon by cattle population and wild fauna. Ecological factors like temperature, humidity, etc also affect animal life. Seasonal variations of weather such as severe drought can have marked effect on wildlife. Humidity also influences the loss of moisture from the body of certain animals.*

iii) Fires: *-Fires play havoc with wildlife. The wild animals get trapped in fire and killed, most susceptible are the young ones. Fires destroy eggs, micro-fauna and nests. There is considerable loss of habitat too.*

iv) Epidemics: -*Epidemics amongst the wildlife is not a common feature, yet deer and antelopes are susceptible to diseases being transmitted through domestic cattle grazing freely in forest.*

v) Atmospheric Influences: -*The adult are seldom affected by the climatic disturbance but the young once suffer causalities mostly from frost. The hatching of birds is badly affected by heavy rains. Drought reduces the water sources and threat to wildlife increases.*

vi) Hunting/Poaching*: - In spite of complete ban on hunting, the stray incidences of hunting wild animals do take place particularly, when the animals migrate to lower elevations due to unfavourable conditions. The damage to orchards and agriculture crops prompts local people to resort to hunting.*

vii) Climatic Conditions*: - Sometimes the adverse climatic conditions like heavy rains, heavy snow, and prolonged drought affect the wild animals particularly the young ones.*

viii) Disease Transmission*: - Epidemics constitute one of the main factors for the depletion of our fauna. Very little work has been done on the detection and treatment of wildlife diseases in Himachal Pradesh. The diagnosis of wild animals is very difficult but nevertheless, extremely important. Several communicable diseases of bacterial, viral and protozoan origins occur among wildlife, Wildlife and domestic cattle suffer from almost similar diseases and the chance of transmission is extremely high one such example is Foot &Mouth disease.*

2B.3 Protection of Fauna: -*Following are the measures for protection of fauna: -*

i) Wildlife (Protection) Act, 1972 prohibits shooting and hunting of wild animals and trade in Animal articles and trophies. All the statutory provisions and regulatory measures of the Act should be enforced strictly.

ii) There are enough perennial streams and springs in the area and water shortage is not a major problem. Grazing by local animals however needs to be controlled / regulated so that the herbivores get enough food especially in lean months.

iii) Fires in summers in some localities and majority in winters (due to negligent pan burning) cause considerable damage to the existing wildlife. Therefore, effective fire protection measures and control of fires will help to a great extent in protection of wildlife.

iv) Notice boards having useful information and restrictions should be displayed at prominent place. These should be in Hindi/English.

v) Cases of cattle damage by leopard, other carnivores and bear are often reported in the tract. This is due to shortage of natural prey in their habitats. Although compensation is paid for the losses, yet it is insufficient to cover the complete loss. Effort should be made to provide timely compensation.

vi) Beers and porcupine cause damage to the agriculture fields. There is no compensation for such damage; people are often tempted to do away with the damaging animals. A suitable crop compensation policy/ crop insurance scheme is likely to be helpful to people. Therefore, the Government should frame a policy for addressing the problem of crop damage by wild life on priority as applicable in the other States in India.

vii) Spreading of the massage of awareness and conservation can have good results. In this context, celebration of wildlife week, organizing Eco-clubs in schools and colleges and involvement of N.G.O.'s is called for. The ultimate aim should be the involvement of local population in conservation of biological diversity.

viii) Renewal of existing arms licenses & grant of new ones to be done judiciously subject to condition that arms will be deposited with the Police Department especially in winter season in every year on set of harvesting of crops to avoid any misuse of gun/arms under the provision of Wildlife (Protection) Act, 1972.

ix) Adequate patrolling staff particularly of forest guards in fields is must for the protection of wildlife.

Table 3.1Glossary of common Trees, Shrubs, Herbs and Grasses found in Kinnaur Forest Division

A:- Trees		
Sr. No.	**Botanical name**	**Local name**
1	**2**	**3**
1.	*Abies pindrow*	Tosh
2.	*Acer oblongum*	Parang
3.	*Acer pictum*	Rikhandlu
4.	*Acer caudatum / Acer villosum*	Rikhandlu
5.	*Acer caesium*	Chirandru, Manderang
6.	*Aesculus indica*	Khanoor, Poo
7.	*Albizzia lebbek*	Siris
8.	*Alnus nitida*	Kosh, Kunish, Nyum
9.	*Betula utilis*	Bhojpatra, Pad
10.	*Betula alnoidfes*	Sheori, Kathbhoj, Shagra.
11.	*Bueuswallichiana (Syn. Buxus empervirens)*	Shamshad
12.	*Carpinus viminea*	Khirkii, Lolti
13.	*Castanea sativa*	MithaKhanor, Poo
14.	*Cedrela serrata*	Darb, Krishing
15.	*Cedrus deodara*	Deodar, Kelo, Diar, Kialmang
16.	*Celtis australis*	Khirak, Koo
17.	*Corylus colurna*	Sharol, Banshari, Ge bija
18.	*Cornus capitata*	Kareeva, Khagsha, Saktaquas
19.	*Cornus oblonga*	Kareeva
20.	*Cupressus sempervirens*	Saru
21.	*Cupressus torulosa*	Devidiar
22.	*Euonymus tingens*	Barmelui, Kalachindwara
23.	*Engelharditacolebrookiana*	Samma
24.	*Fraxinus xanthozyloides*	Thum
25.	*Fraxinus micrantha*	Angu
26.	*Ficus palmata*	Phedu
27.	*Ilex dipyrena*	Kandru
28.	*Kydiacalycina*	Pula
29.	*Juglans regia*	Akhrot, Khor, ka
30.	*Juniperus macropoda*	Guggal, Dhup, Shur
31.	*Litsaeaumbrosa*	Paror, Chirindi
32.	*Litseaconsimilis*	Paror, Chirindi
33.	*Machilusduthiei*	Chan, Chirindi
34.	*Melia azedarach*	Bakain, Drek
35.	*Olea cuspidate*	Kahu, Vee
36.	*Piceasmithiana*	Spruce, Rai, Rayang
37.	*Pinus wallichiana*	Kail, Lim
38.	*Pinus roxburghii*	Chil
39.	*Pinus gerardiana*	Neoza, Chilgoza, Ri
40.	*Pieris ovalifolia*	Ayar, Yarta
41.	*Pistacia integerrima*	Kakkar, Kakrian
42.	*Populous alba*	Safeda, Mal
43.	*Populus ciliate*	Poplar, Pahari Pipal, Chalun, Karamal,Mangal
44.	*Prunus armeniaca*	Chulli, chul
45.	*Prunus cerasoides*	Paja
46.	*Prunus persica*	Aaroo, Behmi, Reg
47.	*Pyrus foliolosa*	Ranreg
48.	*Pyrus lanata*	Ban Palti, Marpol

49.	*Pyrus pashia*	Shagal, Batangi, Kainth, Lee
50.	*Quercus ilex*	Breh
51.	*Quercus leucotricophora*	Ban, Bani
52.	*Quercus semicarpifolia*	Kharshu, Kor
53.	*Rhododendron arborium*	Baras,Parag
54.	*Rhus wallichii*	Hurku, Shush
55.	*Robiniapseudoacacia*	Pahari kikar
56.	*Salix babylonica*	Majnun, Shon
57.	*Salix daphnoides / Salix alba*	Beuns
58.	*Salix elegans*	Bhashal, Beuns, Shon
59.	*Salix tetrasperma*	Beau, Shon
60.	*Symplocoscrataegoides*	Lodar, Logh
61.	*Taxus baccata*	Rakhal, Barmi, Neyamdal
62.	*Ulmuswallichiana*	Marn, Maldung
63.	*Ulmus laevigata*	Maral,Maldung
B-SHRUBS AND HERBS		
	Botanical Name	**Local Name**
1.	*Abelia trifloral*	Indian Abelia
2.	*Andrachne cordifolia*	Durlu, Bharti, Karkan
3.	*Artemisia maritima*	Seski, Buer
4.	*Artemisia vestita*	-Do-
5.	*Artemisia vulgaris*	Charmer (Khadar)
6.	*Astragalus candolleanus*	Rudravanti
7.	*Astragalus rhizanthus*	Root-Flower Milk-Vetch
8.	*Berberis chitria*	Kashmal, Chutrum
9.	*Berberis aristate*	Kashmal, Khepacho
10.	*Berberislyceum*	Kashmal, chutrum
11.	*Berberis kunawurensis*	Kashmal, chutrum
12.	*Bosiaamherstiana*	Khasbar
13.	*Buddleia paniculate*	Safed chindwa
14.	*Caragana gerardiana*	-
15.	*Caragana brevispina*	Shameh
16.	*Colebrookaiopositifolia*	Bhamber
17.	*Coriarianeplensis*	Masuri, lit zaklo
18.	*Coluteanepalensis*	Chum raonsh, banang
19.	*Cotoneaster acuminata*	Chum, Raonsh, banang
20.	*Cotoneaster bacillaris*	Reuns, Raonsh, banang
21.	*Cotoneaster microphylla*	Raonsh
22.	*Crataegus oxyacantha*	Bat sangli
23.	*Daphne oleoides*	Jiko
24.	*Daphne papyracea*	Kaula, gandiri
25.	*Daphne retusa*	Agru
26.	*Desmodiumsambuense*	Safed kathi
27.	*Desmodiumtilieaefolium*	Mortoi, mus
28.	*Deutzia staminea*	Ghugtai
29.	*Deutzia corymbose*	Philru, chururu, kakhu
30.	*Elaeagnus umbellate*	Geai, gehain, surch
31.	*Elsholtizapolystachya*	Pothijaunkra
32.	*Eurotiaceratoides*	-
33.	*Ficus foveolata (Climbing Shrub)*	-
34.	*Flemingiafruticulose*	Chopru
35.	*Flemingiaprostrata*	-
36.	*Gaultheria nummularioides*	-
37.	*Hypericum lysimachioides*	-
38.	*Indigofera dosua*	Kathi, Kanthi

39.	*Indigofera hebepetala*	Kathi, Kanthi, Kastiarang
40.	*Indigofera gerardiana*	Kathi, Kanthi
41.	*Indigofera heterantha*	-Do-
42.	*Indigofera pulchella*	-Do-
43.	*Inula cappa*	-
44.	*Inula grandiflora*	-
45.	*Juniperus recurve*	Thaily, Guggal, Thailu
46.	*Jasminum humile*	Chameli, Kurang
47.	*Lepidagathiscuspidate*	-
48.	*Lepidagathis lanceolata*	Choti Frodari
49.	*Loranthus elatus*	Banda, Pand
50.	*Loranthus vestitus*	-Do-
51.	*Lonicera angustifolia*	Kantias, Pirlu
52.	*Lonicera quinquelocularis*	Kantias, Pirlu
53.	*Myrsine Africana*	Banwa, ChhotaMehndru, Chitring
54.	*Piptanthusnepalensis*	Chamboa
55.	*Plectranthusrugosus*	Chhichhri, Piyag
56.	*Plactranthuscoetsa*	Bangra
57.	*Poranaracemose*	-
58.	*Prinsepia utilis*	BhekalBekhlang
59.	*Perowskiaatrplicifolia*	-
60.	*Rhus cotinus*	Rikhal, Tung, Tugang
61.	*Rhus semialata*	Titar,Titry
62.	*Reinwardtiatrigyna*	Basant
63.	*Ribes grossularia*	-
64.	*Ribes orientale*	-
65.	*Rhododendron campanulatum*	Kashimiripatha, Sirmang
66.	*Rhododendron lepidotum*	Sumral
67.	*Rhamnus virgatus*	-
68.	*Royleacalycina*	Karnoltitpati
69.	*Rubus biflorous*	Anchu
70.	*Rubus ellipticus*	Hinsar, Kala, Chosho
71.	*Rubus lasiocarpus*	Kalaksha, Swating
72.	*Rubus purpureos*	-
73.	*Salix hastata*	Buins
74.	*Salix denticulate*	-
75.	*Salix daphnoides*	Buinus, Bhainsala
76.	*Sarcococcasaligana*	Taliary, Charabara
77.	*Skimmialaureola*	Shashra, Kedarpatti, Shuru
78.	*Spiraea canescens*	Takol, Chaku, Taku
79.	*Spiraea bella*	-
80.	*Spiraea lindleyana Syn. S. Sorbifolia spiraea vestita*	Kaltiri, Kueht
81.	*Solanum dulcamar*	-
82.	*Staphyleaemodi*	Nag Daun
83.	*Smilax vaginata*	PeepalSatta
84.	*Syringa emodi*	-
85.	*Saussurealappa*	Kuth
86.	*Viburnum coriaceum*	-
87.	*Viburnum cotinifolium*	Taliana, Bhutool, Tustus
88.	*Viburnum Stellulatum*	Richhoi
89.	*Viburnum nervosum*	Tilenal, Talkha, Thalin
90.	*Viscum album*	Bhangra
91.	*Wikstroemiacanescens*	Chambat, Tilak
92.	*Woodfordia floribunda (Syn W. fruticosa)*	Dhan, Dawe
93.	*Zanthoxylum alatum*	Timber, Tirmira, Timri

	HERBS	
94.	*Aconitum heterophyllum*	Patish, Mohra
95.	*Agrimonia eupatorium*	Kanaula
96.	*Ainsliaea aptera*	Durwa, kalighati
97.	*Anaphalis arvensis*	-
98.	*Anaphalisnubigena*	Bhujnu
99.	*Androsacelanuginosa*	-
100.	*Androsace rotundifolia*	-
101.	*Androsacesarmentosa*	-
102.	*Anemone obiusilosa*	Ageli
103.	*Anemone rivularis*	Ageli,Carbini, maruiri
104.	*Aquilegia pubiflora*	-
105.	*Asparagus filicinus*	Sahasimuli
106.	*Atropa belladonna*	Saagngur
107.	*Bidens wallichii*	-
108.	*Boenninghauseniaalbiflora*	Pesmmar
109.	*Caltha palustris*	-
110.	*Campanula argyrotricha*	-
111.	*Campanula cashmiriana*	-
112.	*Campamula latifolia*	-
113.	*Campanula colorata*	-
114.	*Cannabis sativa*	Bhag, kus
115.	*Capsella bursa-pastoris*	-
116.	*Carum carvi*	Zira
117.	*Chenopodium album*	Tulsi, Dankhar
118.	*Cimicifuga foetida*	-
119.	*Crepis japonica*	-
120.	*Cynoglossummicranthum*	-
121.	*Cynoglossumwallichii*	-
122.	*Datura stramonium*	Datura
123.	*Delphinium denudatum*	Nirvisi
124.	*Delphinium vestitum*	Kalulu
125.	*Digitalis purpurea*	-
126.	*Dipsacusinermis*	Tori
127.	*Echinopscornigerus*	-
128.	*Echinopsniveus*	-
129.	*Ephedra gerardiana*	Somlata, Khanta
130.	*Erigeron multiradiatus*	-
131.	*Erystimumhieracifolium*	-
132.	*Fagopyrum cymosum*	-
133.	*Fragaria vesca*	Balbalsho
134.	*Foenieuhumvulzare*	Saunf
135.	*Gallium spp.*	-
136.	*Gentian argented*	Nilisarnal
137.	*Gentian kurroo*	Karu, Kore
138.	*Geranium nepalense*	Tirrahani
139.	*Geranium ocellatum*	-
140.	*Geranium robertianum*	-
141.	*Geranium wallichianum*	Chowhri
142.	*Gerbera lanuginose*	Kopra
143.	*Geumurbanum*	Chandana
144.	*Geraradiana heterophylla*	Bichchubuti
145.	*Gnaphalium luteo-album*	-
146.	*Gynuraangulosa*	Kasiunga
147.	*Halenia elliptica*	Pitpapra

148.	*Hypericum cernuum*	Banjwakra
149.	*Hyoscyamus niger*	-
150.	*Impatiens amphorata*	-
151.	*Impatiens roylei*	-
152.	*Impatiens thomsoni*	-
153.	*Impatiens scabrida*	-
154.	*Jurineamacrocephalla*	Dhup
155.	*Mentha sylvestris*	Podina
156.	*Morina persica*	-
157.	*Myosotis caespitosa*	-
158.	*Myosotis sylvatica*	-
159.	*Nepeta ciliaris*	Brun
160.	*Nepeta elliptica*	-
161.	*Pedicularispectinata*	-
162.	*Phlomisbracteosa*	-
163.	*Picrorhizakurrooa*	Karu, kardi, karwi
164.	*Podophyllum hexandrum*	Bankakri, Papri
165.	*Polygonatumcirrifolium*	-
166.	*Polygonatumverticillatum*	Salam mishri
167.	*Polygonum alatum*	Malora
168.	*Potentilla argyrophylla*	-
169.	*Potentilla atrosanguinea*	-
170.	*Potentilla nepalensis*	Dora
171.	*Potentilla sibbaldi*	-
172.	*Plantago tibetica*	-
173.	*Primula denticulate*	Hantingoo
174.	*Primula petiolaris*	Kouri, Phantingoo
175.	*Ranunculus arvensis*	-
176.	*Rumex hastatus*	Malora, Bhilmora
177.	*Rumex nepalensis*	Malora, Bhilmora
178.	*Salvia glutinosa*	Gwadra
179.	*Salvia lanata*	-do-
180.	*Salvia lappa*	Kuth, Koot
181.	*Saxifrage diversifolia*	-
182.	*Scrophulariahimalensis*	-
183.	*Senecio chrysanthemoides*	-
184.	*Sisymbrium alliarea*	-
185.	*Stroilanthes atropurpureus*	Mashna, Mashain
186.	*Strobilanthes daldousianus*	Machine Mashian
187.	*Strobilanthes alatus*	Mashna, Machin, Nashain
188.	*Sambucus ebulus*	Gandala
189.	*Sweritia chirata*	Charaita
190.	*Swertia cordata*	-do-
191.	*Swertia paniculate*	-do-
192.	*Tanacetum nubigenum*	-
193.	*Tanacetum longifolium*	Bhut keri
194.	*Taraxacum officinale*	-
195.	*Thalictrum pedunculatum*	GabiniMamiri
196.	*Thalictrum javanucum*	-do-
197.	*Thalictrum neurocarpum*	Barmod
198.	*Trifolium repens*	Kuth
199.	*Thymus serphyllum*	-
200.	*Smilax vaginata*	Ban jewain
201.	*Valeriana hardwickii*	-
202.	*Valeriana pyrolaefolia*	Nlhani, Nakh

203.	*Velerianawallichii*	-
204.	*Verbascum Thapsus*	Mushkbala
205.	*Veronica serpyllifolia*	-
206.	*Viola serpens*	Banafsha
207.	*Viola patrinii*	-do-
208.	*Wulfeniaamherstiana*	-
C- CLIMBERS		
1.	*Cuscularеflexa (parasite)*	Akashabel
2.	*Clematis connate*	Garol, Wantah
3.	*Clematis grata*	Garol, Wantah
4.	*Clematis barbellata*	Belkangu, Chabru, Wantah
5.	*Clematis Montana*	Garol, Wantah
6.	*Dioscoreadeltoidea*	Kunj Calendi, Singlimingli, Baniatakari
7.	*Hedera helix*	Grumru
8.	*Jasminum officinale*	Malti, Bammalti
9.	*Jasminum dispermum*	Malti
10.	*Rosa macrophylla*	Pahari gulab, Kuja, Benyal
11.	*Rosa moschala*	Kuja, Yal
12.	*Schizandra grandiflora*	Angeli
13.	*Smilax vaginata*	-
14.	*Smilax parvifolia*	-
15.	*Vitis semi-cordata*	Miaza
16.	*Vitis trifolia*	Pola
17.	*Vitis parvifolia*	Panibel
D-GRASSES AND BAMBOOS		
1.	*Andropogon ischaemum*	-
2.	*Agropyron longearistatum*	-
3.	*Agropyron semicostatum*	-
4.	*Agrostis alba*	-
5.	*Agrostis royleana*	-
6.	*Arthraxon lanceolatus*	-
7.	*Arundinaria falcate*	Ringal, Nirgal, Poo
8.	*Arundinaria spathiflora*	-do-
9.	*Arundinella brasiliensis*	-
10.	*Arundinellasetosa*	-
11	*Arundo donax*	Nal, Naldura, Rajal
12	*Avena aspera*	-
13	*Avenafatua*	-
14	*Bromus asper*	-
15	*Bromus patulus*	-
16	*Cynodondactylon*	Dub, Drub
17	*Calamagrostis littorea*	-
18	*Dactylis glomerata*	-
19	*Danthonia cachemyriana*	-
20	*Deyeuxiascabrescens*	-
21	*Eragrosits nigra*	-
22	*Erianthus fulvus*	Kahio
23	*Erianthusravennae*	-
24	*Festuca giganted*	-
25	*Festuca kashmiriana*	-
26	*Festuca modesta*	-
27	*Ischaemumnototum*	-
28	*Muehlenbergia himalayensis*	-
29	*Neyraudiamadagascariensis*	-

30	*Oplismenus composites*	-
31	*Oryzopsisaequighumis*	-
32	*Panicum plicatum*	-
33	*Paspalum ambiguum*	-
34	*Pennesetum flaccidum*	-
35	*Poa pratensis*	-
36	*Pogonatherum saccharoideum*	-
37	*Pollinia mollis*	-
38	*Pollinia quadrinervis*	-
39	*Setariagluaca*	Siun
40	*Setariaviridis*	-
41	*Sporobolus piliferus*	-
42	*Stipa sibirica*	-
43	*Tripogonfiliformis*	-

TABLE 3.2: ANIMALS, BIRDS, REPTILES AND FISH ETC. FOUND IN KINNAUR FOREST DIVISION

English Name	Scientific Name	Local Name
(A)Animals		
(i)Cats		
Panther or leopard	*Panthera pardus*, Linnaeus	Bagh, baghera
Leopard cat, jungle cat	*Felis bengalensis, Felis chaus* Guldensdoedt Syn.	Ban bilao, Janglibilli
Snow leopard	*Uncia uncia, Schreber*	Safed bagh
(ii)Bears		
Himalayan black bear	*Selenarctos thibetanus, Syn. Ursus torouatus*, G.Cuvier.	Bhalu
Brown bear	*Ursus arctos,* Linnaeus	Lal bhalu
(iii)Dog family		
Himalayan fox, Tibetan wolf Himalayan jackal,Tibetan wolf	*Vulpes bengalensis,* Shaw *Canis* Nodgson.	Lumir Siar
(iv)Mongoose		
Common mongoose	*Herpestesedwardsi,* Geoffroy	Neola
(v) Weasels		
Himalayan yellow throated marten	*Martes flavigula,*boddaert	Chitrala
Himalayan weasel	*Musteressibirica*	
(vi) Goat & sheep group		
Himalayan Thar	*Hemitragusjemlahicus*	Thar
Blue Sheep	*Pseudoisnayaur*	Bharal
(vii) Goat antolope group		
Goral	*Nemorhaedus goral*	Goral, ghurar
Serrow	*Capricornissumatrensis*	Serao
(viii) Deer group		
Barking deer	*Muntiacusmuntjak*	Kakar
Musk deer	*Moschus moschiferus*	Kastura
Sambhar	*Cervus unicolor*, nigar	Jarao
(ix) Rodents		
Common Indian Hare	*Lepus nigricollis*	Khargosh
Large red flying Squirrel	*Petauristapetaurista*	Koryal
Indian crested porcupine	*Hystrix indica*	Sehi
Common house rat	*Rattus rattus,* Linn.	Chuha
House mouse	*Mus musculus*Linneaus	Musco
Indian gorbille or Indian Antelope rat	*Tatera indica*, Hardwicke	„

Short tailed mole rat	*Nesokia indica*, Gray and Hardwicke	„
Himalayan marmot	*Marmot bobak*, Mueller	„
(x) Monkey and Langoors		
Himalayan langur	*Presbytis entellus*	Guni
(xi) Insectivores		
Gray musk shrew	*Suncus murinus*	Chuchundar
(xii) Bats		
The allied horse shoe bat	*Rhinolophus affinis*	Chamgadar
(B) BIRDS		
(a) GAME BIRDS		
(i) Pheasants and fowls group		
Cheer pheasant	*Catreuswallichii*, Hardwicke	Cheer
Jungle fowl	*Gallus gallusMurghi*Rohinson&Khoss	Junglimurghi
The white crested pheasant	*Lophuraleucomelans* Latham	Kaleej/ kala murga
Koklas, Medium tailed Himalayan pheasant	*Pucrassiamacrolopha,* Lesson	Kokla
Impeyyan or Monal Pheasant	*Lophophorusimpeyanus*	*Monal*
Western Tragopan	*Tragopan melanocephalus*	Jejurana
(ii) Partridge and quail group		
Button quail	*Turinixtaki, Blyth*	„
Jungle bush quail	*Perdicula asiatica*	„
Chakorpertridge	*Alectorisgraeca,* meisner	Chakor
Black Breasted or rain quail	*Coturnix coromandelica*Gemelin	Chinak bater
Snow partridge	*Lerwalerwa.* Hodgson	Gunguria
Black partridge	*Francolinusfrancolinus.* Linneaus	Kala Titar
Himalayanor wood partridge	*Arborophilatorqueola*Valenciennes	Peora
Snow cock	*Tetraogallustibetanus*G.R.Gray	Ram chakor
(iii) Doves and pigeon group		
Spotted dove	*Striptopelia chinensis*	Chitter fakhta
Rufous turtle dove	*Striptopeliaorientalis*Lathaam	Ghugti
Ring Tailed dove	*Streptopeliadecaocto*	„
Common green pigeon	*Treronphoenicopterus*	*Harial*
Wedge tailed green pigeon	*Treronapticauda*	
Blue rock pigeon	*Columba livia.* Gamelin	*Kabutar*
Pintailed green	*Treronapicauda.* Blyth	*Malya*
Snow pigeon	*Columba leuconota.* Vigor	*Safed Malya*
(b) NON- GAME BIRDS		
(i) Crows, king crows, tree pies Magpies, Jays and nut crackers		
Himalayan nut cracker	*Nucifragacarvocatactes*	*Pathphor*
Jungle crow	*Corvus macrorhynchos,*Walger	*Kawa*
Himalayan red crowned	*Carrulusglandarius,* Linnaeus	Lal kanth
Red billied blue magpie	*Kittaerythorphyncha*, Boddaert	Lampuchhia
Himalayan tree pie	*Dendroecittafromosea,* Swinhoe	„
Blue throated jay	*Garrulus lanceolatus*, Vigors	Neel kanth
(ii) Vultures, Eagles, Kites and Falcons		
Black Hobby falcon Kastonal Falcon	*Ictinaetusmalayensis,* Tamminck	Cheel
Panish Kite	*Milvus migrans,*Boddaert	„
Brahminy kite	*HaliasterIndus,*Boddaert	„
Golden eagle	*Aquila chryaetos,*Hodgsoni	„
Hawk eagle		„

Tawny eagle		„
Himalayan griffon vulture	*Gyps himalayensis*, Hume	Gidh
Lammergeier or beards vulture	*Gypaetus barbatus* Linnaeus	Gidh
King vulture	*Torgosalyus*	„
White backed vulture	*Gopaetus bengalensis*	„
Scavenger vulture	*Neophron perenopherus*	„
(iii) Owls and night jars		
Himalayan wood owl	*Strixaluconivicola, Idnnaus*	Uloo
Scully's wood owl Horned owl	*Strixalucobiddhlphi*	„
Himalayan batred owl	*Glaucidium cuculoides*	„
Lolng tailed night jar	*Caprimulgus macrourus*	_
Franklings night jar	*Caprimulgus monticolus*	_
(iv) Thrushes and babblers		
Whistling thrush	*Myophoneuscaerulens*	Chilar
While throated thrush	*Garrulaxalbogularis*.Gould	„
Variegated thrush	*Garrulaxvarisgatum,*Vigors	„
Red backed thrush	*Garrulax erythrocephalus*Vigors	„
streaked thrush	*Garrulaxstriatus,*Vigors	„
Jungle babbler	*Turodoidesstriatus*	„
(v) Fly catchers		
Sooty fly catcher	*Hemochslidonsilbrica*	
White browed blue fly catcher	*Muscicapulasurperciliaris*	
White billied blue fly catcher	*Muscicapulapallipos*	
Blue throated fly catcher	*MuscicapulaRebecoloides, Vigors*	
Rufous bellied niltava	*Niltavasundara*	
(vi) Finches, sparros and buntings		
Rose finch	*Carpodacus erythrinus,* Pallas	Tuti
Himalayan gold finch	*Carduelis carduellis*linnaeus	Surja
Himalayan tree finch	*Cardelisspinoides*, Vigors	Surja
Common house sparrow	*Passer domesticus* Linnaeus	Gauriyya, Chirya
Cinnamon tree sparrow	*Passer rutilans*Temminck	Gauriyya, Chirya
Created bunting	*Melophuslathanfi,* Gray	Rather Chirta
White capped bunting	*Eperzastewarti,* Blyth	
(vii) Wood Peckers, Tree Creepers and Barbets		
Scaly bellied woodpecker	*Picussquamatus*, Vigors	Kathphorwa
Himalayan pied woodpecker	*Cryobateshimalayasis*	„
Brown fronted pied woodpecker	*Dryobatesauriceps*	„
Himalayan tree creeper	*Certhiahimalayana*	„
Himalayan barbet	*Mogalaimavirens,*Boddaert	
Green barbet	*Megalaimaviridis*	
(viii) Birds along water courses		
White capped red start	*Chaimarrornislaucocephalus*	
Plumbeous red start	*Rhyacornisfuliginosus*	
Spotted fork tail	*Enicurus maculates*	
Himalayan pied king fisher	*Cerylelugubris*	
(ix) Others		
Red vented bulbul	*Molpastescafer*	Bulbul
White cheeked bulbul	*Milpastesleucoganys*	„
Yellow cheeked bulbul	*Macholophus*xantogenus	
Gray tit	*Paras major*	
Black tit	*Lophopharrensrufornuchalis*	
Pied bush chat	*Saxicola caprata*	
Common house swallow	*Hirundorustica*	
Parakeet	*Psittaculahimalayana*	Tota

Gray hornbill	*Dichocerasbicornis*	
Swift	*Chaetura caudatus*	
Blue bearded bee eater	*AlcemeropsAlthertoni*	
Black headed shrike	*Laniusnigriceps*	
C) REPTIIES		
(i) Snakes		
Rat snake	*Ptyasmucosus,* Cope	Dhaman
Krait	*Bungarus caeruleus,* Daud	Krait
Indian cobra	*Najanaja,*Schleg	Kobra, Nag
Himalayan pit viper	*Ancistrodonhimalayanus*Gunther	Sapp
(ii) Lizards		
Common house gecko	*Himidactylusbrooki,* Gray	Chhipkali
Common lizard	*Agama tuberculata,*gray	„
Common Indian monitor Lizard	*Varanus monitor,* Linnaeus	„
(D) FISHES		
-	*Barbus tor*, Hamilton	Mahaseer
-	*Labeaocalbasu*	Kala Bans
Rishala	*Orcinus sinautus*	Rishala

ENVIRONMENTAL FLOW

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CHAPTER 4 CAT PLAN COMPONENTS

4.1 The Government of Himachal Pradesh, Forest Department is actively engaged with arriving at the most logical allocation of funds for the different components of Catchment Area Treatment Plan. The present Notification in force is No. FEE-B-F-(2)-72/2004-Pt-II dated 30.9.2009.The salient features of these guidelines envisaged the following mandatory requirements:

- The total CAT Plan outlay should not be less than 2.5% of the total project cost and the minimum area to be treated would be approximately 15% of the effective catchment.
- Provisions with an appropriate budget to be made for carrying out forestry research of relevance to the area.
- 5% budgetary provisions to be made under M&E. Provisions for Silt Observatory Posts have also to be made under this component.
- A Chapter on J.F.M. and Micro-planning components should be included.
- 1% of the CAT Plan budget to be kept for Eco Tourism.
- A separate Chapter on improvement and development of wildlife and reduction of man animal conflicts should be given.
- Under the Infrastructure Component provisions have also to be made for forest protection.
- Under PES a provision of 10% of the Total CAT Plan outlay should be made.
- A provision of 10% per year to be made for Contingencies to offset inflationary trends on account of increase in the wages rate and cost of material.
- Provision should also be made for training of Forest staff.
- Provisions for Energy Saving Devices also to be made.
- Site Specific Work Plans.

4.1.1 The above guidelines are adhered to while preparing this CAT Plan. Government of Himachal Pradesh vide its Notification No FFE-B-F(5)-9/2017dated21stNovember 2019 has fixed the cost of CAT Plan at 1.5% of the Project cost. Thus, for Raura HEP, the cost of CAT Plan is Rs. 142.37 lacs which is 1.5% of the project cost of Rs.9491.43 lacs. Similarly, in a recent directive the cost of Infrastructure component is required to be reduced to 5% and the saving thus made is to be increased in the component of Monitoring and Evaluation. However, an exception needs to be made in case Runang Beat which is dilapidated and is of no use. It is, therefore, essential to have a newly constructed Beat Guard Hut in Runang Beat. Provisions are made accordingly in the CAT Plan.

4.1.2 In this CAT Plan 42.95 % of the CAT Plan amount is distributed between Forestry and SMC components. The percentage share of each component as per HPFD guidelines and modifications thereto stated above are as follows:

Table 4.1 Component wise fund allocation

Sl.	CAT Plan Component	Amount (Rs.)	Percentage of total projection
1	Forestry	35,46,010	24.91
2	Soil &Moisture Conservation Measures	25,80,990	18.04
3.	Research, Training & Capacity Building	7,19,000	5.0
4	Payment for Environment Services	14,23,000	9.99
5	Infrastructure & Forest Protection		
	A. Renovation of existing infrastructure and construction of new buildings etc.	16,00,000	11.24
	B. Forest Protection	4,50,000	3.2
6	Wildlife Protection and Micro Planning	18,52,000	12.95
7	Eco Tourism	0	0
8	Monitoring & Evaluation	7,11,000	4.99
9	Contingencies.	14,20,000	9.98
	Total:	1,43,02,000	100.3%

Or say Rs. 1,43,00,000

4.2 **AFFORESTATION:** Afforestation is the major component of the CAT Plan. During the interaction with HPFD staff as well as the Field survey, it revealed that the Forests in the Catchment are generally well stocked leaving lesser scope for the new plantations. Conifers and Broadleaved species are prescribed in the potential areas. Areas for Enrichment plantations are identified. Provisions have also been made for Pasture development. Availability of the quality nursery plants is the first and foremost requirement for undertaking plantations in the Forests. This CAT Plan provides for up-gradation and modernization of Kakasthal Nursery in Tapri Beat. A provision of Rs. 35,46,010/- is made for treatment of 33 Hectares of land and strengthening of Kakasthal Nursery in Tapri Beat. HPFD Cost Norms for the year 2021-22 are applied. Seven Years Maintenance support has been provided. Beat wise allocation of funds under Forestry Components is tabulated below:

Component	Runang(Rs.)	Tapri (Rs.)	Urni (Res.)	Total (Rs.)
i. Enrichment	4,94,090	4,94,090	4,94,090	14,82,270
ii. Energy Plantation	1,18,904	2,37,808	2,37,808	5,94,520
iii. Silvi-Pastoral Development.	2,59,760	3,24,700	2,59,760	8,44,220
iv. Strengthening of Kakasthal Nursery	0	625,000	0	6,25,000
Total:	**8,72,754**	**16,81,598**	**9,91,658**	**35,46,010,**

4.2.1. NEW Plantations: -In keeping with the current forestry practices, new plantations aim at the planting of 1100 plants per Ha. Out of which at least 20% would be trees of medicinal value and 10% of wild fruit species to maintain diversity. Under this component, five strand barbed wire fencing with RCC fence posts and two layers of live- hedge plants to reinforce the fencing is prescribed. In the Catchment of Raura Khad, **no new plantation is planned.**

4.2.2 Enrichment: - Enrichment aims at planting 800 tall plants per notional Hectare. Under this component the area falling in degraded forest to improve the forest stocking is provided. **Enrichment**

plantation is proposed in an area of 15 hectares at an amount of Rs. 14,82,270/-.

4.2.3. Energy Plantation: - Under this component, species of trees and shrubs which are harvestable in comparatively shorter time and are specifically meant for fuel and fodder are selected. Such plantation provides almost inexhaustible renewable sources of energy which are essentially local and independent of unreliable and finite sources of fuel. The main feature of Energy plantation is utilization of erosion prone land for raising such plantation, which helps to reduce wind and water erosion thereby minimizing siltation and loss of nitrogen and minerals in the soil. **Energy plantation in 5 hectares amounting to Rs. 5,94,520/- is proposed.**

4.2.4 Silvi- Pastoral Development: It is observed that due to adverse climatic and geographic conditions/ factors, there is scarcity of grass and fodder in the catchment Areas. Large herds of sheep and goat are owned by the local people. In winter, these herds are taken outside the catchment area in lower parts of Himachal Pradesh, and they return during summer. Alpine pastures within the catchment area and its adjoining areas are the main grazing grounds for these herds. These pastures are heavily grazed and there has been a decline in the quantity and quality of grass in these pastures. The CAT Plan, therefore, provides an amount of Rs. 64,940/- per ha. **for silvi- pastoral development.** The productivity of these pastures is decreasing gradually. **Silvi Pasture Development in 13 hectares of land is planned with a provision of Rs. 8,44,220/-.** A note on the recommended species is given in paragraph numbers. 4.2.4.1 to 4.2.4.3

4.2.4.1 The indigenous silvi-pastoral grass species to be propagated under this activity suggested by the HPFD Field staff during interaction in Runang, Tapri and Urni Beats are as under:

(i) Medicago sativa (Local name: Lucerne grass)

(ii) Trifolium Repens (Local name: safed tibetiya)

(iii) Trifolium- (Local name: Barseem grass)

(iv) Stylo Hamata Grass (Local name: Hamata ghass)

4.2.4.2 The indigenous silvi-pastoral tree species to be propagated under this activity suggested in the research paper titled **Natural Resource Enhancement Through Silvipastoral Establishment In Western Himalayan Region by Inder** Dev[1], Sudesh Radotra[2], OPD Khola[3], Bimal Misri[4], Sindhu Sareen[5], AK Srivastava[6], Bhupinder singh[7], SK Sharma[8], KP Chamoli[9] and Dinesh Kumar[10] (IGFRI, Palampur, Himachal Pradesh 176 062 India. 18 January 2016) are quoted below:

"The trees and shrubs may be used primarily to produce fodder for livestock, or they may be grown for timber, fuelwood, and fruit or to improve the soil. A silvi-pastoral system is needed in dry areas, in order to meet out the demands of wood and fodder throughout the year. There are three main categories of silvicultural system:

a) Protein bank: The trees planted in protein banks are *Greuia optiva , Bauhinia variegata, Morus alba, Artocarpus spp., Anogeissus latifolia, Cordia dichotoma, Dalbergia sissoo, Eutralobium saman, Zizyphus jujube*, etc.

b) Live fence of fodder trees and hedges

c) Trees and shrubs on pastureland

4.2.4.3 In a research paper titled, **"Status of Poplar and Willow Culture in Himachal Pradesh"** Dr. R.C. Dhiman mentions his findings for Kinnaur as, "Kinnaur district also represents semi-dried conditions where planting of poplars mainly *P. alba, P. ciliata, P. nigra and P. deltoids* is more common than

willow. The most important willow species found in the cold desert are *S. alba, S angustifolia,S. caesia, S. daphnoides, S. elegans, S. flabellaris, S. fragilis, S. hastate, S. oxyaxaropa, S. sclerophylla and S. tetrasperma* (Nautiyal, 1991)"

4.2.5 Awareness programmes: It is well appreciated that the plantation and growth of alpine pastures can be best done with consultation and agreement between the graziers and the forest department after adequate awareness generation. Having good pastures is the need of graziers as well.

4.3 SOIL & MOISTURE CONSERVATION: Soil &Moisture Conservations Measures form the second major component of the CAT Plan. The requirement of SMC works in the catchment was assessed together with the Forest Department Officials. Briefly, based on the interactions and site visits, soil & moisture conservations are required on the following 17 nallas and land slips:

- Runang Beat: Rangdhul Nalla, Kasti Nalla, Rangle Nalla, Gotangrangh Nala, Choling Nalla and Patik Nalla.
- Tapri Beat: Janakpuri Nala, Shulling Nalla, Khonge Nalla, Rishal Nalla, PagalNalla,Bokudhar Nalla and Kakasthal Nalla.
- Urni Beat:Monerang slip on Dharpo Nala, Urawaning Slip on Dharpo Nala, **Kutano** slip near Khange Nala, Pang Slip, Pandom Slip, PotuShakhsang Slip, Resto Nala.

4.3.1. The requirement of funds for 100% treatment of these nallas and slips will be manifolds beyond the available funds for SMC works under this CAT Plan. Hence, projections under SMC component are restricted to 18.04% i.e.Rs.25,80,990/- against permissible percentage of 25% Machine bound gabion structures of various sizes as per actual site requirements measuring 121 meters @ Rs. 17790/- per structure are proposed i.e. 41 in Runang and 40 RMT each in Tapri and Urni Beats.

4.3.2. Reduction of silt load in the River Waters is the major requirement for setting up of the .Therefore, is laid on the construction of Gabion Check dams supported with Bio engineering measures (planting of shrubs). **This CAT Plan has a provision of Rs. 25,80,990/- under this component.** The soil and moisture conservation measure works are prescribed i n following categories:

a) Moisture retention operations: Bio-engineering species planting.
b) Civil structures-masonry Gabion Check dam.

4.4 Research, Training & Capacity Building: The need for Training of Beat Level, Range Level and Division Level staff on latest techniques was emphasized upon by HPFD staff. It was stated that periodical trainings and exposure visits to reputed Institutes in the State/ country should be organized to update the skills of HPFD staff. Also, there is need of training the Territorial staff in handling the wildlife which too is proposed to be catered under this Component. Further Publicity and Awareness Training camps for the field staff as well as to the farmers should be organized to apprise them of the latest techniques. Therefore, a consolidated provision of Rs. 7,19,000/- is made for this component. Expenditure on providing training to Territorial as well as Wildlife staff and organizing workshops for wildlife management including publicity of 'dos and don'ts' will be met out of this component. The amount is to be utilized from Division level.

4.5 Payment for Environmental Services: H. P. Forest Department Guidelines for Catchment Area Treatment Plans provide 10% of the CAT Plan funds for utilisation for Payment for Environment Services. The nature of environmental services that may be provided by the people vary with the locations, living surroundings and the ecological status of each catchment area. As such, it is difficult to create precise hard and fast instructions for the application of these funds. However, the common consensus always is to provide these funds to the communities and not to individuals. Activities to be propagated under PES component of this CAT Plan are providing Grass Stacking M.S. Pipes, Bee keeping and training of farmers in bee keeping. The other activities which can be taken up at the discretion of HPFD in accordance with the guidelines in force from time to time include incentives for survival of plantation, incentive for reduction in biotic pressure, incentives to given to villages for helping HPFD in fire prevention, preventing forest land encroachments, incentives for maintenance and development of water resources, incentives for rotational grazing, setting up Gosadans for stray cattle. A lump sum provision of Rs. 14,23,000/- for Runang, Tapri and Urni Beat is made in this CAT Plan to be controlled from Division level.

4.5.1 PES activities through Joint Forest Management Committees (JFMCs): JFMCs play vital role in augmenting various Forestry/PES related activities. Involving JFMCs in persuading and encouraging the local people in protecting the forests and reducing pressure on forests by incentivizing them for various activities for survival of plantations, reducing biotic pressure, helping Forest staff in fire prevention, preventing encroachments on forest lands, rotational grazing and development of water resources under PES components, construction of Village ponds, Community Storage Tanks, Community Gathering Grounds needs to be encouraged. This, on the one hand, will go in a long way in improving the economic conditions of the farmers and on the other hand reduce pressure on the forests. More activities can also be included under this component in keeping with the guidelines issued by State Government/Forest Department. Interaction with the HPFD officers/officials revealed that presently no JFMCs exist in these three beats of Kalpa Range. There is need to create JFMCs**.**

4.6 Infrastructure Development and Forest Protection: An allocation of Rs 20,50,000/- (i.e. Rs. 16,00,000 for Infrastructure and Rs. 4,50,000/- for forest protection) is made for Infrastructure development and Forest Protection. During discussions with Divisional Forest Officer, Kalpa as well as discussions with other Field staff of the Division, it revealed that there is urgent need of construction of Beat Guard Hut in Runang Beat.

4.6.1 According to recent guidelines communicated to H.P. Forest Department from Government of India, Ministry of Forest and Environment, the projections under Infrastructure Development should be restricted to only 5% instead of earlier limit of 10%. Thus, the total projections under Infrastructure and Forest Protection are restricted to only 10% instead of earlier limit of 15%. In this CAT Plan, 5% amount for infrastructure development worked out only to Rs. 7,12,000/- whereas the amount required for construction of new Forest Guard for Runang Beat alone is estimated at Rs. 16,00,000/- (i.e. 11.24%). Therefore, the balance funds required have been met out from the funds of other components such as Eco Tourism and Site Specific Work plans.

4.6.2 Forest Protection: There is need for having adequate firefighting equipment at Beat and Range Level as Forest Fires are very common and frequent in these Beats. Even during our survey, Forest Fire was observed in Runang Beat which was continuing for the last three days then. Divisional Forest Officer as well as the Range and Beat staff expressed the need for having Fire Fighting Equipment including fire extinguishers and

apparatus to lift the water from the source to the fire-sight, proper clothing and boots etc. for safety of staff/ people for prevention from injuries. Therefore, a consolidated provision of Rs. 4,50,000/- is made for Forest Protection including maintenance of fire lines and purchase of Fire Fighting equipment and items of Patrolling kit comprising of Jungle Boots, Haversack, Water bottle, Jungle Caps, Stick and Pickaxe, Helmet and other equipment. The firefighting equipment will be purchased centrally from Divisional Headquarters. The projections made under Infrastructure and Forest Protections are as under:

i)	Construction of new Forest Guard Hut at Runang:	Rs. 16,00,000
ii)	Consolidated amount earmarked for Fire Fighting Equipment:	Rs. 4,50,000
	Total:	**Rs. 20,50,000**

4.7 WILDLIFE PROTECTION, MICRO PLANNING AND ABUNDNCE STUDY:

4.7.1 No wildlife sanctuaries fall in the project catchment. However, wildlife exists in the territorial areas of the Raura HEP Project catchment. No human-animal conflicts are reported in the project catchment areas. Therefore, provisions for construction of small water conservation ponds in forest areas are planned in accordance with discussions with the field staff. These small water ponds will have dual advantage i.e. (i) availability of drinking water to wildlife and (ii) availability of water for controlling forest fires to save forests and wildlife. A provision of Rs. 2,08,000/- two water ponds i.e. one in Runang Beat and one in Tapri Beat is made @ Rs. 1,04,000/- per water pond.

4.7.2 In addition, a lump sum amount of Rs. 6,44,000/- is made in the CAT Plan for purchase of Wildlife protection equipment such as Binoculars, Trapping Cameras and 1 tranquilizer gun and salt licks. The purchase of equipment will be controlled from Division Level. The recommended specifications of Waterproof Trap Cameras are:

Still Resolution: 1200 Mega Pixel
Wide Resolution: 1280 x720
Video Length 90-180 Second
Data Storage: 32 GB minimum
Night vision using low glow LED with audio recording.
Minimum 2" colour LED.
Power: source Recharge Lithium Ion
Capable of transmitting photos over mobile network.
The approximate cost of one such camera with above features is Rs.60,000/-

4.7.3 During deliberations held in the Review Committee Meeting on 15.7.23 for this CAT Plan it was decided that an amount of Rs. 10.00 lacs for Wildlife Abundance Survey through Wildlife Institute of India (WLII) or some other institute of repute be provisioned in addition to the already approved amount of Rs.8.52 lacs. Therefore, this CAT Plan also caters for Wildlife Abundance Study. Thus, the total allotment of Rs. 18.52 lacs is made in this CAT Plan under this activity as under:

i)	Water Ponds	Rs. 2,08,000/-.
ii)	Purchase of Equipment:	Rs. 6,04,000/-
iii)	Salt Licks	Rs. 40,000/-
iv)	Wildife Abundance Study through WLII	Rs.10,00,000/-
	Total:	**Rs. 18,52,000/-**

4.7.4 The expenditure on providing training and workshops for territorial as well as wildlife staff for handling wildlife management and publicity of 'do's and don'ts', the same will be met out of the Rs. 7.19 lacs funds provided under Research, Training and Capacity Building of the CAT Plan (Refer Chapter 9). This will be controlled from Division Level.

4.8 Eco Tourism: Under Eco Tourism component 1% of the CAT Plan outlay can be earmarked for this component. Very negligible amount of Rs. 1.42 lcas would have been earmarked for this component which could hardly serve any purpose. Therefore, projections for eco-tourism are not made under this component. This amount is utilized under Infrastructure Development component.

4.9. MONITORING AND EVALUATION. The activity of monitoring and evaluation can be split in several parts. These relate to monitoring of the conduct of implementing CAT Plan Actions and evaluating the efficacy with which the implementation takes place. The means of identifying success of the CAT Plan Actions is the measurement of silt load. The CAT Plan actions can further be classified in those which contribute directly to the conservation of the soil and moisture. These will, therefore, include all the sub-components of Afforestation measures and all the subcomponents of soil & moisture conservation measures which account for roughly 50% of the total CAT Plan outlay. In addition to this, the CAT Plan Component which contribute to the capacity building of the Forest Department, such as forest infrastructure and protection, research and development, wildlife measures, eco-tourism and socio-economic incentives given through PES. The success of all these can best be measured through monitoring the silt load at periodic intervals.

4.10 M&E of Implementation: A lump sum provision of Rs. 7,11,000/- @ Rs. 2,37,000/- for each beat is made for Monitoring and Evaluation which works out to Rs. 4.99% of the total CAT Plan. Checking by the Forest Guards, B.Os. Range Forest Officer and Divisional Forest Officer are prescribed. Constitution of Divisional CAT Plan Committee at Divisional Level and range Level is recommended for this purpose there is a need to ensure effective supervision and guidance in the implementation of CAT Plan works. There is a two-tier system proposed. The first tier of monitoring will be monitored by the concerned D.F.O. and C.F. However, the second tier of monitoring envisages monitoring and reporting by third party Consultants. This monitoring has to be exhaustive and to be done after field inspection of completed works versus its comparison with planned works. It is envisaged that such monitoring exercise must be done in every alternate year to ensure appropriate quality of work besides ensuring achievement of physical and financial targets.

4.11 CONTINGENCIES: A provision of 10% of the Projections under CAT Plan Cost in respect of all the components is made in the CAT Plan to offset the unforeseen expenditure on account of cost escalation and increase in the labour rates from time to time. This is left at the discretion of Forest Department and may support unforeseen expenditures as well as unplanned activities which may arise from time to come. If maintained at the level of 10% the Contingencies, fund may also be effective in setting off cost escalation in times to come. A provision of Rs.14,20,000/- is made under this component as under:

Runang Beat: Rs 4,75,000/-

Tapri Beat: Rs4,75,000/-

Urni Beat: Rs 4,70,000/-

4.12 Conclusion: The CAT Plan amount works out to Rs. 1,43,00,000/- Thus, NERIL's approach to Raura HEP CAT plan is in conformity with the HPFD guidelines for allocation of funds and its utility.

CHAPTER 5 FORESTRY AND HABITATMANAGEMENT GUIDELINES

5.1 Introduction. Forests play an important role in the economy of the State. They meet our requirement of timber, fuel wood, fodder, paper pulp, sports goods, match wood, plywood, resin, packing cases, and agricultural implements, other minor forest produce and medicinal plants. Forests are a major natural system to complete the water cycle. Owing to increasing pressure on forests due to enhanced grazing and other human interference, the natural regeneration on which we had depended a few decades ago is now very scarce. It has therefore, become necessary to restock the forests by planting suitable tree, shrub and grass species. Forests are also the natural habitat for the entire biota from microorganisms to large species such as leopards. Management of Forests is important for the existence and propagation of all wildlife. It is, therefore, important that the habitat for wildlife animals must be improved, niche areas must be protected and key stone species must be conserved. This CAT Plan provides budgets and methods to achieve these objectives. The Afforestation measures, therefore, includes extension and improvement of pastures with more nutritious and palatable grasses besides plantation of shrubs and other forages under energy plantation for domestic animals, migrant graziers as well as wildlife.

5.2 Afforestation measures:-(Refer **Appendix 'A''B' and 'D'**for cost norms)

The most important component of management of catchment areas is Forestry. Forests must be protected if they are well stocked, new plantations are to be made, if culturable areas exist, gaps may have to be filled in new plantations where the survival has been poor in plantations which have finished with their maintenance period or enrichment plantation has to be carried out to ensure that old forests where the stock has depleted is enriched again. Grasslands and Pastures play a key role in the continuity of food chain. They are as important for the migrant shepherds as for the ungulates. The afforestation measures under CAT Plan address each of these key areas in a systematic manner and in accordance with the established forestry practices and guidelines of the Department of Forests and CAMPA. The Afforestation measures will include raising of multi-tier mixed vegetation of suitable local/native species in the steep and sensitive catchment areas of rivers and streams with the objective of keeping such areas under permanent vegetative cover. Afforestation measures when implemented will hold soil and reduce siltation.The actual plantation pattern in the catchment and treatment area and the choice of species will depend upon the altitude, the aspect, the prevalent phyto- sociology and availability of nursery stock. Consequently, the decision for the exact species mixes to be planted must necessarily be left to the Officers at Division level based on the actual field conditions. However, it is specified hereunder as to what plants, shrubs, herbs and grasses are suitable at different elevations. It is highly recommended that the main species population should generally not exceed 50% of the total plantation density. The origin of any plantation starts with the nursery and hence under *'Afforestation Measures'* emphasis is laid on strengthening of nurseries. The Afforestation measures are categorized under these 7sub-components:

- Establishment of Modern Nursery
- New Plantations: o Broad leaved plantations, o Conifer/Oak two stage plantations
- NTFP Plantations
- Gap Filling
- Enrichment planting:
- Pasture Development:

5.2.1 Establishment of Modern Nursery. Survival of the fittest is the underlying principle in the process of evolution, renowned naturalist and father of the theory of evolution, "Charles Darwin". The progeny of the fittest can therefore be assumed as genetically superior individual within species. The maintenance/ ecological security of these superior individuals of the species therefore requires interventions like selection of Candidate plus trees, collection of seed, enhancing viability of seeds and finally creation of quality planting stock for plantation in field. Over the years these superior trees have either seized to be seed bearers due to over maturity or have been removed. The situation therefore warrants the establishment of model nursery with facilities of seed storage, germination, establishment of seedlings and planting in the field. Forestry is a pure science and its practice requires a holistic study about tree species, their habitat, ecological and site requirements, regeneration, association, entomological and pathological interventions, tree improvement etc. Every step of seed collection, processing, storage, pre-treatment, sowing, pricking, establishment in the nursery, transportation of nursery stock, site preparation, planting, maintenance of plantations, management of forests, harvesting etc. is based on scientific principles and require professional skills.

- Genetically improved seed is in short supply for quite some time particularly in the developing countries. Therefore, utmost care should be taken while collecting seeds as general collection to produce nursery stock. They must be collected from healthy, disease free, middle aged, straight bowl, deep in forest or plantations etc. Seed collection from the forest floor, isolated tree, very young or old trees, injured or disease tree etc. should be avoided. Seed processing and storage are also important aspects for maintaining regular supply of quality seeds to produce nursery stock and for that facilities should be there in model nursery itself. When the genetically improved seeds are not available for nursery production and only good quality seeds are available, it is imperative to improve upon nursery techniques to realize the full productive potential of the saplings thus produced. The role of nursery technology will remain of prime importance irrespective of the propagation technologies employed. Therefore, establishment of `Model/ Modern Nursery' and its subsequent management to continuously improve the nursery technology and to produce uniform quality planting stock would be regarded as the main activity of all the Forestry departments.

- To produce large-scale quality planting material, a basic know- how of techniques for identifying superior performers among the populations for rooting the vegetative material in appropriate time using appropriate chemical treatment, and infrastructure for the establishment of Vegetative Multiplication Garden is the most essential need in model nursery.

Germplasm collected from various locations can be established and maintained as hedges for mass multiplication of juvenile material.

5.2.2 The emphasis on plantation forestry for enhancement of forest productivity also brings a concern for production of quality planting stock from improved seed and propagation by employing modern nursery techniques. The gains of tree improvement can be fully realized by adopting suitable plant production methods. In the pre-planting activities, production of quality planting stock is the most important aspect, which has direct bearing on successful establishment of productive plantations. Therefore, establishment of Model/Modern nursery (1-2 ha.) at the range level is needed.

5.2.3 Transportation of Seedlings: Seedlings are very delicate and should be handled properly. The polypot seedlings should always be held by the bag and never by the plant itself. Seedlings should be watered thoroughly before carrying them to the field. Seedlings should be transported in the trays, boxes or baskets and not tied in bundles with strings or grass. In case of stumps, they should be bundled, wrapped with a wet sack, and transported to the field. The plants should be kept in shade and plants not being planted the same day should be sprinkled with water in the morning and evening. While transporting bare root seedlings, the nursery beds from which the plant is taken should be irrigated to facilitate making of ball plants. After making ball plants, they should be graded according to their height and put in shade. To keep the earthen balls around the roots intact the balls should be wrapped in grass and tied bysutli.

5.3 Plantation Techniques

The Catchment area is highly mountainous with steep to moderate slopes covered largely by coniferous forests in the higher reaches and by the horticultural crops in the gently sloping lower areas. The Forest area around sparsely populated villages is under severe threat of encroachments and other biotic pressures especially from villagers and graziers etc. It is, therefore, the need of the hour to secure the physical protection of the forests as first charge of the department, by resorting to repair and renovation of existing boundary pillars of Reserve and Demarcated Protected Forests and demarcation of the Un-Demarcated Protected Forests including the updating of the demarcation records.

5.4 Natural regeneration is required to be assisted by artificial regeneration by resorting to effective closures followed by planting in patches of well grown tall and quality seedlings of indigenous species (15cmx15cmx15cm), sowing of quality seeds in pits (45cm x 45cm x45cm) in trenches (100cm x30cm x 30cm). The rugged, denuded and difficult sites should be taken up for sowing and planting of local coniferous species like Deodar, Kail, Fir, Spruce only after the area is covered or taken over by the indigenous nursing crop species of herbs, shrubs and trees, ensuring success of the main coniferous species at their very initial stage of establishment. The patch sowing should be preferred to pit or trench planting in steeply sloping areas, causing least disturbance to the soil. Whereas the pit planting should be preferred in moderately sloping areas and the trench planting should be resorted in the flat areas having moderate slope receiving low precipitation to ensure maximum moisture conservation in situ creating conducive conditions for the early establishment and fast growth of the seedlings.

5.5 The vegetative measures should always be given preference over the mechanical measures like lying of crates, DRSM etc. for conserving maximum soil and moisture. The totally denuded and barren area should not be straight-away taken for planting of the coniferous species. Such area needs to be closed effectively and sown/ planted first with the associates of the main coniferous species intended to be planted in such area. The plantation of the major / main coniferous species should always be taken up after being given complete rest to the site for a period of at least one to two years. The soil working in general, should always be carried at least six months to one year in advance of actual planting affording sufficient time for weathering of the dugout soils and pits / trenches.

5.6 The agricultural and other categories of the lands falling outside the forest area should always be preferred for planting of the horticultural species ensuring least disturbance to the soil and maximum vegetative coverage of the soil. The local people should be educated and made aware of the benefit of the horticultural crop cultivation viz-a-viz cultivation of soil depleting crops like maize, rice, potato and wheat etc. The area surroundings heavy populations should preferably be planted with local fuel and fodder species.

5.7 During discussions with forest staff, it is noticed that the three-strand barbed wire fencing is not ineffective. Hence it is advised to use fencing of 4 to 5 strand barbed wire using the kind of fence posts which are most suited to the site in question. The annual maintenance of the fencing in area experiencing moderate to heavy snowfall is a necessity for the success of plantation. Similarly, the area facing heavy pressure of grazing and demand for fuel and fodder, the annual maintenance and cultural operations are necessary for the success of the plantation. It is observed that the best plantation raised using the best quality of material and methods including the fencing cannot sustain, survive, succeed unless such plantations are looked after by continuous (round the clock) watch and ward.

5.8 The interest of local people in protection of forests from fires and illicit felling etc. has been decreasing seemingly after withdrawal of TD and grazing rights. There is need to create awareness among the local people to create their interest in protection of forests. This aspect can be covered under payment for environment services by introducing incentive schemes to the village communities / cooperatives/ Self Help Groups / JFMs. The quantum of incentive to be given to such villager's groups should be quantified and co-related with the level of efforts made by the villages in saving the forests from fires, illicit felling of trees, poaching and reducing the silt loads in the water.

5.9 The Field Officers and lower field functionaries expressed the need for devising some means for Pastures development. This aspect needs to be looked into greater details. However, to start with, controlled grazing through Rotational Closures/ Deferred Closures and seed sowing could be some of the possible measures for Pasteur development. The fodder and fuel are the bi-products of the well managed quality forests. The fodder and fuel requirements will automatically be fulfilled through the best management of forests and grazing of the pasture lands within it carrying capacity.

5.10 The Forests and Wildlife are inseparable. The wild animals, birds and other wild species of plants and animals are not only confined to the protected areas, but the wildlife as a whole is also found in the forest's areas falling outside the protected area. Therefore, the protection of wildlife outside the protected area is as important as the protection of wildlife (flora and fauna) found inside the protected area. It is felt that appropriate and adequate training is required to be given to the Territorial Forest Staff regarding wildlife management in the Territorial Areas. Wildlife can not necessarily be confined to wildlife areas only. In case of Man animal conflict or poaching activities, one cannot wait for the wildlife wing/ staff only to come forward to handle such situations. Therefore, there is necessity for making provisions for training of both Territorial and wildlife staff to handle such eventualities in their respective areas as and when required. Provision is made for national and international level exposure / technology exchange visits and studytours of Field level staff. Training in equipment handling is also provisioned for the Field Staff. There is immense necessity of percolation of the training and exposure needs to the field staff level. It is also desirable that the protected area should not be exposed to the excessive tourist pressure until and unless requisite facilities are created preferably far away from such protected areas.

5.11 It is a well-known fact that there has been incidence of unregulated, uncontrolled and unscientific grazing in the forests and pasture lands beyond their carrying capacity. This is one of the most important factors responsible for the failure of natural regeneration and plantation to the large extent. Adequate provision has been made for the assessment of carrying capacity of the forests and pasture land enabling the department to regulate and control the grazing on scientific lines. The people of all walks of life should be educated through a well-designed strategy about

the economic, ecological, social, religious, historical and climatic importance and the impact of forest on their lives and livelihood.

5.12 Selection of Species. Tree line in the Himalayas extends up to 3500 m altitude. Climatic variations occurring due to altitudes, aspects, temperature, rain fall, soil types have resulted into several forest types and vegetation types that vary from place to place due to these factors. Because of this, it is not possible to recommend a particular tree species for every area. However, while selecting the species for planting in any area the following points should be considered:

- The soil and climate of the area is suited for the growth of a particular tree species,
- The species selected for planting are in accordance with the plantation policy of the Government,
- The species selected meet the fodder, fruit and other requirements of the villagers living in thevicinity,
- The species selected suit the needs of birds and wild animals dwelling in the area. The species selected for planting should provide suitable cover and food to herbivores and carnivores
- The species should be useful for water and soil conservation such as Ban oak, and Burans etc.

5.13 Selection of Site

The selection of site and selection of species are inter-dependent. The selection of site is however more important as the selection of species depends upon the selection of site. The site selected for planting should be suitable for the growth of species desired to be planted. For this purpose, the soil type, its depth, study of vegetation in the neighbourhood, local factors and other conditions should be given due consideration and advice of the local villagers should be taken. Selection of planting site should be done by the end of September.

5.14 Site Development: This includes clearance of planting site, bush cutting, control burning, lopping of tree branches, checking of soil erosion, soil conservation works in 'nala', construction of vegetative or stone, preparation for agave planting where necessary, marking of pits for planting of saplings and other soil works. In addition, demarcation of boundary walls or fencing and inspection paths should be made to facilitate the movement of people engaged in plantation works. This work should be completed by the end of November. While developing the site for planting, care should be taken to retain all indigenous species of trees and shrubs that are naturally growing in the area. They should not be cut and burnt alongwith weeds and thorny species. Preferably they should be adopted in the plantation should be made around each of these plants for retention of moisture and for protection against fire and damage by grass cutters.

5.15Digging of Pits

After clearing the land and before digging of pits, pit sites should be identified by using a measuring tape to ensure the desired spacing and then mark with wooden or bamboo sticks at the spo tthat will be the centre of the pit. Pits of the size 30 cm x 30 cm and 45 cm depth should be dug. Pits should be deep enough to ensure that the roots of the plants do not curl up once the planting material is placed in it. The soil dug from the pits should be dumped close to the pit. While digging stones, roots of trees, grass or shrubs, if any, should be separated so that while filling the dug-up earth back in the pits these are not mixed with the soil. The spacing of pits varies according to the planting scheme for different areas. Generally, the spacing between pitto pit along the contour line is 2 m and the distance between lines (Contour) is 3m. In hilly areas, it may not be possible to follow this spacing strictly due to presence of boulders or trees. No pits should be dug within the vicinity of five meters from a tree. The spacing between the pits should, however, not be less than 2 x 2 m. Pits should always be dug along the contour

lines. The procedure of making the contour lines has been described in Diagram 5.1. The pits in the second line should be dug in such a way that they fall between the pits dug in the first line as shown in staggered alignment of the pits (Diagram 5.2) and alignment of pits in hilly areas (Diagram 5.3). This method should also be applied while digging contour trenches.

Diagram: 5.1 Schematic diagram of staggered trenches

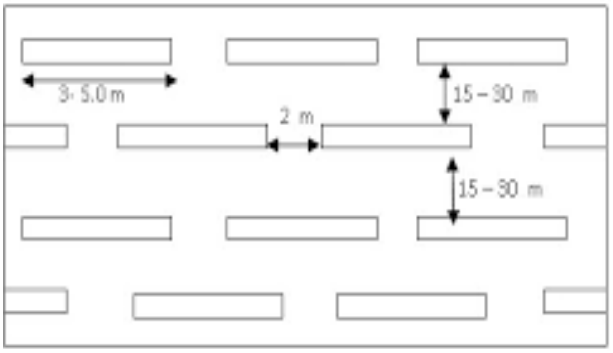


Diagram 5.2 Staggered alignment of the pits along contour lines

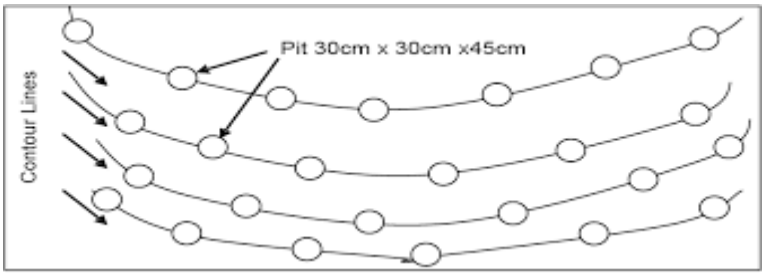
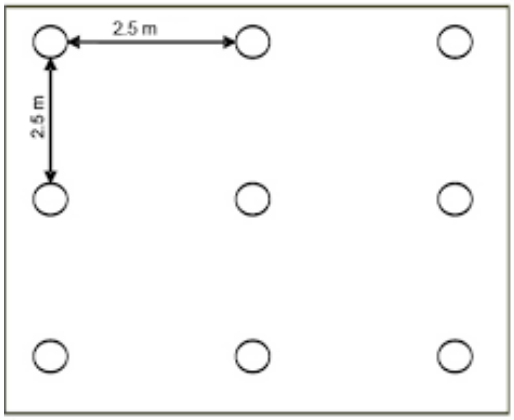


Diagram 5.3 Alignment of pits in hilly areas. Pits in row with equal square spacing



5.16 Protection of Plantation Sites:

The proper fencing of plantation areas is essential to protect the seedlings from damage by the cattle and wild animals. The choice of fencing depends on the type of terrain, soil depth and the kind of soil. Since most of the Afforestation programmes are employment oriented, a fence type with high labour input is preferred. Cost of fencing is another important criterion. RCC Fence posts not being successful in snowbound areas and involvement of heavy carriage cost to far off and very steep heights Wooden Fence Posts are recommended in this CAT Plan with 7 years maintenance support on the basis of HPFD Plantation Cost Norms 21-22.

5.17Barbed wire fencing with wooden fence posts:

In areas where stones are not easily available or where cartage of stones is expensive due to long distances, the plantation area should be protected by barbed wire fencing. Wooden posts are used for this purpose with a length of 3 m and a girth of 30 cm to 45 cm. The upper ends of the posts are fashioned in conical shape to avoid rainwater from rotting it. The lower end which remains in contact of the soil is painted with coal tar to avoid damage by white ants and wood decay fungi. The posts are dug 30 cm deep and placed 2.5 m to 3 m apart. Three strands of barbed wire at the height of 22, 52 and 74 cm from the ground level are stretched and fixed to these posts with the help of iron staples.To make this barbed wire fencing more effective thorny bushes are put along the fencing. For entry in the plantation area wooden ladders are provided. From the landing point of the ladder an inspection path is made inside the plantation area. Areas having nilgai menace or damage by animals like deer etc. requires at least 4 rows of barbed wire fixed at an interval of 30 cm each with two strands of barbed wire inclined at 450 to the poles to provide extrastrength.

5.18 RCC Fencing: The HPFD has promulgated use of RCC pillars instead of wooden posts for fencing. In this CAT Plan, Fencing with Wooden Posts is provided as explained in para 5.18above.

5.19 Social fencing: In community areas and areas close to habitations, local villagers have to be encouraged to resolve among themselves about not sending their cattle in plantation areas and protect grasses in the plantation areas to be cut after maturity by mutual agreement. Van Panchayats should be made models of such social fencing efforts. In such cases, the money earmarked for fencing must be utilized to pay the villagers who choose to stay at the plantation site and protect it from grazing. The grasses so produced can be shared by the villagers as per the mutualagreement.

5.20 Fire protection: A1.5m wide strip along the outer periphery of the fencing should be cleared of grass and bushes and the strip scrapped with spade for fire protection so that any fire from outside may not enter the plantation area. A hut should be constructed inside the plantation area, preferably at the entrance point for the stay of people during rains and for the stay of Chowkidar deputed to look after the plantation.

5.21 Filling of Pits: This work should be completed in the first week of June. The dug earth dumped near the pits should be filled back after about a month or before the monsoon, so that the pit and the earth to be filled are exposed to sunlight. Insecticides may also be mixed in the soil while filling into the pit. The pit should be filled a little above the ground level so that after the earth settles the upper surface of the pit is level to the ground thus avoiding any water logging. While filling the pits, the area surrounding the pit should be scraped with spade to remove grasses or weeds. Topsoil should be filled in the bottom of the pit and after this, subsoil should be filled.

5.22Planting of Saplings: The plantation of sapling must be done in the first weekof July when monsoon rain has begun. Planting of naked root plants should be completed as early as possible so as to take full advantage of the rain. The planting work should be done either in the afternoon or during light rain or cloudy sky. The roots of the plants should be kept straight, and the plant put straight in vertical position. For this a hole should be made with the help of a stick or small crowbar. The collar of the plant should be kept at the surface level of the pit. After planting the sapling, the earth around it should be firmly pressed by hands or feet and while doing so the plant should be pulled about half inch to make sure that its roots is not bending. Species suitable for naked root planting are Akhrot, Angu, Utis, and Deodar etc. Bagged plants should be sprayed with water before planting. The polythene should be carefully removed so that the plant is not damaged. The plant with the soil intact should then be placed in the pit in straight position, the collar of the plant being in level with the ground. The soil around the plant should then the pressed firmly by hands only. Pressing by feet is likely to disturb the soil of the plant. The planted saplings should be of suitable thickness and height.

5.23Planting Technique:-The Chilgoza Pine (*Pinus gerardiana*) is medium sized ever green tree. The flowering time is May and June and the maturation time of female cone is September and October. Generally, the Chilgoza tree starts bearing cones at the age of 15-20 years. The average yield of Chilgoza seeds is about 7 to 10 kgs per tree and the number of seeds per cone is about 140 to 150. The cones mature in 18 months after flowering. The cones are harvested during September – October, when the cone attains the full size having dark green colour. The harvesting is done by cutting the end of branches supporting the cones by sickle. It has been observed that the patch sowing has not yielded good results in the past, therefore, only polythene raised plants should be planted in the field as per plantation schemes of the Forest Department.

(i) Site Selection: The area selected should be having good manageable soil.

(ii) The area selected should be fenced properly. The area is to be closed both from grazing as well as plucking of cones in September. The area should remain closed to plucking of cones for at least five years and to grazing till the seedlings get established.

(iii) In case the plantation is carried through Village Forest Development Committees, the area selected should also be closed.

(iv) Double trench method should be used. Two trenches should be dug out. One filled and the other unfilled. The unfilled trench will be used for water /snow storage and is made on the upper side of the filled trench used for planting.

(v) The soil in the plantation / closed area should be raked/worked up during October, so that it is ready for the seed. In the first year contour trenches will be made and two selected shrub species will be planted. Selection of shrub will depend upon availability in nursery stock and hardy species which are sure to survive. Thereafter, one plant of an associate broadleaf species such as Behmi and Chulli should be planted in the first year.

(vi) The Plantation should be raised mainly through pit, pit / trench method. The patch-sowing method should invariably be discouraged and only 20 % of the area, wherever necessary, should patch sown, and the remaining 80% should be left for pits / trenches and pit planting.

(vii) Patches prepared should be 60x60x60 cm Size and 10-15 seeds should be sown per patch during December after treating with poisonous material (to prevent being by birds or rodents.) The patches should then by cover with thorny bushes.

(viii) The size of pits should be 60x60x60 cm to accommodate 18" polythene –bag raised minimum $2^1/_2$ years and $3^1/_2$ years old seedlings.

(ix) The pine plant size recommended is 22.5 cm, which is achieved in $2^1/_2$ years to $3^1/_2$ years old of age..

(x) The spacing should be 3m X 3m in case of pits.

(xi) Two weeding and hoeing in the months of April and September should be given.

(xii) The pits should be dug in June, so that adequate weathering of soil takes place by the time of planting.

(xiii) At lower altitudes and near water sources planting by pit can be resorted to.The plantations should be irrigated once in a fortnight (wherever, there is availability of water) from May to November during the First two years and thereafter, once in a month for the next two years.

5.24 Maintenance and After Care: - Special Watch and Ward for Seven Years is provided.

a) A Chowkidar must be deputed for five years in the plantation area to look after it soon after the planting work is over. Following duties should be assigned to him:

b) Periodical weeding and removal of grasses suppressing the plants,
c) Maintenance and repair of inspection paths,
d) Repair of boundary wall or fencing wherever necessary,
e) To protect the plantation area from grazing and damage by wild animals and villagers cutting grass,
f) To protect the area from fire, cleaning of dry grass and twigs, etc. from the area and cleaning of inspection paths,
g) Cleaning of the outer periphery of the plantation area in two meter width,
h) Keeping regular watch over the plantation area during the fire season and
i) Seeking help and co-operation of the neighbouring villagers in the protection of the plantation area.

5.25 Maintenance in Subsequent Years.

5.25.1Second year:-Beating up works should be carried out in the second year. In this operation the dead plants are replaced by planting fresh saplings immediately at the onset of monsoon rains. Under normal conditions not more than twenty per cent plants are required to be planted during the beating up operation in the second year. The reasons for mortality should be ascertained. The dead plants should be replaced by the species which are growing successfully. At least one weeding should be done and thanwalas be made. Protection wall or fencing should be repaired wherever necessary.

5.25.2 Third, to seventh year: -Normally no beatings up operations are carried out during these years but full attention is given to protect the area from grazing and fire. However, soil working and weeding around the plants during the rainy season promotes the growth of seedlings. Therefore, provision of sufficient funds should be made for this purpose too.

5.26Causes of Failures of Plantations: - The main causes of failure of plantation works in grazing, frost, lack of desired rainfall or excessive rain and fire. There are several other adverse factors causing failure of plantations. These are as follows:

- Wrong selection of species such as planting of deodars at lowaltitudes,
- Planting of weak and damagedsaplings,
- Untimely planting of saplings,
- Carelessness in cartage of plants. The bagged plants need very careful handling during loading/unloading. If, cartage is done by head load they should be carried in trays or baskets to avoid damage,
- Lack of supervision at the time of growing plants in the nursery and while planting in the plantation area,
- When proper shifting, grading and root cutting of plants is not done in the nursery as prescribed, before taking plants to the planting siteand
- Proper attention is not paid in planting, weeding and otherworks.

5.27Planting of Grasses and Shrubs. Since vegetation of any particular area is always adapted to the local conditions of that place, therefore, the varieties of grasses belonging to that place are different. According to the vegetative conditions, Himalayan forests can be divided into three categories.

- Humid temperate forests
- Dry temperate forests
- Alpine forests

5.28 As is evident from the names of these forests that cold places having enough moisture are called 'Humid temperate forest', forests where the moisture is comparatively low, and climate is dry and cold is called 'Dry temperate forests' whereas the snow-covered areas are called 'Alpine forests'. Similarly, the grasses found in these three areas are also different

5.29 Classification of grasses according to forest areas and vegetation types: In natural forests there are certain associations of higher species and grasses. These represent the symbiotic relationships in nature. Some examples are as follows:

5.30 Shrubs. At present per annum demand of forest products is 3.6 lacs m3 in hills. This demand is likely to be increased in near future. This enormous demand can only be met out if efforts are made to enhance the productivity of land. Shrubs may be one of the important tools in this regard. Shrubs may be advantageous in the following respects:

- They produce a variety of fruits, medicines, minor forest products like fibre, gum, lac and also provide fodder and fuel,
- Shrubs can be well adapted to the adverse climatic conditions and a variety ofsoils,
- Shrubs are suitable for soil conservation as their roots penetrate the soil densely. Ithelps
- Similarly as iron rods in reinforced cement concrete,
- Being small, they can be pruned and easily managed,
- Being compact in size, these are resistant to high wind velocity,
- They can even be grown in areas having poor soil and dry conditions,
- They can be used for bio– fencing and
- Some shrubs are good for nitrogen fixing thus increase soil fertility.

5.31NTFP Plantations: -The factors responsible for non-development of NTFP in theState are classified under two primary headings:

a) Wild Collected NTFP.
b) Cultivation of NTFP.

5.32Wild Collected NTFP: - Most of the collection's methods are exploitative and non-sustainable in nature. They, therefore, are not remunerative to the community. On the other hand, non-sustainable removal also results in putting tremendous pressured on these natural resources. Some of the main reasons are:

a) Un-organized collection: Unorganized collection due to destructive harvesting and low returns to the collectors as their ability to bargain is compromised due to advances taken from the brokers.

b) Authenticity Issues: Inability of the collectors to precisely identify the plant/or mixing them up with similar species thus obtaining adulterated material. The authenticity is, therefore, disturbed due to contractual labours who are required to collect large quantities without proper knowledge.

c) Unscientific Post Harvesting Handling: Most of the collecting households do not have the facilities for cleaning, cutting and drying. Unscientific handling at this stage results in loss of aroma, loss of colour and fungal attacks resulting in lowreturns.

d) Lack of Management Control: This sector of forest produce is not managed at all. Non availability of field identification guides, lack of trained staff to guide people about harvesting restrictions to protect the species are also not exhorted.

5.33 Cultivation of NTFP

Even though this CAT Plan does not propose any NTFP Plantations, the findings from the

Study carried out in the Mid Himalayan Project is worthy of attention as these can be used by the implementers of this CAT Plan if and when so desired. The study carried out by the Mid Himalayan Project has also identified that cultivation of NTFP in the state has failed due to following reasons:

- Non availability of suitable land,
- Long gestation period of the produce,
- Lack of economic viability,
- Absence of demonstration fields,
- Non availability of certified Germ Plasma,
- Prohibitive investment unaffordable to small and marginal farmers,
- Lack of appropriate marketing support and
- Non supportive legal environment.

5.34 The problem areas are very well identified. N.T.F.Ps. in particular herbs and shrubs, can play a vital role in soil conservation. The CAT Plan, therefore, should have inherent interest in promoting the conservation of existing NTFP in the forest area and cultivation of NTFP in the non-forest areas. Considering the economic potential of this produce, it can be of immense help to enhance the livelihood of the local population. However, although this seems to be the obvious choice of people and the Forest Department, there are numerous hurdles The Mid Himalayan study has identified the causes of failure to promote NTFP as a major source of livelihood. To summarise it can be said that role of NTFP in local economy and in enhancing the standards of living have not received adequate recognition. It is, therefore, this area where large improvements are possible, if an organized effort is undertaken by the Forest Department in collaboration with the local population.

*(**Source:** Himachal Pradesh Mid-Himalayan Watershed Development Project Non-Timber Forest Produce as Livelihood Option for Rural Communities of Mid Himalayas in Himachal Pradesh page no 12- 13)*

5.35 Silvi-pastoral development: - This CAT Plan in accordance with the deliberations with HPFD Field staff, provides for silvi-pastoral development of indigenous species namely P. alba, P. ciliata, P. nigra and P. deltoids. The important willow species found in the cold desert are S. alba, S angustifolia,S. caesia, S. daphnoides, S. elegans, S. flabellaris, S. fragilis, S. hastate, S. oxyaxaropa, S. sclerophylla and S. tetrasperma in addition to ***Trifolium Repens, Stylo Hamata grass, Medicago sativa*** **and** ***trifolium*****, under Pasture Development Component as decided in the Review Committee Meeting of HPFD held on 15.7.23 for this CAT Plan.** It is observed that due to adverse climatic and geographic conditions/ factors, there is scarcity of grass and fodder in the CAT Areas. Large herds of sheep and goat are owned by the local people. In winter these herds are taken outside the CAT area in lower parts of Himachal Pradesh to be taken back during summer. Alpine pastures within the Catchment area and areas adjoining to it are the main grazing ground for these herds. These pastures are heavily grazed and there has been a decline in the quantity and quality of grass in these pastures. The productivity of these pastures has been decreasing gradually. For improvement of these pastures it is proposed to augment the existing grass production by way of:

- Patch sowing of palatable grass seed in 60x60x25 cm patches
- Broadcast sowing of seed after making pellets with cow dung
- Removal of obnoxious weeds and unpalatable grasses
- Application of Farmyard manure to augment fertility.
- Planting of grass tufts in 0.30x0.30 cm gradian structure/trenches over-ridge
- The special watch and ward for 35 Ha. / person @ Rs. 170 / Day for three months in a year during the period of transplantation and growth i.e. from 15th March to 15th April plus 60 days for sub alpine pastures and from April 30th to May 30th Plus 60 days for alpine pastures.

- Awareness programmes: It is well appreciated that the plantation and growth of alpine pastures can best be done with consultation and agreement between the graziers and the forest department after adequate awareness generation. Having good pastures of graziers as well.

5.36 Plantation Process: -Normally, any plantation to succeed it should be provided with protection. However, at the heights of alpine pasture it is physically difficult and economically impractical to erect RCC Poles with barbed wire fencing. The second option which may be advocated by some is to make cattle proof trenches. Considering the problem faced by these areas due to water seepage during snow melt and the erosion that will be caused by such water seepage leading to landslips will be counterproductive. The pastures will need protection during its sowing stage and for the first 45 to 60 days thereafter. It is considered prudent and cost effective to provide for watch and ward staff for 90 days between the periods mentioned above. The same person can be tasked with and trained for communicating with the migrant shepherds.

a. The plantation is carried out either by the pit method or by the strip method. In the present case, we have considered strip method with a combination of legumes and grasses 50% each. It is recommended that the palletized grass seed be broadcast, in addition to tufts of grass being sown along with legume seeds. The suitable species and seed rate for these altitudes of grasses and legumes as researched by the "Regional Research Centre, Indian Grassland and Fodder Research Institute, Palampur" are as follows:
b. **Grasses**: - Lolium *perenne, Festuca pratense, F. rubra, Phleum pratense*. In sub alpine areas *Festuca arundinacea, Phalaris arundinacea and P. Tuberose* are also suitable.
c. **Legumes: -** Trifolium repens, T. pratense, for subalpine areas, Trifolium subterraneum. Lotus corniculatus, Medicago sativa and Onobrychis viciifolia are also suitable. In the context of the pastures, it is very important to create mixed vegetation so that the herbage availability is assured the season round. Depending upon the availability of seeds, it is recommended that the seeds of grasses and legumes should be sown in proportions.
d. **Seed rate**: -The optimum seed rate for sowing of grasses is 5kg/ha excepting Festuca arundinacea. In this case the recommended seed rate is 6 kg/ha. In case of legumes the optimum seed rate is 5 kg/ha except Lotus corniculates and Onobrychis for which a seed rate of 7 and 15 kg/ha, respectively may be applied.

5.37 Transplantation: -Nurseries of grass seedlings should be raised on well drained elevated soils 45 days before the date of transplantation. Manure @ 100 kg per hectare should be added. An ideal bed size would be 4m x 2m. Seed should be evenly spread on the soil and a thin layer of soil not more than 2 cms above the seed should be spread over it. Light shower with a sprinkler should be provided after sowing. The bed should then be covered with mulch which should be removed when the seedlings reach two leaf stages and the bed then should be irrigated regularly. The seedlings are ready to be transplanted in the pits/ strips when they are 20 cms long. Two hours before the transportation of seedlings to the sight the bed should be flood irrigated. Thereafter, the seedlings can be uprooted and tied in small bundles or tufts and transported. At site the strip should be made ready after moving the sward and the soil cleaned and dug up to 10 to 15 cms. At site the upper portion of the seedlings should be chopped off and length of only about 10 cms from base should be maintained for the seedling. Minimum of two seedlings should be transplanted at one spot and these spots should be 10 cms apart.

5.38Time of sowing: - For the best survival of the seedlings of grasses and legumes, sowing should be made during March and April in sub alpine areas and during April and May in Alpine region. The survival rate will be adversely affected if the sowing time is at variance than that recommended in the spring. Exact time may have to be determined after considering the time of snow melt availability of clear pasture area and weather conditions.

5.39. Application of Fertilizers: - In case of grasses the best response and growth is found by

application of 90 kgs of Urea per hectare whereas for legumes best response is found with 60 kgs of p2o5. It is recommended that 90 kg N plus 60 kg p2o5 may be applied to the renowned pasture in three instalments; first the basal application; second after the growth of seedlings to about 30 CMS and third application should be made at initiation of boot stage i.e. when the developing seed head begins to push through the uppermost leaf sheet and the plant stops elongating. This is the reproductive stage and is the period when the seed head develops, pollination occurs, and the new seed develops.

5.40. Post sowing activities: -The next stage of operation will be the next year and identical to the first. The interspaces of strips should be replanted in the same way as described above to ensure greater spread of the desired grasses. The newly transplanted/ resown grasses will need one year for establishment. The entire area should not be planted in one go. Half the area should be improved and protected from grazing for one year and it may be opened for grazing in the following area when the rest of the area may be resown or transplanted. In order to maximize production, regular management practices like fertigation and regulated grazing need to be followed.

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CHAPTER 6 GUIDELINES FOR SMC MEASURES

6.1 INTRODUCTION- Soil & Moisture conservation measures are a set of activities which range from RCC, Gabion, Random Rubble, Brush wood to bio-engineering measures. The main objective of devising site- specific measures is to minimize soil erosion, reducing velocity of water from natural drainage and surface run off by using locally available materials in the most effective manner. In the Himalayan ranges soil is invariably loose, rocks are sedimentary, slopes are steep and long and debris flow is quite common. This Chapter introduces the different treatment measures generically referred to as SMC measures with details. This CAT Plan specifies location specific SMC measures which include construction of check dams and bioengineering measures. The details of drawings and designs together with specification of materials and its cost estimate of the structure are given in Appendix 'B' and 'C'.

6.2 Check Dams: These are small, sediment-storage dams built in the channels of steep gullies to stabilize the channel bed. They are commonly used in all countries to control channelized debris-flow frequency and volume. A less common use is to control revelling and shallow slides in the source area of debris slides. Channelized debris flows are associated with channel gradients over 25 degrees and obtain most of their volume by scouring the channel bed. They serve three purposes when installed in the channels:

- To mitigate the incidence of failure by reducing the channel gradient in the upper channel.
- To reduce the volume of channel-stored material by preventing down Cutting of the channel with subsequent gully sidewall destabilization and by providing toe support to the gully slopes.
- To store debris-flow sediment, when installed in the lower part of the channel.

6.2.1 When installed on debris slides, the dams store gravelled material, which eventually creates small terraces on the slide, reducing the surface slope. The spacing of dams depends on channel gradient and dam height. For example, a 2-m-(6 foot) high dam in a 20-degree channel with 10-degree sloping channel infill will be spaced every 12 m (36 feet). Lateral stream erosion and scour by spillway water is the main drawback.

6.2.2 Measures to be taken to prevent check dam failure: -During construction, the wing walls and log crib ends must be tied securely into the canyon wall and streambed to withstand backfill pressures and lateral scour. Wing walls should slope at about 70 percent and extend a minimum of 1–2 meters (3 to 6 feet) into the banks. The foundation of the dam should have a minimum width of one-third the total height of the dam and be deeper than any scour holes likely to develop. Backfilling the dam, rather than allowing it to fill naturally, reduces the dynamic loading on the structure and results in a more stable design. The slope of the backfill should be less than one-half the channel gradient. Dams that have been back-filled usually will survive a debris flow. The backfill material will not be scoured during or after a torrent.

6.3 Proper drainage management: In-appropriate & in-adequate drainage management is very commonly observed in majority of slides investigated in MWs. Water infiltration in the overburden during heavy rains and consequent increase in pore pressure within the overburden reduces the strength of the material and causes sliding of the landmass. This can be minimized by reducing infiltration by providing adequate drainage network. In this regard, a dual-pronged strategy must be adopted such as reducing flow of water into the vulnerable slope material by constructing interceptor drain, trench drain, diverting side drains and by channelization of all drains and second, by draining out

the remaining water by horizontal to sub-horizontal drainage system (using perforated pipes) including construction of collection chamber and diverting the water to existing channel and removal of any blockade to existing drainage system. Most important, all drainage systems need regular maintenance and surveillance for detecting any change in the flow pattern or pore water pressure by installing inexpensive piezometers at selected locations.

6.4 Ditches and drains: -Surface drainage can be through either surface ditches or shallow subsurface drains. Surface drainage is especially important at the head of the slide, where a system of cut off ditches that cross the headwall of the slide, and lateral drains to lead runoff around the edge of the slide are effective. Ditch gradient should be at least 2 percent, to ensure rapid flow away from the unstable area. The simplest type of subsurface drain is the lateral trench constructed above an unstable slope. Drainage trenches are economical only for shallow soils overlying bedrock or hard impermeable till. The trenches should be excavated to the base of the shallow soil to intercept any ground-water flow along the failure plane. They are backfilled with coarse gravel to prevent sloughing of the ditch sidewalls. An improvement is to use drainpipe and then backfill the area with coarse gravel. Engineering measures are more effective in conserving soil and water when they are supplemented by vegetative methods. But in certain situations, only engineering measures can be proposed. This section gives a brief about the various engineering measures that are suggested for soil and water conservation for the project area. These measures have been suggested after site visits carried out by the group of experts. Four different types of structures with varying dimensions have been suggested for the project area. These engineering structures are as follows:

- Check dam
- Check/Retaining wall
- Water harvesting structure
- Water Conservation Ponds

These structures have been defined with fixed width and height and the length varies as per the requirements of the treatment site. The cost of each structure varies with the length. These measures must be selected depending upon the site's topography and weather. Conditions like torque and stress caused by wind and water also need to be considered before constructing these structures. The drawings and cost estimates for the different soil and water conservation measures are given ibid. Some of the most common prevalent practices which are easy to follow are given hereunder with drawings for ready reference:

6.5 Gully Plugging and Nala Control: -In control of gullies and Nallas the erosive velocities are reduced by flattening out the steep gradient of the gully by constructing a series of checks which transform the longitudinal gradient into a series of steps with low riser and long flat treads. This involves construction of (vegetative, stone and crate wire or wire mesh). Spur walls and retaining walls can also be constructed for bank protection to save valuable agricultural fields from being cut up. Mechanical measures) are supplemented by planting in gullies behind. All gully or nala control work should start from the top of gully/nala and this activity must cover both non-arable and arable land. The stabilization of gullies through vegetation is difficult task as gullies have to be used for conveying run off during the time vegetative measures are undertaken and these measures get damaged by runoff. Therefore, mechanical measures must be adopted to prevent washing away of vegetative measures by large volume of runoff. Vegetation once established is able to take care of gully. Thus, mechanical measures, temporary or permanent, are necessary in gully control to be supplemented by vegetative measures since mechanical measures weaken and vegetative measures get strengthen with the passage of time. Following types of structures are being suggested under mechanical measures.

6.6 Brushwood: -The main requirement of temporary control structures is that they must be quick

and easy to construct and use cheap readily available materials. In brushwood small branches preferably of coppice able species are fixed in two parallel rows across the gully or nala and packed with Brush wood between the rows of these vertical stakes (Diagrams6.1 and 6.2). The vertical stakes can be tied down with wires or fastened with sticks across the top. The important point in erecting brushwood is to pack the Brush wood as tightly as possible and to secure it firmly. Brushwood is generally meant for small gullies or at the starting stretch of the gullies. Posts are set in trenches (0.3 x 0.2 m in size) across the gully to a depth of about 1/3 to 1/2 of the post length, and about 0.3 to 0.4 m apart. The length of the posts is 1.0 to 1.5 m and their top-end diameter is 3 to 12 cm. Any tree or shrub species, such as Alnus, pine, bamboo, Salix, poplar, etc., can be used as posts. The flexible branches of trees (Salix, Poplar, Gliricidia, Cassia, etc.) flexible stems of shrubs (Tamarix, Arundinaria, etc.), and the strips made of bamboo stems may be used as interlink material. These materials are woven between wooden posts driven into the ground. The ends of interlink materials should enter at least 30 cm into the sides of the gully. The space behind the Brush wood must be filled with soil to the spillway. If sprouting species (Salix, Poplar, etc.) are selected as posts and interlink materials, Brush wood should be constructed when the soil in the gully is saturated or during the early rainy season. If non- sprouting species (pine and Alnus as posts, bamboo strips as interlink materials) are used, Brush wood can be constructed during any season

Diagram 6.1. Seedlings: Front view

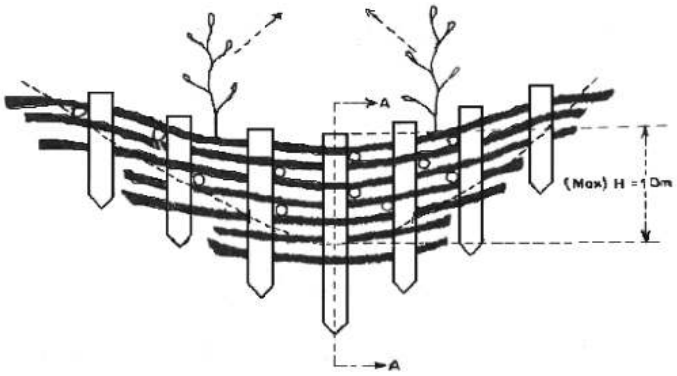
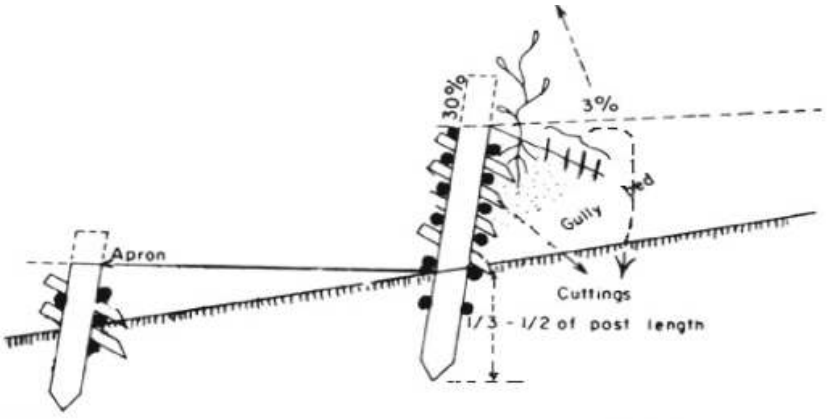


Diagram 6.2: A double row Brush wood check dam

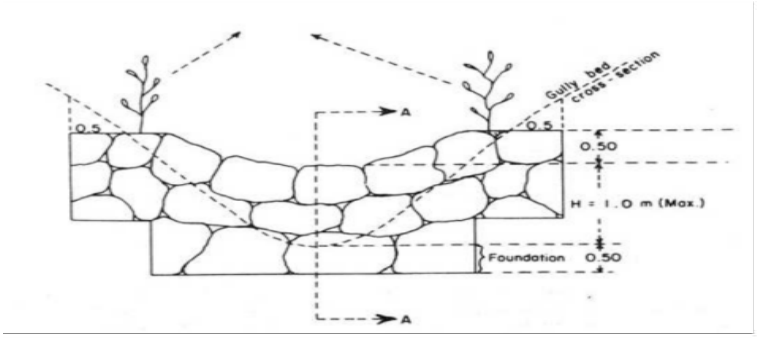


6.7 Stone Check dams:-For constructing Random Rubble (RR) dry stone , the site where it is to be constructed is cleared and the sides are sloped 1:1. The bed of gully is excavated for foundation to a uniform depth of 0.45 m to 0.60 m and dry stones are packed from that level Diagram 6.3 .Over the foundation, R.R. dry stone masonry super structure of check dam can be constructed. The stone are dressed and properly set in with wedges and chips. The width of check dam at the base should be approximately equal to maximum height and successive courses are narrower so the section is roughly

a trapezium. It is common to find upstream face of vertical with all slopes on the downstream face but while there is sound engineering reason for this in case of large dams, but it is not of any consequence in small gully control dams. In the centre of the dam portion enough water way can discharge the maximum run off. The dry stone work should go up to 0.30 m to 0.60 m in the stable portion of the gully side to prevent end-cutting. Enough aprons should be provided to prevent scouring of the structure. The thickness of the apron packing should be about 0.45 m and gully sides above the apron must be protected with packing to a height of atleast 0.30 m above the anticipated maximum water level to prevent side scour being formed by the falling water.

6.8 Crate wire or wire-mesh: When a check dam is held down with woven wire netting, the life and strength of the structure is enhanced many folds. The mesh of wire is generally 0.15 m x 0.15 m and care should be taken that stones used are larger than the mesh size so that stones do not pass through the mesh. The wire netting is spread below the stone foundation and in the sides before stone work and after completion of stone work the wire netting is tied, covering the masonry tightly so that the whole structure becomes one piece. The stability is secured by careful masonry work, setting and wedging. Wire mesh stones have proved very useful and more lasting than ordinary stone (Diagram 6.3).However, in our opinion this practice must be discontinued, and machine woven gabion must be used.

A. Seedlings



B. Compensation gradient

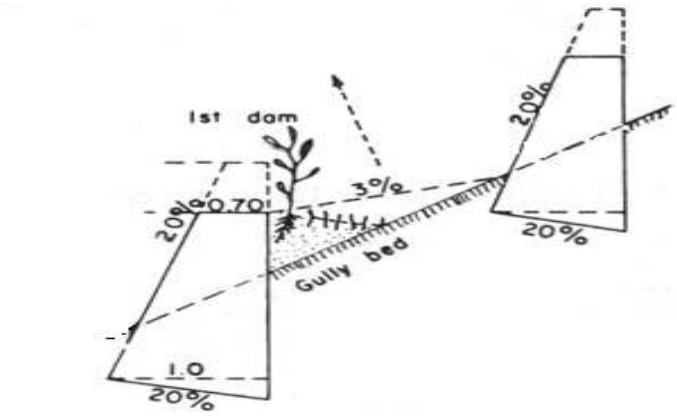


Diagram 6.3: A dry stone check dam

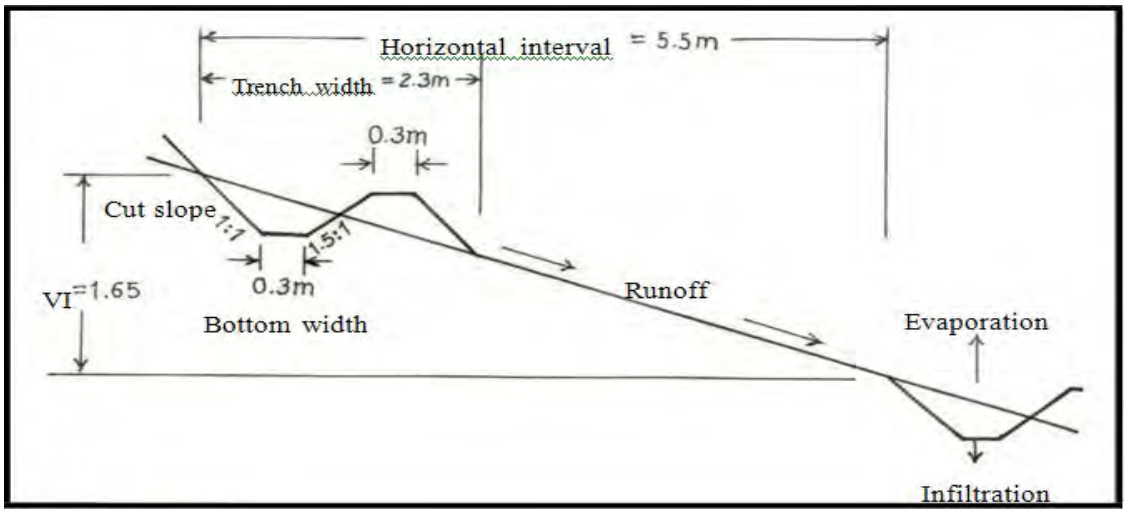
(A: Front view; B: 'A'-'A' cross section, C: Live structure)

6.9 Diversion Drains: Diversion drains intercept the storm water which could otherwise flow down from higher ground on to the arable land which it protects. It is the first line of defence and vital for protection systems and structures below down as it effectively controls the runoff from outside the arable land and conducts it safely to natural outlet. The diversion drains should be aligned on non-erosive and non-silting grades. It must also be protected from silting. A narrow and deep ditch does not get silted up as rapidly as a broad and shallow ditch of the same cross-sectional area and is therefore, self-maintaining. The soil excavated from the diversion drain shall be deposited on lower side of the drain, leaving a berm of 0.30 m and sectioned in a trapezoidal shape with side slopes not steeper than 1:1. The outlet end of the diversion drain should be taken to the existing or stabilized safe natural drainage lines or outlets so as to conduct the run off properly without causing erosion. Suitable spreading type of grasses must be planted. Panicum repensis found the best for the alluvial soil of Dehradun followed by *Brachiaria multica, Cynodon plectostachys, C. dactylon* and *Paspalum rotatum (Sharda et al., 2006).* The maintenance operations include periodical removal of weeds, filling of the patches with grass and proper cutting of grass.

6.10 Contour Trenching: Contour trenches are widely used for moisture conservation in plantation areas. It is a practice of excavating trenches along a uniform level across the slope of land. Bunds are formed along the trenches on the downstream side with material taken out of them. The expected service life of a trench is about 3 to 4 years, after which, the vegetation is supposed to perform the conservation function. Contour trench break the velocity of runoff and store whole or part of runoff. If contour trenches are constructed on the slope at the interval, just before runoff water attains erosive velocity; their life will be much more. Trenches should be designed to store 60-70 per cent of runoff from 6 hours storm with 4 years return period in coarse textured soil (Sharda et al., 2006). The intercepted runoff percolates through the soil slowly and is made available to the plants. The structural details of a contour trench have been mentioned in Diagram 6.5 They are normally used in the upper portion of watershed for the plantation of forestry/horticultural plants. Fodder grasses should be planted on the bund and trees may be planted just downstream of the trench or in the trench itself in gravelly soil. Contour trenches are of two types:

6.11 Continuous trenches: -The trenches are called continuous when there is no break in length and can be 10-20 m long across the slope depending upon the width of the field. Trenches are generally used in low-rainfall areas and dug with a cross section varying from 30 cm to 45 cm x 45 cm.

Diagram 6.4



6.12 Staggered trenches: -These are generally made in high rain fall areas as there is a danger of overflow and breach in case of continuous trenches in such areas. In staggered trenching, the trenches

are located directly below one another in alternate rows and in a staggered fashion. These may be 2 m to 3 m long and the spacing between the rows may vary from 3 m to 5 m

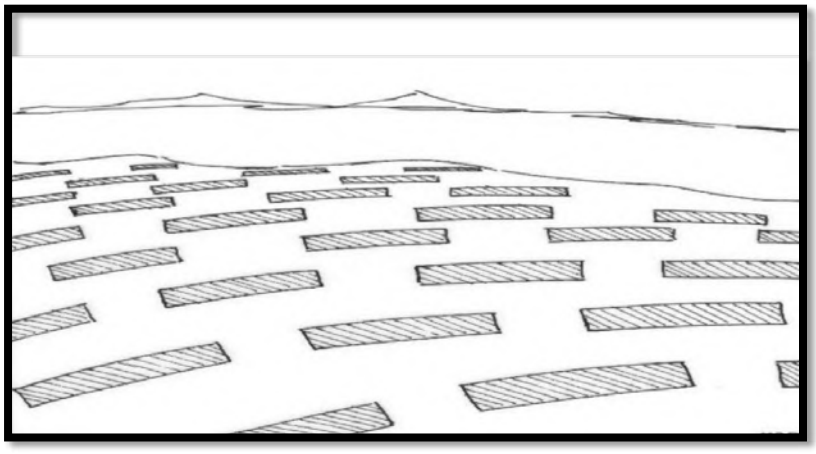


Diagram 6.5 Staggered trenching

6.13 Stabilization of Landslides:

6.13.1 Stream bank protection: One of the main reasons for the frequent occurrence of landslides in the hill areas is toe cutting by streams and rivers. In order to confine the flow and protect the bank, construction of spur walls/retards is desirable to deflect water of torrents from toe cutting of banks particularly at the curves. As a matter of fact, R.C.C. block spur wall involves large scale work with heavy cost. Therefore, wire mesh boulder or stone spur walls must be constructed as there is no dearth of boulders or stones in the hills. A method for locating the spur wall or retard is shown in Diagram 6.7. The first major retard at A is located by the intersection of the projected centre line of flow with the concave bank. In locating the second major retard C, a line HB is drawn parallel to the above projected centre-line and through the end of retard A. The intersection of this line with the concave bank locates point B. AC is then made equal to twice AB. Additional retards are located by intersection of a line connecting end points of two previous retards with concave bank (CD). An auxiliary retard at K is located at a distance AB upstream from A and is extended into the stream about one half the lengths of other retards. The retard of spur walls should extend into the stream at an angle of 45 degree for a distance of about 30 per cent of the channel width. On small streams the spacing of retards may be made equal to stream width and length 0.25 times the spacing. In the silt setting between parallel lines of spur walls, species which grow well near stream beds should be planted e.g. Alnus nepalensis, Ipomoea carnea, Populus ciliata, Salix, Vitex negundo and local grasses etc.

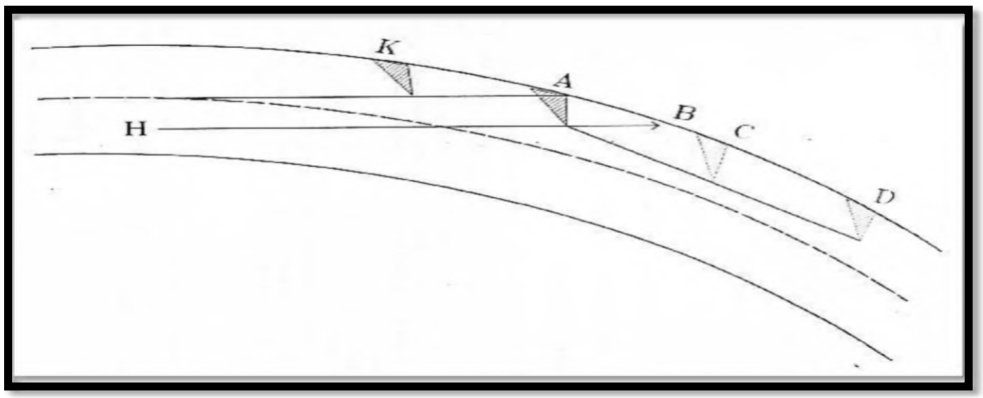


Diagram 6.6: Design and location of retards

6.14 Stabilization of Land Slipped Slopes: - Following measures are suggested for stabilization of land slipped slopes:

6.14.1 Protective measures against biotic pressure: Four strand barbed wire fencing should be erected around the affected area to prevent cattle, sheep, goats and other animals grazing in the area.

6.14.2. Structural measures: Stone retaining walls along contour should be constructed to withhold and help in stabilizing the land slip.

6.14.3 Vegetative measures: Slip area should be planted and well covered with quick establishing species of trees and shrubs e.g. Agave, Alnus nepalensis, Ipomoea, Populus ciliata, Salix, Vitex, Woodfordia, etc.

6.14.4 Covering with netting: Wherever possible land slipped slopes should be provided with cover of wire netting, rope netting or sack (coarse jute fabric) etc. including wattling and mulching. Several types of netting can be used woven with wire, jute yarns or cannabis ropes etc. To use these nettings, slopes should be smoothened, seeded, fertilized, then a layer of mulch is spread, and the netting unrolled over the mulch and anchored by wire staples.

6.14.5 Diversion channel: Diversion channel well above the landslide can check rain water coming to fragile site and divert it to safe natural course nearby.

6.14.6 Development of Natural Ponds, Lakes and Springs: Ponds and springs in the hills are of small size while lakes are quite large. Development of ponds and springs in the forest areas should be done according to the local conditions after consulting the villagers. If during consultation with the villager's technical shortcomings come to light, solutions should be decided again in consultation with the villagers for which a plan should be worked out keeping the following in mind:

- Topographic survey of ponds and springs falling in the area
- Identification of problems such as premature silting, diversion of rain water, soil erosion etc. in the area.
- Consultation with the local people and users.
- Knowing the object of ponds, springs and lakes such as drinking water for cattle, irrigation and drinking water, seasoning of branches of 'Bhimal' and 'Bhang' for extracting fiber or any other purpose.

6.15 Bioengineering: Bio-engineering is the use of vegetation, either alone or in conjunction with civil engineering structures, to reduce instability and erosion on slopes. Bio- engineering is an effective way of enhancing civil engineering structures to increase stability as far as possible. This is mainly because it provides the best way to armour slopes against erosion and can also provide a significant contribution to soil reinforcement and other anti-failure measures (Transport Research Laboratory, 1997). These bio-engineering measures have the following salient features:

- Involve use of local available materials and skills providing benefits through economically useful products.
- cost effective
- Better slope stabilization and erosion control
- Designed as per prevailing condition of the site
- Environment friendly solution to stabilize cut slopes along the road alignment.

- Under most circumstances, bioengineering can be effectively combined with appropriate and low-cost geotechnical applications to provide the most cost-effective, integrated solution to slope stability problems. This is important for places like Himachal Pradesh because, with the steep and dynamic slopes found in the Himalayas, most hill roads are engineered near to the margin of safety. The vegetative structures are also flexible, being capable of absorbing movement and recovering from damage. In this respect, bioengineering is simply part of wise and sustainable asset management since it helps to ensure the life of physical structures and reduces overall maintenance costs. Roadside plants reduce the flow of debris from degrading slopes. Debris is one of the greatest contributors to soil erosion and road maintenance costs through blocked drains and damaged pavements.

6.16 Plantation types and Design and Function: There are several types of bio-engineering measures which can be adopted based on the type of soil, depth of topsoil and slope. Some of the bio-engineering designs and plantation methodologies are tabulated in the table 6.3 below:

Table 6.1

Sr.	System Type	Design and Function
1.	Grass Planting	Grass seed is spread on to the slope, armouring the surface. Alternatively, grass is hand-planted in lines.
2.	Shrub and Tree Planting	Shrubs or trees are planted at regular intervals on the slope. As they grow, they create a dense network of roots in the soil. The main engineering functions are to reinforce and, later, to anchor. In the long term, large trees can also be used for slope support
3.	Brush Layering, Palisades and Fascines	Woody cuttings are laid in lines across the slope, usually following the contour and configurations. These form a strong barrier, preventing the development of rill, and trap material moving down the slope. In the long term, a small terrace will develop. The main engineering functions are to catch debris, and to armour and reinforce the slope. If they are angled, these structures can provide a drainage function
4.	**Composite Systems**	A range of composite systems are commonly used. Examples are: Live , which armour and reinforce gully beds and catch debris; vegetated stone pitching, which provides strong armour for ephemeral water courses; planted geo-textiles, where the geo-textile provides the armour, later supplemented by the vegetation, which also reinforces the soil.

6.17 Use of Bio-engineering in Slope Stabilisation and Protection: Vegetation can provide protection and reinforcement of backfill and surrounding slope areas, protection from scour and the undercutting of the foundations and sides of structures and a flexible extension to a wall through large bamboos, shrubs or trees close to it adding to the engineering functions of catching, supporting and buttressing. In practice, slope stabilisation depends on the use of a retaining structure, which can be drawn from a menu of standard and specialist techniques such as those shown in Table below:

Table 6.2

Wall Type	Maximum Safe Height (metres)	Typical width: Height Ratio	Advantages	Limitations
Dry masonry	4	1:1 to 0.6:1	Well drained, flexible, relatively low in cost and blends well with the surroundings.	Low strength threshold (susceptible to lateral pressures and traffic vibrations); limited height of construction.
Composite masonry (crib construction)	8	0.75:1 to 0.5:1	Better drained and cheaper than mortared masonry.	Strength not as good as for mortared masonry.
Mortared masonry	10	0.75:1 to 0.5:1	Relatively easy to construct on steep terrain; most durable wall type	Requires good foundations and cannot tolerate settlement; Poor through drainage.
Gabion (wire crate)	10	Width = ½ h + 0.5	Flexible without rupturing; tolerates poor foundations, and weak and saturated ground conditions; well drained; relatively low cost for strength.	Construction requires a relatively wide foundation footprint to achieve the same shear strength of mortared masonry.
Reinforced earth	8	Depends on design; substantial horizontal clearance usually required to develop required tension resistance.	A high level of flexibility and the potential for a well landscaped, "natural" finish.	Reinforcing is expensive and relatively difficult to obtain in remote areas; stability calculations are complex, and it is difficult to achieve the correct compaction and tension.
Soil nailing	5	Depends on design	A potential stabilisation option where space is limited for other types of retaining wall.	Costly; requires advanced technical skills and specialist equipment to build.

Wall Type	Maximum Safe Height (metres)	Typical width: Height Ratio	Advantages	Limitations
Mass concrete and reinforced concrete	10	Depends on design	Strongest type of retaining wall.	Relatively costly; requires large quantities of cement and Crushed aggregate and advanced technical skills to build; poor through drainage.
Anchored reinforced concrete	10	Depends on design	A strong wall type for certain situations where space is limited for other types of retaining wall	Very costly; requires a sound bedrock foundation, advanced technical skills and specialist equipment to build
Bored-pile wall built in situ	5	Depends on design	Allows through drainage between piles, in sites with identifiable failure planes within reach of piling.	Very costly; requires advanced technical skills and specialist equipment to build.

6.18 Common Slope Stability Measures: These measures include providing breast walls/ buttresses, sub-drains, soil reinforcement, surface protection, slope modification, retaining walls, gabion wall, etc. These measures have been found successful in mitigation in initial stages, however, later have failed due to severity of erosion/slides as well as due to in-adequate dimensions designed without giving due attention to areal extent & causes of slides. Same measures can still be implemented by re-designing and re-constructing with locally available materials. Lack of appropriate drainage systems across & above slope is one of the major reasons behind the frequent occurrence of slides even in areas treated well. Majority of slides are occurring along roads, especially across the cuttings made in the hill sides for construction of roads by PWD/BRO. These cuts leave over hangs and affect the angle of repose thus adversely affecting the slope stability. Most of the common civil engineering measures mentioned above are seen to be designed and implemented by PWD/BRO. However, the biggest gap in civil engineering measures being designed & implemented is found to be the lack of drainage control measures across high steep slopes. Some of the unique designs of engineering suggested by USGS are highlighted below.

6.19 Back filling with lightweight material: - A technique related to height reduction is to excavate the upper soil and replace it with a lightweight backfill material such as woodchips or logging slash. Then, covered with a thin layer of coarse aggregate, the backfilled material can form a foundation for limited-use traffic.

6.20 Stream channel linings: Channel linings are another way of stabilizing a stream or creek channel and the sides of the stream or creek. The lining is usually slush grouted with high-quality concrete, preferably reinforced by steel fibre mat to resist abrasion. **Protruding boulders are set in the concrete**

to dissipate the energy of water flow. Channel linings can reduce the incidence and volume of debris flows. They are also effective in maintaining channel alignment upstream from a bridge and for protecting the abutments. Channel linings are most effective if applied over the entire reach of an unstable channel. Linings are usually much less costly than, for example especially if a long reach is to be stabilized. are preferable, however, if the banks are very unstable because a dam can be keyed into the bank, providing toe support and thereby enhancing stability.

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7.1 Payment for Ecosystem Services (PES): -Government of Himachal Pradesh, Department of Forest has issued a notification No. FFE-B-C (15)-3/2005-II dated 5th November 2013 regarding the "State Policy on Payment for Ecosystem Services (PES) in HP. In addition, the Forest Department Guidelines for Catchment Area Treatment Plans No. FFE-B-F-(2)-72/2004-Pt-II dated 30.09.2009 stipulate that 10% of the CAT Plan funds are for utilization for Payment for Eco system Services. The nature of Eco system services that can be given by the people vary with the locations, living surroundings and the ecological status of each catchment area. As such it is difficult to create precise fixed instructions for application of these funds. However, the common consensus has always been to provide these funds to the communities and not to individuals.

7.2 Establishing Institutional arrangements: The Notification dated 5th November 2013 stipulates establishing Institutional arrangements as under:

"*Local level community-institutions and other state level institutions, either existing or newly created shall be enabled and strengthened so as to act as key drivers in main streaming eco-systems approach and securing the supply of ES. These institutions shall work in tandem with the existing Panchayati Raj bodies at various levels which shall have the role of:*

(i) Organising and empowering communities to manage the resources which provide the ecosystem services and engage with ES beneficiaries.

(ii) Mainstreaming eco-system-based approaches in decision-making processes, through creation of a dedicated cell in each department which shall steer and institutionalize the processes."

7.3 Determination of types and levels of payments:

(i) Payments can be for outcomes, outputs, or a combination thereof.

(ii) They may be in cash or kind or a combination thereof.

(iii) The payments in all cases (whether community driven or individual) will be coordinated through community groups operating in the area.

(iv) Payments would typically be made based on agreements that may include the management steps, the basis for the payment, time-frame monitoring requirements etc.

7.4 Applying an ecosystems approach to decision making may include the following:

(i) Identifying strategic dependence of different departments and sectors on ecosystem services.

(ii) Reviewing existing plans and practices and identifying opportunities and instruments to work with natural systems to deliver policy objectives.

7.5 Monitoring: Based on well-defined and measurable criteria and indicators, mechanisms for regular monitoring of physical flow of ES and subsequent adjustments to PES mechanisms for ensuring maximum impact shall be established.

7.6 Partnerships in Capacity Building: This policy envisages developing long term partnerships amongst different departments and with communities and accordingly build capacities at all levels. Research Institutions and NGOs will be encouraged to participate and support this process.

7.7 Safeguards: The process of developing PES programme and agreements should include safeguards such as reducing scope of leakage so that protection at one place does not simply shift the pressures elsewhere, identifying interests of marginal stakeholders, and ensuring that communities have the benefit of longer times and stability of tenure.

7.8 OPERATIONAL GUIDELINES: To achieve the above-mentioned policy objectives the CCF/ DFO will frame operational guidelines from time to time in consultation with Stakeholders such as District Agriculture Officer, District Horticulture Officer and District Animal Husbandry Officers.

7.9 PES IN RAURA HEP CAT PLAN. The Raura HEP CAT Plan has a provision for Rs.14,23,000/-under PES Component to be utilized as per the Government Instructions mentioned above and those that may be issued later from time to time. People's participation is important for fare and transparent utilisation of PES funds. This amount is to be utilized towards construction of community storage tanks, village ponds, energy saving devices and rewards given in kind only for providing help to the forest department for protection of forests from fire, anti-poaching operations etc. This, on the one hand, will go in a long way in improvising the economic conditions of the farmers and on the other hand reduce pressure on the forests. The Payment for Eco system Services was introduced with an objective to ensure that the people in the catchment area get adequately enthused to participate in conservation of Eco in the catchment. The expenditure on this account must, therefore, be made to ensure firstly, that the activity results in substantial contribution to conservation of Eco system Services, which in turn should conserve the soil and moisture regime in the catchment and secondly, it should ensure that the amount spent under this head must be for the common good of the community. It must also be ensured that any reference to the expenditure incurred on PES must receive wide publicity so that other villagers and people in the catchment get equally enthused and encouraged to contribute.

7.10 The available amount for PES (10% of CAT plan) in Raura HEP CAT Plan is Rs 14,23,000/-, Some of the suggested activities are as follows:

- Construction of Community Storage Tanks,
- Water Ponds,
- Distribution of energy saving devices,
- Solar lights,
- Solar cookers,
- Solar powered fencing near the villages to prevent man-animal conflict and to save crops.
- Reward schemes to village societies in prevention of forest fires,
- Anti-poaching activities.
- Distribution of two lengths of M.S. Pipe for grass stacking by the farmers. The practice of cutting large no. of trees for stacking grass for use during winters is prevalent in the State. It is, therefore, felt of great utility if metal G.I. Pipes for making grass stacking structures are provided to the farmers in these beats. This will provide permanent solution to the farmers for stacking fodder for lean months.

Number of other such activities in accordance with the instructions of H.P. Forest Department from time to time can be included.

CHAPTER 8 INFRASTRUCTURE NEEDS & FOREST PROTECTION

8.1. Infrastructure needs of HPFD Ranges in the Catchment Area.

Execution of this CAT Plan provides an opportunity to ensure better stocking of the forests in the catchment. It also adds a very large amount of work to be carried out by the Forest Department staff. It is, therefore, imperative that the department's infrastructure be strengthened to enable them to take on such a large task. NERIL has discussed and obtained the precise needs of the forest officials for strengthening infrastructure. Considering the latest guidelines of Govt. of India through H.P. Forest Department the allocations under Infrastructure Development and Forest Protection component must be restricted to 10% of the CAT Plan outlay (i.e., 5% for infrastructure development and 5% for Forest Protection). The CAT Plan allocation for infrastructure development component works out to be Rs. 14,23,715/- (i.e., Rs. 711857/- each for infrastructure and Forest Protection components). In view of rugged and difficult terrain, it is our considered opinion that the infrastructure facility available to the Range Staff must be made substantially more robust than the existing available infrastructure. Our approach, therefore, has recommended appropriate infrastructure improvements. This CAT Plan caters to construction of one Beat Guard Hut at Runang. A provision of Rs. 16,00,000 is made in the CAT Plan construction of new Forest Guard Hut at Runang. In the case of this CAT Plan, construction of a Forest Guard Hut for Runang Beat alone being of utmost importance will require a provision of Rs.16,00,000/-, which is higher than the prescribed percentage of 5%. Therefore, the balance funds for this component are proposed to be met out from Eco Tourism and Site-Specific Work Plan components.

8.2 Forest Protection: Another important subcomponent under this is Forest Protection. The activities proposed under this include maintenance of fire lines, purchase of firefighting equipment and patrolling / firefighting kits for the Forest Staff. The firefighting equipment will include purchase of fire extinguishers, water lifting pumps/spray pumps and other apparatus. The firefighting kit will comprise of Jungle Boots, Haversack, Water bottle, Jungle Caps, Stick and Pick Axle, Helmet with Fiber and other equipment. A consolidated provision of Rs.4,50,000/- lac is made for this component. Purchases of firefighting equipment are to be made at Division Level.

No. WL (Misc.)-60/HEP/Vol-XI/ 1012
Himachal Pradesh Forest Department.
Dated Shimla-171001, the 25/05/2022

From:

Principal CCF Wildlife and
Chief Wildlife Warden, H.P.

To

DLI Power (India) Pvt. Ltd. (A DLZ Company)
House No. 16, IAS Colony (West End),
Panthaghati, Shimla, 171001

Subject:- Preparation of CAT Plan for Raura HEP-Vetting of Chapter 9-Wildlife Management.

Sir,

This is in-continuation of this office letter No. WL (Misc.)/60/HEPs/Vol-XI/153 dated 07.04.2022 on the subject cited above.

The revised chapter of Wildlife and reduction of Human Animal Conflicts is hereby approved and the same may be incorporated in the CAT Plan of Raura HEP.

Encls: As above.

25/5/2022

Pr. Chief Conservator of Forests (WL) &
Chief Wildlife Warden H.P. Shimla-1

Endst. No. WL (Misc.)-60/HEP/Vol-IX/ Dated

Copy is forwarded to:-

1. CCF (WL) Shimla w.r.t. this office endst. No. 154-56 dated 07.04.2022 for information and necessary action.
2. Supdt. Accounts of this office w.r.t. this office endst. No. mentioned above for information and necessary action.
3. Naik Environment Research Institute Ltd. (NERIL), H.No. 24, IAS Colony, Panthaghati, Shimla 171001 H.P. w.r.t. his office letter No. NERIL/Raura-HEP CAT Plan/WL Chapter/ dated 16.04.2022 for information.

Pr. Chief Conservator of Forests (WL) &
Chief Wildlife Warden H.P. Shimla-1

CATCHMENT AREA TREATMENT PLAN FOR RAURA HEP 12 MW BY DLI POWER (INDIA) PVT. LTD.

CHAPTER-9: WILDLIFE PROTECTION, MICROPLANNING & ABUNDANCE STUDY

9.1. The Government of Himachal Pradesh, Department of Forest, Notification No. FFE-B-F(2)-72/2004 Pt. II dated 30.09.2009 has promulgated the guidelines for the preparation of Catchment Area Treatment Plan. The guidelines further stipulated that every CAT Plan being submitted by the User Agency shall mandatorily conform to the requirements in this Notification. The requirement at serial no. 10 stipulates that "A separate chapter for improvement and development of Wildlife and reduction of Human-Animal Conflicts duly vetted by the Pr. Chief Conservator of Forests (Wildlife) will be incorporated."

9.2. Even though no wildlife sanctuaries fall in the project catchment, wildlife exists in the territorial forest areas of the catchment. During discussions at Range Level, it is revealed that instances of citing the Ghoral and other ungulates are common. The three beats are in relatively undisturbed area and can be a good habitat for herbivores if perennial water and pastures are provided. No wildlife sanctuaries fall in the project catchment. However, wildlife exists in the territorial areas of the Raura HEP Project catchment. During our field visits to the project catchment; it was observed that the wildlife like Ibex has to come from top areas to the River for drinking water.

Fig-1 Herd of Ibex coming down towards river satluj

In case some poundage is created just below the snow line, it can be of good use for providing drinking water to the wildlife. Keeping this in view, provisions for construction of small water conservation ponds in forest areas are planned in accordance with discussions with the field staff. These small water ponds will have dual advantages i.e.

(i) availability of drinking water to wildlife and

(ii) (ii) availability of water for controlling forest fires to save forests and wildlife.

9.3 This CAT Plan has also made provision for development of 13 Hectares of pastures under the afforestation component and several perennial waterholes with gradual Slopes to help animals to walk when water level reduces. The CAT Plan guidelines stipulate that the lay out for its Wildlife component. should be pegged at 6% of the total CAT Plan Outlay. The allotment made under Wildlife Management is to the tune of 12.95%. So far as expenditure on conducting training programmes and workshops to territorial / wildlife staff for wildlife management as well as publicity of 'dos and don'ts' is concerned, the same will be catered out of the funds 7.19 lacs earmarked for Research, Training and Capacity Building Component of the CAT Plan (Refer Para 4.4 and 4.7.1 and 4.7.2 of Chapter 4 of CAT Plan). Further, no cases of human wildlife conflicts in the study area are noticed.

9.4 This CAT Plan caters for construction of 2 Nos. of Water Ponds @ Rs. 1,04,000/- each. An amount of Rs. 2,08,000/- out of Rs. 18,52,000/-is earmarked under wildlife protection for construction of water storage ponds as under:

i) Runang Beat Rs. 1,04,000 for 1 Water Pond in Runang Beat in C-248 (N-31°30'32" E78°11'19")

iii) Urni Beat Rs. 1,04,000 for 1 Water Ponds in Urni Beat in C-255A (N31°32'13" E78°07'00")

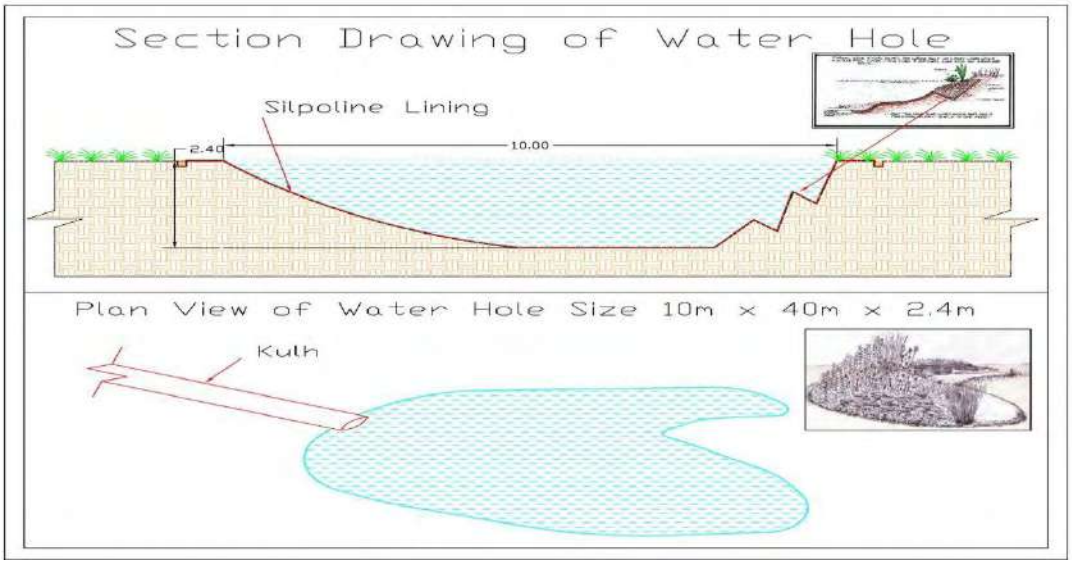
Total: Rs. 2,08,000 for 2 Water Ponds.

A provision of Rs. 6,44,000/- is made for purchase of Wildlife Protection/ Handling equipment i.e. 2 Nos Binoculars, 2 Nos Trapping Cameras and 1No. Tranquilizer Gun and salt licks. This amount will be controlled from Division level. The estimated cost of this equipment is as under:

1.	Binocular @ Rs. 42,000/- each	Rs. 84,000/-
2.	Trapping Camera @ Rs. 60,000/- each.	Rs. 1,20,000/-
3.	Tranquilizer Gun @ Rs4,00,000/- each.	Rs 4,00,000/-
4.	Lump sum provision for Salt Licks	Rs. 40,000/-
	Total:	**Rs. 6,44,000/-**

The recommended specifications of Trap Cameras are:

1. Still Resolution: 1200 Mega Pixel
2. Wide Resolution: 1280 x720
3. Video Length 90-180 Second
4. Data Storage: 32 GB minimum
5. Night vision using low glow LED with audio recording.
6. Minimum 2" colour LED.
7. Power: source Recharge Lithium Ion
8. Capable of transmitting photos on mobile network
9. All weather operations and Water proof



Note: The size of each water storage structure shown in the diagram is indicative and not binding. It will vary depending on the width of a certain contour line at each location.

9.5 In addition, during deliberations in Review Committee Meeting on 15.7.23 for this CAT Plan, it was decided that an additional provision of Rs. 10.00 lacs should be made for getting Wildlife Abundance Study conducted through Wildlife Institute of India or some other institute of repute. Accordingly, a provision of Rs. 10.00 lacs are made under this component over and above the already approved outlay of Rs.8.52 lacs. **Thus, total provisions to the tune of Rs. 18.52 lacs are made in this CAT Plan for Wildlife Protection, Micro planning and Abundance Study**. All the activities under this component are to be controlled from Division Level.

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CHAPTER 10 MONITORING, REVIEW & EVALUATION

10.1 INTRODUCTION. Monitoring Plan and Review and Evaluation Mechanism is considered as a management tool, for effective and efficient project implementation. Monitoring Plan and Review and Evaluation Mechanism is considered as an integral part of the project's regular operations rather than on and off events conducted at periodic intervals. The Mechanism will provide information on key issues, progress and performance, social and environmental impact, which are immediately fed back to decision making. The main objective of CAT Plan is to ensure arresting soil erosion in catchment and clear water to the stakeholders of the project Catchment in Satluj. Hence the key focus of the project is prevention of soil erosion and land degradation, rehabilitation of degraded forests and slopes, improvement of land capability and moisture regime and to ensure people's participation. It is therefore crucial for the project to develop a reliable information system which is timely and accessible, and which is also reflective about the project's processes.

10.2 Monitoring: is a process of measuring, recording, collecting, processing and communicating information. It continuously tracks performance and provides information on whether progress is being made towards achieving the targets. Monitoring looks at the processes and changes in conditions of target groups, institutions and natural resources.

10.3 Evaluation: is the periodic assessment of the relevance, performance, efficiency, and impact (both expected and unexpected) of the project in relation to stated objectives. It is a process by which inputs, activities are analysed and judged against planned schedules and anticipated goals. It relies on data generated through monitoring activities as well as information obtained from other sources.

10.4 The Role of M&E Plan. The role of Monitoring Plan and Review and Evaluation Mechanism is to:

- Provide timely, accurate, reliable and relevant information on the progress and performance of Micro-watershed developmental activities.
- Reflect the true picture; emphasize /improvements rather than mere reports.
- Collect Analyze and Communicate data, avoiding gaps and delays.
- Disseminate M&E observations and ensure effective feedback mechanism.
- Use monitored information for decision making.
- Monitor the functioning and performance of User Groups, Line Dept. and NGO's.
- Identify and share the best practices and lessons learnt.
- Provide timely progress, thematic and valuation reports.
- Ensure timely data updation in the web based GIS application.

10.5 Guiding Principles. Monitoring Plan and Review and Evaluation Mechanism shall be guided by the principles that:

- The mechanism generates only relevant information that are required and used at the appropriate level and frequency for the decision-making process.
- The mechanism should help in assessing the outcomes and impact of the project vis-

a-vis the objectives.

10.6 The Structure of M & E Mechanism. Following the common guidelines for watershed development projects by Government of India, appropriate institutional/ or implementation arrangements would be made at various levels for effective and professional execution of Raura HEP CAT Plan. The various levels suggested are State, Forest Division and Forest Range. Divisional Forest Office,

Kalpa will be the Nodal Agency. The state existing state level mechanism is quoted before the project specific M & E mechanism to provide continuity of the chain of command. The project specific composition, functions and roles & responsibilities of each agency is described thereafter.

10.7 STATE LEVEL NODAL AGENCY (State CAMPA). The implementation arrangement at the State Level Nodal Agency are planned to ensure that existing institutional mechanism of State CAMPA are undisturbed. The Aims, Objectives, Functions, Accounting Procedures, Monitoring & Evaluation of the Works etc. are same as given in the Government of Himachal Pradesh, Department of Forest Notification No. FFE-B-F (2)-72/2004-Pt-II. dated 3rd August, 2009. The institutional mechanism of State CAMPA to function through a Governing Body, a Steering Committee and an Executive Committee are reiterated below:

10.7.1 Governing Body. The Governing Body shall lay down the broad policy framework for the functioning of State level CAMPA and review its working from time to time. The composition of Governing Body is as follows:

Sr. No.	*Personnel*	*Status*
(i)	*Chief Minister*	*Chairperson.*
(ii)	*Forest Minister*	*Vice Chairperson*
(iii)	*Minister for Panchayati Raj & Rural Development*	*Member*
(iv)	*Minister for Tribal Welfare*	*Member*
(v)	*Chief Secretary*	*Member*
(vi)	*Addl. Chief Secretary (Forests)*	*Member*
(vii)	*Pr. Secretary (Finance & Planning)*	*Member*
(viii)	*Pr. Secretary (Tribal Welfare)*	*Member*
(ix)	*Pr. Secretary (Panchayati Raj & Rural Development)*	*Member*
(x)	*Pr. Secretary (Environment)*	*Member*
(xi)	*Chief Wildlife Warden*	*Member*
(xii)	*Principal Chief Conservator of Forests H.P.*	*Member Secretary*

10.7.2 Steering Committee. The composition of Steering Committee is as follows:

Sr. No.	*Personnel*	*Status*
(i)	*Chief Secretary*	*Chairperson*
(ii)	*Addl. Chief Secretary (Forests)*	*Member*
(iii)	*Principal Chief Conservator of Forests*	*Member*
(iv)	*Principal Secretary (Finance)*	*Member*
(v)	*Principal Secretary (Rural devpt& Panchayati Raj)*	*Member*
(vi)	*Principal Secretary (Environment)*	*Member*
(vii)	*Chief Wildlife Warden*	*Member*
(viii)	*Nodal Officer (CAMPA)*	*Member*
(ix)	*A representative of the Ministry of Environment & Forests*	*Member*
(x)	*Two eminent NGO's to be nominated by the State Government for a period of 2 years at a time who shall be eligible for re-nomination*	*Member*
(xi)	*Addl. Pr. Chief Conservator of Forests (CAT Plans)*	*Member*

10.7.2.1 Powers & Functions of the Steering Committee:

- lay down and/ or approve rules and procedures for the functioning of the body and its Executive Committee, subject to the overarching objectives and core principles of State CAMPA;
- monitor the progress of the utilization of funds released by the State CAMPA;
  - o approve the Annual Plan of Operation (APO) prepared by the Executive Committee.
- Approve the annual reports and audited accounts of the State CAMPA.
- ensure inter-departmental coordination.
- meet at least once in six months.

10.7.3 Executive Committee. The composition of Executive Committee is as follows:

Sr. No.	Personnel	Status
(i)	Principal Chief Conservator of Forests	Chairperson
(ii)	Chief Wildlife Warden	Member
(iii)	Addl. Pr. Chief Conservator of Forests (CAT Plans)	Member
(iv)	Addl. Pr. Chief Conservator of Forests (Finance)	Member
(v)	Financial Controller in the o/o PCCF HP	Member
	Two eminent NGO's to be nominated by the State Government for a period of 2years at a time who shall be eligible for re-nomination	
(vii)	*Nodal Officer (CAMPA)*	*Member Secretary*

10.7.3.1 Powers & Functions of Executive Committee:

- o Take all steps for giving effect to the State CAMPA and overarching objectives and core principles, in accordance with rules and procedures approved by the Steering Committee and the approved APO;
- o Prepare the APO of the State for various activities, submit it to the Steering Committee before end of December for each financial year, and obtain the Steering Committee's concurrence for release of funds, while giving break-up of the proposed activities and estimated costs;
- o Supervise the works being implemented in the State out of the funds released from the State CAMPA;
- o Be responsible for proper auditing of both receipt and expenditure of funds;
- o Develop the code for maintenance of the account at the implementing agency level;
- o Submit reports to the Steering Committee for review/consideration ;and
- o Prepare Annual Report by end-June for each financial year.

10.8 DIVISIONAL LEVEL NODAL AGENCY (FOREST DIVISIONS)

The responsibility to oversee the implementation the project will lie with the concerned Divisional Forest Officer (DFO) i.e. Kinnaur. The DFO of the area shall be the Nodal officer of Divisional Level Nodal Agency. However, the physical, financial progress and quality of the work done by the Divisional Level Nodal Agency will be closely monitored by the respective Conservator of Forests (CF) Rampur. The concerned Assistant Conservator of Forests (ACF) will closely supervise the project in all respects and will be designated as the 'Project Coordinator' for implementation of CAT Plan actions. ACF of respective forest division will act as Project Coordinators for the overall co-ordination of the staff from all Implementation Units and specialists from different disciplines. For effective implementation of the CAT Plan, the DFO will need a Project Management Cell (PMC). In PMC the Project Coordinator (ACF) will work in close coordination with the DFO. The technical staff

of PMC will comprise of one specialist from line department such as agriculture, horticulture, animal husbandry, representative from hydro power projects, representative from gram panchayat and the local Women Self Help Group. The M & E funds provided in the CAT Plan may be used for setting up/strengthening the Data Cell at Divisional Level Nodal Agency and for financially supporting the M & E work and hosting of periodic review meetings.

10.8.1 The composition of Divisional Level Nodal Agency is as follows:

Sr. No.	Personnel	Status
(i)	Divisional Forest Officer	Chairperson
(ii)	Representative from Raura HEP	Member
(iii)	Representative from Panchayati Raj Institutions (Forest Range wise)	Member
(iv)	Representative of Women Self Help Group	Member
(v)	Assistant Conservator of Forests	Member Secretary

10.8.1.1 The functions of Divisional Level Nodal Agency will be as follows:

a) Take up the overall responsibility of facilitating the preparation of strategic and annual action plans for CAT Plan activities in respective forest division.

b) Capacity building of staff with reference to technical, financial, administrative and managerial aspect of the programme through meeting, workshop, training and exposure visits at various levels.

c) Assist Gram Panchayat / Gram Sabha in constitution of the CAT Plan Implementing Agency and their functioning.

d) Organizing and nurturing User Groups and Self-Help Groups.Maintaining project accounts and ensure smooth flow of funds for carrying out CAT Plan activities.

e) Monitoring, checking assessing, and undertaking physical verification and measurements of the work done.

f) Arranging physical, financial and social audit of the work undertaken.

g) Establish and maintain the Divisional Level Data Cell.

h) Ensure timely submission of required documents to Nodal Agency of the Department.

i) Setting up arrangements for post-project operation, maintenance and future development of the assets created during the project period.

10.9 CAT PLAN IMPLEMENTING AGENCY (FOREST RANGE LEVEL) The CAT Plan Implementing Agency will function at Forest Range level in Kalpa. The concerned Range Officer will be directly responsible for field level planning, execution and monitoring of implementation of work as specified under annual plan of operation (APO) in the CAT Plan.

10.9.1 The staff structure of CAT Plan Implementing Agency (for one forest range) is as follows:

Sr. No.	Personnel
(i)	Range Officer
(ii)	Forest Block Officers
(iii)	Forest Beat Guards
(iv)	Intermediate Panchayats
(vi)	Other operational staff

10.9.2 The functions of CAT Plan Implementing Agency will be as follows:

- To create awareness about CAT Plan actions.
- Conducting the capacity building of village communities and Panchayats through workshops, training and exposure visits.
- Convergence and networking with respective line department.
- Formation and activation of user groups and Self Help Groups.
- Ensure quality of work and implementation of the CAT Plan activities as per work plan.
- To ensure timely submission of prescribed reports to the ACF designated as CAT Plan coordinator.
- Ensure proper maintenance of records of project activities.
- Convening quarterly meetings of Gram Sabha, Gram Panchayat and SHGs for collating opinions regarding the process of implementation of the programme.
- Taking follow up action on all decision.
- To identify and allot extension work to the local NGOs and/ or SHGs through his operational staff.
- Maintenance and sustainability of assets created after completion of the projects.

10.9.3 In addition to the above functions CAT Plan Implementing Agency should also take care of institutional arrangements at the village level and people's participation in order to have overall development and achieve the goal of integrated catchment area treatment plan.

10.9.4 Self Help Groups: The CAT Plan Implementing Agency shall constitute SHGs from amongst poor, small and marginal farmer households, landless/asset less poor agricultural labourers, women, shepherds and SC/ST persons in active collaboration with Gram Panchayat/ Sabha. These Groups shall be homogenous groups having common identity and interest who are dependent on the watershed area for their livelihood.

10.9.5 User Groups: The CAT Plan Implementing Agency shall also constitute User Groups in active collaboration with Gram Panchayat/Sabha. These shall be homogenous groups of persons most affected by each work/ activity and shall include those having land holdings within the watershed areas. Each User Group shall consist of those who are likely to derive direct benefits from a watershed work or activity. The User Groups will be responsible for the operation and maintenance of all the assets created under the project in close collaboration with the Gram Panchayat and the Gram Sabha.

10.10 Components of Monitoring Plan and Review and Evaluation Mechanism.

The mechanism shall have five distinct components, namely

i. Performance tracking-

Performance in terms of quality and quantity of physical and financial progress made against afforestation as well as soil &water conservation targets given in the yearly APOs will be tracked. It will be based upon input-output system to track the progress and performance on monthly basis at various levels, particularly at range, division level. The concerned RFO will be responsible for giving completion status (well supported by site photographs) to the project coordinator i.e. ACF. After conducting site visits in each range to review 50% of the work done as per completion status submitted by RFO, concerned ACF will update the data in the web based GIS application. This, submission of completion status report and 50% reviewing will take place every month. Lastly, the concerned DFO will supervise 25% of the work done in his division and authenticate the data updated by ACF. The 25% supervision by concerned DFO will take place every quarter of the year.

ii. Nodal Agency's Performance tracking-

Internal and External process monitoring to track the processes and progress (to provide leads and direction on the progress towards the achievement of the various end results of the project components) by a joint review i.e. forest department and various stakeholders will take place twice a year. The concerned CF along with representative from various stakeholders in his forest circle will supervise 10% of the work done and data updated by the Divisional Level Nodal Agency and CAT Plan Implementing Team.

iii. In-house monitoring–

In-house monitoring will be done through the office of concerned Divisional Forest Officer to supervise the 10% of physical and financial targets achieved as per APO.

iv. Silt monitoring–

Silt sampling will be done for a period of 15 days in pre and post monsoon season. In addition to it sampling can be done in other demanding conditions also like flood, cloud burst etc. Considering that this CAT Plan has a total of only Rs. 7,11,000/- for Monitoring and Evaluation, it is planned to establish an 'Automatic Silt Density Measurement Laboratory' with its equipment and peripherals at Kalpa, in the office complex of DFO Kinnaur. An amount of Rs. 2,40,000/- each is provided in the third and fifth year and Rs. 2,31,000/- in the seventh year for the purchase / renewal of equipment, peripherals and consumables.

v. Impact evaluation–

A separate study in form of third-party monitoring by independent agency for impact assessment by assessing the changes in silt load, survival of plantations, change in water discharge in natural springs, change in land-use, change in man-animal conflicts, status &functioning of user groups and trend of fire incidences in vulnerable areas.

10.11 Reports. A monthly, quarterly, half yearly and the annual reports in the formats already promulgated by HPFD web-based application software SCIS will be generated after completion status submitted by RFO to A.C.F. which will be reviewed at respective Divisional Level.

CHAPTER 11: PROJECTIONS FOR RUNANG BEAT UNDER RAURA HEP CAT PLAN- SUB CATCHMENT								
Sl.No.	**Activity**	**Area**	**Lat Long**	**Unit**	**Unit cost (Rs.)**	**Phy**	**Financial (Rs.)**	**Remarks**
I. AFFORESTATION								
i.Enrichment Plantation (800 Plants per ha.).								
(a)	Plantation & Maintenance	i. UPF Chhan Panang	N-1°30'36" E-78°10'55"	Ha.	76050	3	228150	
		ii. UPF Tharo	N-31°32'33" E-78°08'50"	Ha.	76050	2	152100	
Total:					76050	**5**	**380250**	
(b)	Nursery cost of plants		Rate: 28.46 per plant	Ha.	22768	5	113840	
Total Enrichment Plantation					98818	**5**	**494090**	
ii. Energy Plantation (1100 plants per ha.)								
(a).	Energy Plantation & Maintenance	i. NC-28 Tharo		Ha.	94550	1	94550	
Total :					**94550**	**1**	**94550**	
(b)	Nursery cost of plants.		22.14 per plant	Ha..	24354	1	24354	
Total Energy Plantation					118904	1	**118904**	
iii.	**Silvi Pastoral Development**	i. Soragden Kanda	N-31°32'15" E-78°09'29"	Ha.	64940	2	129880	
		ii.Runang Kanda	N-31°31'24" E-78°11'37"	Ha.	64940	2	129880	
Tota Silvi Pastoral Development					64940	**4**	**259760**	
Grand Total Plantation & Maintenance						**10**	**734560**	
Grand Total Nursery cost of Plants							**138194**	
iv.	Strengthening of Beat Level Nursery Runang Beat					0	0	
Total Afforestation						**10**	**872754**	
II. SOIL & MOISTURE CONSERVATION MEASURES (SMC)								
i.	Gabion Checkdams	i.Rangdhul Nallah 5KM	N-31°31'13" E-78°09'15"	No./ RMT	17790	8	142320	5x1.25x1.25
		ii. Kasti Nala 2.5 KM	N-31°31'33" E-78°10'04"	No./ RMT	17790	6	106740	5x1.25x1.25
		iii.Rangle Nalla 4KM	N-31°31'46" E-78°08'19"	No./ RMT	17790	6	106740	5x1.25x1.25
		iv. Gotangrangh en Nalla 5KM	N-31°32'58" E-78°08'16"	No./ RMT	17790	8	142320	5x1.25x1.25

Sl.No.	Activity	Area	Lat Long	Unit	Unit cost (Rs.)	Phy	Financial (Rs.)	Remarks
		v. Choling Nalla 2KM	N-31°31'09" E-78°08'54"	No./ RMT	17790	5	88950	5x1.25x1.25
		vi Patik Nala 5KM	N-31°33'08" E-78°09'51"	No./ RMT	17790	8	142320	5x1.25x1.25
Total:					**17790**	**41**	**729390**	
ii.	Planting of Medicinal Herbs/Shrubs	i.Rangdhul Nallah 5KM	N-31°31'13" E-78°09'15"	No.	8.5	2400	20400	
		ii. Kasti Nala 2.5 KM	N-31°31'33" E-78°10'04"	No.	8.5	2400	20400	
		iii.Rangle Nalla 4KM	N-31°31'46" E-78°08'19"	No.	8.5	2400	20400	
		iv.Gotangrang dhen Nalla	N-31°32'58" E-78°08'16"	No.	8.5	2400	20400	
		v Choling Nala	N-31°31'09" E-78°08'54"	No.	8.5	2400	20400	
		vi. Patik Nala	N-31°33'08" E-78°09'51"	No.	8.5	2400	20400	
Total:					8.5	**14400**	**122400**	
Total SMC							**851790**	
III. RESEARCH, TRAINING & CAPACITY BUILDING (RT&CB)								
i.	Forest Guards on latest techniques and handling wildlife and Exposure Visits of the staff.				L/s			
ii.	Publicity and Awareness camp				L/s		Rs. 240000/- Allocation will be controlled by DFO Kinnaur	
IV. PAYMEBNT FOR ENVIRONMENT SERVICES. (PES)								
i.	PES through HPFD & JFMCs						Rs. 475000/-. Allocation will be controlled by DFO Kinnaur for all the 9 villages of the project catchment	
V. INFRASTRUCTURE & FOREST PROTECTION								
A. Forest Department Infrastructure.								
i.	Construction of new Forest Guard Hut at Runang		N-31°30'43" E-78°10'38"	No.	L/s	1	1600000	
Total:				**No.**	**L/s**		**1600000**	
B. Forest Protection								
i.	Provision for Fire Fighting Equipment			No.	L/s	1	150000	
Total:Infrastructure & Forest Protection						2	**1750000**	
VI. WILDLIFE PROTECTION , MICRO PLANNING AND ABUNDANCE STUDY								
i.	Construction of Water holes/pond	C-248	N-31°30'32" E-78°11'19"	No.	104000	1	104000	

Sl.No.	Activity	Area	Lat Long	Unit	Unit cost (Rs.)	Phy	Financial (Rs.)	Remarks
ii.	Purchase of WL Equipment 1 Binocular, 1 Trap Camera and 1 Tranquilizer Gun Salt Licks			No.	42000+60000+400000	3	502000	Allocation to
iii					L/s	..	14000	be controlled
IV.	Wildlife Abundance Study through WLII				L/s	1	1000000	from Division
Total:						**5**	**1620000**	Level.
VII. Eco Tourism					0	``	0	
VIII. MONITORING & EVALUATION (M&E).					L/s	0	**237000**	To be controlled from CCF Office.
IX. CONTINGENCIES					L/s	0	**475000**	
GRAND TOTAL:							**6521544**	

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CHAPTER 12: PROJECTIONS FOR TAPRI BEAT UNDER RAURA HEP CAT PLAN- SUB CATCHMENT 10.								
Sl.No.	**Activity**	**Area**	**Lat Long**	**Unit**	**Unit cost (Rs.)**	**Phy**	**Financial (Rs.)**	**Remarks**
I. AFFORESTATION								
(i) Enrichment Plantation (800 plants per ha.)								
(a)	Enrichment Plantation and Maintenance	i. NC-21	N31°32'09" E78°06'19"	Ha.	76050	3	228150	
		ii. C-258	N31°32'43" E78°04'25"	Ha.	76050	2	152100	
Total:					76050	**5**	**380250**	
(b)	Nursery cost of Plants	Rate: Rs. 28.46 per plant.		Ha.	22768	5	113840	
Total Enrichment Plantation:					98818	**5**	**494090**	
(ii) Energy Plantation (1100 plants per ha.)								
(a)	Energy Plantation and Maintenance	i.C258A, Chagaon	N31°33'12" E078°05'19"	Ha.	94550	1	94550	
		ii.UPF Kakasthal	N31°33'12" E078°05'19"	Ha.	94550	1	94550	
Total:				Ha.	94550	**2**	**189100**	
(b)	Nursery Cost of Plants	Rate: Rs. 22.14 per plant.		Ha.	24354	2	48708	
Total Energy Plantation					118904	**2**	**237808**	
iii.	**Silvi Pastoral Development**							
		i. Chagaon Kanda	N31°32'40" E78°05'56"	Ha.	64940	3	194820	
		ii.Talibe Kanda	N31°33'14" E78°04'53"	Ha.	64940	2	129880	
Tota Silvi Pastoral Development					64940	**5**	**324700**	
Grand Total Plantation & Maintenance						12	**894050**	
Grand Total Nursery cost of Plants						12	**162548**	
iv.	**Strengthening of Beat Level Nursery, Kakasthal**		N31°31'25" E78°05'59"	Ha.	L/s	0.39	**625000**	
Total Afforestation						**12.39**	**1681598**	
II. SOIL & MOISTURE CONSERVATION MEASURES (SMC)								
i.	Gabion Checkdams	i.Janakpuri Nala 4KM	N31°31'25" E78°05'59"	No./ RMT	17790	5	88950	5x1.25x1.25
		ii. Shulling Nalla 6KM	N31°31'45" E78°03'28"	No./ RMT	17790	8	142320	5x1.25x1.25
		iii.Khonge Nalla 4KM	N31°31'25" E78°05'59"	No./ RMT	17790	6	106740	5x1.25x1.25
		iv. Rishal Nalla 3KM	N31°31'54" E78°0624"	No./ RMT	17790	5	88950	5x1.25x1.25

Sl.No.	Activity	Area	Lat Long	Unit	Unit cost (Rs.)	Phy	Financial (Rs.)	Remarks
		v. Pagal Nalla 6KM	N31°32'08" E78°03'05"	No./ RMT	17790	8	142320	5x1.25x1.25
		vi. Bolkudhar Nalla 1.5KM	N31°31'03" E78°07'14"	No./ RMT	17790	3	53370	5x1.25x1.25
		vii. Kakasthal Nalla 5KM	N31°32'20" E78°03'26"	No./ RMT	17790	5	88950	5x1.25x1.25
Total:					**17790**	**40**	**711600**	
ii.	Planting of Medicinal Herbs/Shrubs	i.Janakpuri Nala 4KM	N31°31'25" E78°05'59"	No.	8.5	2400	20400	
		ii. Shulling Nalla 6KM	N31°31'45" E78°03'28"	No.	8.5	2400	20400	
		iii.Khonge Nalla 4KM	N31°31'25" E78°05'59"	No.	8.5	2400	20400	
		iv. Rashal Nalla 3KM	N31°31'54" E78°0624"	No.	8.5	2400	20400	
		v. Pagal Nalla 6KM	N31°32'08" E78°03'05"	No.	8.5	2400	20400	
		vi. BolKudhar 1.5KM	N31°31'03" E78°07'14"	No.	8.5	2400	20400	
		vii. Kakasthal Nalla 5KM	N31°32'20" E78°03'26"	No.	8.5	2400	20400	
Total:					8.5	**16800**	**142800**	
Total SMC:							**854400**	
III. RESEARCH, TRAINING & CAPACITY BUILDING (RT&CB)								
i.	Training of Forest Field staff, on latest techniques in handling wildlife and Exposure Visits				L/s	Rs. 240000/- Allocation will be controlled by DFO Kinnaur		
ii.	Publicity and Awareness camp				L/s			
Total:								
IV. PAYMENT FOR ENVIRONMENT SERVICES. (PES)								
i.	PES through HPFD					Rs. 474000/-. Allocation will be controlled by DFO Kinnaur for all the 9 villages of the project catchment		
V. INFRASTRUCTURE & FOREST PROTECTION								
A. Forest Department Infrastructure								
Total:					0	0	**0**	
B. Forest Protection.								
i.	Provision for Fire Fighting Equipment			No.	L/s	1	150000	
Total: Infrastructure & Forest Protection						**1**	**150000**	
VI. WILDLIFE PROTECTION ,MICRO PLANNING AND ABUNDANCE STUDY								
i.	Salt Licks				L/s		12000	
ii.	Wildlife Abundance Study through WLII				L/a	0	0	Given in Runang Beat
Total:					**0**		**12000**	

Sl.No.	Activity	Area	Lat Long	Unit	Unit cost (Rs.)	Phy	Financial (Rs.)	Remarks
VII.ECO TOURISM					0	0	0	
VIII. MONITORING & EVALUATION (M&E).					L/s	0	**237000**	To be controlled from CCF Office.
IX. CONTINGENCIES					L/s	0	**475000**	
GRAND TOTAL:							**4123998**	

CHAPTER 13: PROJECTIONS FOR URNI BEAT UNDER RAURA HEP CAT PLAN- SUB CATCHMENT 10.

Sl.No	Activity	Area	Lat Long	Unit	Unit cost (Rs.)	Phy	Financial (Rs.)	Remarks
I. AFFORESTATION								
i. Enrichment Plantation (800 plants per ha.)								
(a)	Enrichment Plantation & Maintenance	i.C-255A Monnerang	N31°32'13" E78°07'00"	Ha.	76050	3	228150	
		ii. C-255B Urawaning	N31°32'05" E78°06'54"	Ha.	76050	2	152100	
Total:					76050	**5**	**380250**	
(b)	**Nursery cost of plants**	**Rate: Rs. 28.46 per plant**		**Ha.**	22768	**5**	**113840**	
Total Enrichment Plantation				**Ha.**	98818	**5**	**494090**	
ii. Energy Plantation (1100 plants per ha.)								
(a)	Energy Plantation & Maintenance	UF Kutano	N31°31'25.01" E078°08'17.03"	Ha.	94550	1	94550	
		UF Yuldang	N31°33'25.05" E078°08'42.01"	Ha.	94550	1	94550	
Total:				**Ha.**	94550	**2**	**189100**	
(b)	**Nursery cost of plants**	**Rate: Rs.22.14 per plant**		**Ha.**	24354	**2**	**48708**	
Total Energy Plantation				**Ha.**	118904	**2**	**237808**	
iii.	Silvi Pastoral Development	i. Raura Kanda	N31°34'43" E78°08'28"	Ha.	64940	4	259760	
Grand Total Plantation & Maintenance				**Ha.**		**11**	**829110**	
Grand Total Nursery cost of Plants							**162548**	
iv	Strengthening of Beat Level Nursery, Urni					0	0	
Total Afforestation							**991658**	
II. SOIL & MOISTURE CONSERVATION MEASURES								
i.	Gabion Checkdams	i. Monerang Slip Near Dharpo Nala 5KM	N31°32'15" E78°06'59"	No./ RMT	17790	5	88950	5x1.25x1.25
		ii. Urawaning Slip	N31°31'46" E78°07'25"	No./ RMT	17790	4	71160	5x1.25x1.25
		iii.Lalapan Slip Near Dharpo Nala-5KM	N31°32'22" E78°07'38"	No./ RMT	17790	4	71160	5x1.25x1.25
		iv. Kutano Slip Near Khange Nala 4KM	N31°31'17" E78°08'06"	No./ RMT	17790	4	71160	5x1.25x1.25

Sl.No	Activity	Area	Lat Long	Unit	Unit cost (Rs.)	Phy	Financial (Rs.)	Remarks
		v. Pang Slip	N31°33'21" E78°08'10"	No./ RMT	17790	6	106740	5x1.25x1.25
		vi. Pandom Slip	N31°32'49" E78°07'46"	No./ RMT	17790	5	88950	5x1.25x1.25
		vii. Potu Shakhsang Slip	N31°33'21" E78°08'25"	No./ RMT	17790	6	106740	5x1.25x1.25
		Resto Nalla 6KM	N31°33'09" E78°07'34"	No./ RMT	17790	6	106740	5x1.25x1.25
Total:					**17790**	**40**	**711600**	
ii.	Planting of Medicinal Herbs/Shrubs	i. Monerang Slip Near Dharpo Nala 5KM	N31°32'15" E78°06'59"	No.	8.5	2400	20400	
		ii. Urawaning Slip	N31°31'46" E78°07'25"	No.	8.5	2400	20400	
		iii.Lalapan Slip Near Dharpo Nala-5KM	N31°32'22" E78°07'38"	No.	8.5	2400	20400	
		iv. Kutano Slip Near Khange Nala 4KM	N31°31'17" E78°08'06"	No.	8.5	2400	20400	
		v. Pang Slip	N31°33'21" E78°08'10"	No.	8.5	2400	20400	
		vi. Pandom Slip	N31°32'49" E78°07'46"	No.	8.5	2400	20400	
		vii. Pata Shakhsang Slip	N31°33'21" E78°08'25"	No.	8.5	2400	20400	
		viii. Resto Nalla 6KM	N31°33'09" E78°07'34"	No.	8.5	2400	20400	
Total					8.5	**19200**	**163200**	
Total SMC							**874800**	
III. RESEARCH, TRAINING & CAPACITY BUILDING (RT&CB)								
i.	Training of Forest Field staff, on latest techniques and Exposure Visits			L/s				
ii.	Publicity and Awareness camp			L/s			Rs. 239000/- Allocation will be controlled by DFO Kinnaur	
Total:								
IV. PAYMENT FOR ENVIRONMENT SERVICES. (PES)								
i.	PES through HPFD & JFMCs						Rs. 474000/-. Allocation will be controlled by DFO Kinnaur for all the 9 villages of the project catchment	
V. INFRASTRUCTURE & FOREST PROTECTION								
Renovation of Old Infrastructure/ New Infrastructure					0	0	0	

Sl.No	Activity	Area	Lat Long	Unit	Unit cost (Rs.)	Phy	Financial (Rs.)	Remarks
B. Forest Protection.								
i.	Provision for Fire Fighting Equipment			No.	L/s	1	150000	
Total: Infrastructure & Forest Protection						**1**	**150000**	
VI. WILDLIFE PROTECTION ,MICRO PLANNING AND ABUNDANCE STUDY								
i.	Construction of Water Holes/Ponds	C-255 A	N31°32'13" E78°07'00"	No.	104000	1	104000	Allocation to be controlled from Division Level.
ii.	Purchase of WL Equipment 1 Binocular and 1 Trap Camera			No.	42000 + 60000	2	102000	
iii.	Salt Licks				L/s		14000	
iv.	Wildlife Abundance Study through WLII				L/s		0	Given in Runang Beat
Total:					**104000**		**220000**	
VII. ECO TOURISM					0	0	**0**	
VIII. MONITORING & EVALUATION (M&E).					L/s	0	**237000**	To be controlled from CCF Office.
IX. CONTINGENCIES					L/s	0	**470000**	
GRAND TOTAL:							**3656458**	

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CHAPTER 14: CONSOLIDATED PROJEJECTIONS UNDER RAURA HEP CAT PLAN.

		PROJECTED				Available Amount.
Sl.No.	**Activity**	**Unit**	**Unit Cost (Rs.)**	**Phy.**	**Fin.(Rs).**	
						14237145
I. AFFORESTATION						
i. Enrichment Plantation (800 plants per ha.)						
(a)	Enrichment Plantation & Maintenance	Ha.	76050	15	1140750	
(b)	Plants @Rs. 28.46 per plant	Ha.	22768	15	341520	
Total Enrichment Plantation:			**98818**	**15**	**1482270**	
(ii) Energy Plantation (1100 plants per ha.)						
(a)	Energy Plantatiopn & Maintenance	Ha.	94550	5	472750	
(b)	Nursery cost of Plants @ Rs.22.14 per plant	Ha.	24354	5	121770	
Total Energy Plantation:			**118904**	**5**	**594520**	
iii.	Silvi Pastoral Development	Ha.	64940	13	844220	
Total Silvi Pasture Development			64940	**13**	844220	
Grand Total Plantation & Maintenance					2457720	
Grand Total Nursery cost of Plants					463290	
iv.	**Strengthening of Kakasthal Nursery**	Ha.	L/s	0.39	625000	
Total Afforestation		**Ha.**		**33.39**	**3546010**	**3559286.3**
II. SOIL & MOISTURE CONSERVATION MEASURES (SMC)						
i.	Gabion Checkdams	Nos./RMT	17790	121	2152590	
ii.	Planting of Medicinal Herbs/Shrubs	Nos.	8.5	50400	428400	
	Total:	Nos.			**2580990**	**3559286.3**
Total SMC						
III. RESEARCH, TRAINING & CAPACITY BUILDING (RT&CB)						
i.	Training of Forest Field staff, R.O., B.O. and Forest Guards on latest techniques and Exposure Visits of the staff. (3 Training					
ii.	Publicity and Awareness camp					
Total:					719000	**711857**
IV. PAYMENT FOR ENVIRONMENT SERVICES. (PES)						
i.	PES through HPFD		L/s		1423000	
	Total:				**1423000**	**1423714.5**

		PROJECTED				Available Amount.
Sl.No.	**Activity**	**Unit**	**Unit Cost (Rs.)**	**Phy.**	**Fin.(Rs).**	
V. INFRASTRUCTURE & FOREST PROTECTION						
A. Forest Department Infrastructure.						
i.	Construction of new Forest Guard Hut at Runang	Nos.	1600000		1600000	
	Total:	**Nos.**			**1600000**	**711857**
B. Forest Protection						
i.	Provision for Fire Fighting Equipment				450000	711857
Total: Infrastructure & Forest Protection					**2050000**	**1423714.5**
VI. WILDLIFE PROTECTION,MICRO PLANNING AND ABUNDANCE SURVEY						
i.	Construction of Water Holes/Ponds	Nos.	104000	2	208000	
ii.	Purchase of WL Equipment binoculars, Trap Cameras and Tranquilizer Gun	Nos.	42000/60000/ 400000	7	604000	**To be controlled from Division Level**
iii.	Salt Licks		L/s		40000	
iv.	Wildlife Abundance Survey through WLII				1000000	
Total:		**Nos.**		**5**	**1852000**	**854229**
VII. ECO TOURISM					**0**	**142371**
VIII. MONITORING & EVALUATION (M&E).*			L/s		**711000**	**711857**
IX. SITE SPECIFIC WORKPLANS					**0**	**427114**
IX. CONTINGENCIES			L/s		**1420000**	**1423714.5**
					14302000	
					or say Rs. 14300000	

*To be controlled from CCF Office.

CHAPTER 15: ANNUAL PLAN OF OPERATIONS FOR KALPA RANGEOF KINNAUR FOREST DIVISION.																									
Sl.No.	Activity	Unit	Norm	Year 1		Year2		Year 3		Year 4		Year 5		Year 6		Year 7		Year 8		Year 9		Year 10		Total	
I. AFFORESTATION				Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	phy	Fin	Phy	Fin	Phy	Fin
1	Strengthening of Beat Level Kakasthal Nursery	No.	625000	1	625000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	625000
2	**Enrichment Plantation (800 plants per ha.)**																								
i.	**Plantation & Maintenance**																								
(a)	Plantation	Ha.	53500	0	0	9	481500	6	321000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	802500
(b)	Maintenance:	Ha.		0	0																			0	0
	Ist Year	Ha.	6300	0	0	0	0	9	56700	6	37800	0	0	0	0	0	0	0	0	0	0	0	0	15	94500
	2nd year	Ha.	4250	0	0	0	0	0	0	9	38250	6	25500	0	0	0	0	0	0	0	0	0	0	15	63750
	3rd Year	Ha.	3200	0	0	0	0	0	0	0	0	9	28800	6	19200	0	0	0	0	0	0	0	0	15	48000
	4th Year	Ha.	2200	0	0	0	0	0	0	0	0	0	0	9	19800	6	13200	0	0	0	0	0	0	15	33000
	5th Year	Ha.	2200	0	0	0	0	0	0	0	0	0	0	0	0	9	19800	6	13200	0	0	0	0	15	33000
	6th Year	Ha.	2200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	19800	6	13200	0	0	15	33000
	7th Year	Ha.	2200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	19800	6	13200	15	33000
	Total:	**Ha.**	**76050**	**0**	**0**	**9**	**481500**	**15**	**377700**	**15**	**76050**	**15**	**54300**	**15**	**39000**	**15**	**33000**	**15**	**33000**	**15**	**33000**	**6**	**13200**	**120**	**1140750**
(c)	**Nursery Cost of Plants**																								
	800 Plants per ha. @ Rs. 28.46 per plant	No.	22768	15	341520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	341520
Total Nursery cost of plants			**22768**	**15**	**341520**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**15**	**341520**
Total Enrichment			**98818**	**15**	**341520**	**9**	**481500**	**15**	**377700**	**15**	**76050**	**15**	**54300**	**15**	**39000**	**15**	**33000**	**15**	**33000**	**15**	**33000**	**6**	**13200**	**15**	**1482270**
Total Enrichment and Nursery Development				**16**	**966520**	**9**	**481500**	**15**	**377700**	**15**	**76050**	**15**	**54300**	**15**	**39000**	**15**	**33000**	**15**	**33000**	**15**	**33000**	**6**	**13200**	**16**	**2107270**
3	**Energy Plantation (1100 Plants per ha.)**																								
(a)	Plantation	Ha.	63800	0	0	0	0	5	319000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	319000
(b)	Maintenance:	Ha.																						0	0
	Ist Year	Ha.	8550	0	0	0	0	0	0	5	42750	0	0	0	0	0	0	0	0	0	0	0	0	5	42750
	2nd year	Ha.	5800	0	0	0	0	0	0	0	0	5	29000	0	0	0	0	0	0	0	0	0	0	5	29000
	3rd Year	Ha.	4400	0	0	0	0	0	0	0	0	0	0	5	22000	0	0	0	0	0	0	0	0	5	22000
	4th Year	Ha.	3000	0	0	0	0	0	0	0	0	0	0	0	0	5	15000	0	0	0	0	0	0	5	15000
	5th Year	Ha.	3000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	15000	0	0	0	0	5	15000
	6th Year	Ha.	3000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	15000	0	0	5	15000
	7th Year	Ha.	3000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	15000	5	15000
	Total:	Ha.	**94550**	**0**	**0**	**0**	**0**	**5**	**319000**	**5**	**42750**	**5**	**29000**	**5**	**22000**	**5**	**15000**	**5**	**15000**	**5**	**15000**	**5**	**15000**		**472750**
(c)	**Nursery Cost of Plants**																								
	Nursery cost of 1100 Plants per ha. @ Rs. 22.14 per plant	No.	24354	5	121770	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	121770

Sl.No.	Activity	Unit	Norm	Year 1		Year2		Year 3		Year 4		Year 5		Year 6		Year 7		Year 8		Year 9		Year 10		Total	
I. AFFORESTATION				Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	phy	Fin	Phy	Fin	Phy	Fin
	Total Nursery cost of plants		**24354**	**5**	**121770**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**121770**
	Total Energy Plantation		**118904**	**5**	**121770**	**0**	**0**	**5**	**319000**	**5**	**42750**	**5**	**29000**	**5**	**22000**	**5**	**15000**	**5**	**15000**	**5**	**15000**	**5**	**15000**	**5**	**594520**
4	**Silvi Pastoral Development**																								
(a)	Grass Sowing	Ha.	47400	0	0	7	331800	6	284400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	616200
(b)	Maintenance:	Ha.																						0	0
	Ist Year	Ha.	5870	0	0	0	0	7	41090	6	35220	0	0	0	0	0	0	0	0	0	0	0	0	13	76310
	2nd year	Ha.	4220	0	0	0	0	0	0	7	29540	6	25320	0	0	0	0	0	0	0	0	0	0	13	54860
	3rd Year	Ha.	2450	0	0	0	0	0	0	0	0	7	17150	6	14700	0	0	0	0	0	0	0	0	13	31850
	4th Year	Ha.	1250	0	0	0	0	0	0	0	0	0	0	7	8750	6	7500	0	0	0	0	0	0	13	16250
	5th Year	Ha.	1250	0	0	0	0	0	0	0	0	0	0	0	0	7	8750	6	7500	0	0	0	0	13	16250
	6th Year	Ha.	1250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	8750	6	7500	0	0	13	16250
	7th Year	Ha.	1250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	8750	6	7500	13	16250
	Total:	**Ha.**	**64940**	**0**	**0**	**7**	**331800**	**13**	**325490**	**13**	**64760**	**13**	**42470**	**13**	**23450**	**13**	**16250**	**13**	**16250**	**13**	**16250**	**6**	**7500**	**104**	**844220**
Total Afforestation:				**0**	**1088290**	**16**	**813300**	**33**	**1022190**	**33**	**183560**	**33**	**125770**	**33**	**84450**	**33**	**64250**	**33**	**64250**	**33**	**64250**	**17**	**35700**	**224**	**3546010**
II. SOIL & MOISTURE CONSERVATION MEASURES (SMC)																									
i.	Nalla Treatment																								
	Gabion Cherck dams/ Check Walls	No/RMT	17790	42	747180	42	747180	37	658230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	121	2152590
ii.	Bio Engineering:																								
	Bio Engineering Shrubs	No/ Ha	8.5	16800	142800	16800	142800	16800	142800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50400	428400
Total SMC Measures:				**16842**	**889980**	**16842**	**889980**	**16837**	**801030**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**50521**	**2580990**
III. RESEARCH, TRAINING & CAPACITY BUILDING (RTC&B)																									
i.	Training/ Exposure visits for BL/Range level staff and Publicity & awareness	..	L/s	0	0	0	240000	0	0	0	0	0	240000	0	0	0	0	0	239000	0	0	0	0	0	719000
Total:				**0**	**0**	**0**	**240000**	**0**	**0**	**0**	**0**	**0**	**240000**	**0**	**0**	**0**	**0**	**0**	**239000**	**0**	**0**	**0**	**0**	**0**	**719000**
IV. PAYMENT FOR ENVIRONMENT SERVICES (PES)																									
i. PES activities through HPFD & JFMCs		L/s		0	142300	0	142300	0	142300	0	142300	0	142300	0	142300	0	142300	0	142300	0	142300	0	142300	0	**1423000**
Total PES:				**0**	**142300**	**0**	**142300**	**0**	**142300**	**0**	**142300**	**0**	**142300**	**0**	**142300**	**0**	**142300**	**0**	**142300**	**0**	**142300**	**0**	**142300**	**0**	**1423000**
V. INFRASTRUCTURE & FOREST PROTECTION.																									
A. HPFD Building Infrastructure:																									
C/o/ Renovation of Forest Guard Huts		Nos.	1600000	1	1600000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1600000
Total:				**1**	**1600000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1600000**
B. Forest Protection:																									

Sl.No.	Activity	Unit	Norm	Year 1		Year2		Year 3		Year 4		Year 5		Year 6		Year 7		Year 8		Year 9		Year 10		Total	
I. AFFORESTATION				Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	phy	Fin	Phy	Fin	Phy	Fin
i.	Purchase of Fire Fighting Equipment	Nos.	L/s	0	225000	0	225000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	450000
Total:				**0**	**225000**	**0**	**225000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**450000**
Total Infrastructure & Forest Protection.				**1**	**1825000**	**0**	**225000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**2050000**
VI. WILDLIFE PROTECTIOIN,MICRO PLANNING AND ABUNDANCE STUDY																									
i.	C/o Water ponds	Nos.	104000	2	208000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	208000
ii.	Purchase of WL Protection Equipment		L/s	5	604000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	604000
iii.	Salt licks		L/s	0	20000	0	0	0	0	0	20000	0	0	0	0	0	0	0	0	0	0	0	0	0	40000
iv.	Wildlife Abundance Study through WLII	Nos.	L/s	1	400000	0	0	0	300000	0	0	0	300000	0	0	0	0	0	0	0	0	0	0	1	1000000
Total:				**8**	**1232000**	**0**	**0**	**0**	**300000**	**0**	**20000**	**0**	**300000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**1852000**
VII. ECO TOURISM ACTIVITIES																									
Eco Tourism Activities.		Nos.	L/s	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
VIII. MONITORING & EVALUATION (M&E)																									
i.	M&E activities	Nos.	L/s	0	0	0	240000	0	0	0	0	0	240000	0	0	0	0	0	231000	0	0	0	0	**0**	**711000**
IX. CONTINGENCIES			**L/s**	0	142000	0	142000	0	142000	0	142000	0	142000	0	142000	0	142000	0	142000	0	142000	0	142000	**0**	**1420000**
GRAND TOTAL:					**4986480**		**2951954**		**2427086**		**479610**		**1200870**		**364550**		**348550**		**788550**		**348550**		**311000**		**14302000**

Note 1: The expenditure under Research, Trainig & Capacity Building and PES will be controlled from Division Level.

Note 2: Purhases of Fire Fighting Equipment will be controlled from Division Level.

Note 3: Expenditure on Wildlife Protection, Micro planning and Abundance Study will be controlled from Division level.

Note 4: Under M&E 1% Funs will be utilized from Division Level while the remaining funds will be spent from CF/HQ level.

Note 5: Expenditure undeer Contingencies will be controlled from Division Level.

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APPENDIX-A

GIST OF STANDARD COST NORMS FOR RAURA HEP CAT PLAN AFTER ALLOWING 25% INCREASE FOR TRIBAL AREAS (HPFD PLANTATION COST NORMNS 21-22 PLUS NURSERY COST OF PLANTS).

Sl. No. 1	Activity 2	HPFD Norm 21-22 (Per Ha.) 3 (Rs.)	Nursery cost of Plant (Per Ha.) 4 (Rs.)	Total (Col.3+4) 5 (Rs.)
I.	AFFORESTATION			
1	Enrichment Plantation (800 Plants per Ha.)-Deodar.	76050	22768	98818
2	Energy Plantation (1100 Plants per Ha.)-Other B/L.	94550	24354	118904
3	Grazing Land Development	64940	0	64940
4	Nursery cost of Plants:			
	a. Deodar 2.5 yr.	28.46 per plant		
	b. Other Broadleaf Plants normal	22.14 per plant		
5	Modernisation and Upgradation of Nurseries	As per estimation indicated by H.P. Forest Department.		
II.	**SOIL & MOISTURE CONSERVATION.**			
6	Check Dams Gabion (after allowing 36% escalation)		Rs. 17790/- per unit.	
7	Planting of shrubs		Rs 8.5 per unit.	
III.	**PAYMENT FOR ENVIRONMENT SERVICES.**			
8	Grass Stacking Pole M.S. Pipe		Rs. 1250/-	
9	Village Ponds/ Water hole		Rs. 1,04,000/-	
IV.	**RESEARCH, TRAINING AND CAPACITY BUILDING**			
10	As per Actual expenditure		Lump Sum	
V.	**INFRASTRUCTURE AND FOREST PROTECTION**:			
11	Construction of new Forest Guard Hut/ B.O. Qr.		Rs. 16,00,000/-	
12	Other infrastructure requires such as repair and maintenance of old infrastructure i.e. Division Office, Range Office, Staff quarters and other infrastructure		As per estimation indicated by HPFD staff.	
VI.	**WILDLIFE HABITAT MANAGEMENT**			
13	Binoculars		Rs. 42,000/-	
14	G.P.S.		Rs. 30,000/-	
15	Trapping Cameras		Rs. 60,000/-	
16	Tranquilizer Gun		Rs. 4,00,000/-	

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APPENDIX-B

Activity	**Per ha. Plantation Norms per ha.**	**Plant Nursery cost per ha. (Rs.)**	**Total**	**7 Year Maintenance**								**Total (Rs.)**
				Year 1	Year 2	Year 3	Year 4	Year5	Year 6	Year7	Total	Col.4+Col 12
1	2	3	4	5	6	7	8	9	10	11	12	12
Enrichment Plantation (800 plants per ha.)	53500	22768	76268	6300	4250	3200	2200	2200	2200	2200	22550	98818
Energy Plantation (1100 Plants per ha.)	63800	24354	88154	8550	5800	4400	3000	3000	3000	3000	30750	118904
Grazing Lands	47400	0	47400	5870	4220	2450	1250	1250	1250	1250	17540	64940

GIST OF HPFD PLANTATION NORMS FOR 21-22.

APPENDIX-C

ESTIMATE: CHECK DAM 1.5 X 1.5M									
Item No	No	Length	Breadth	Depth	Quantity	Rate	Unit	Amount	Per RMT
Check Dam Gabion Providing & laying steel Gabions or equivalent type of required section including boxes made of mechanically woven, double Twisted , hexagonal shaped steel wire mesh Gabions as per En standards mesh type 10 x 12 as per EN 10223 , edges are to be mechanically selvedge made of heavily (Zn+PVC) coated G.I. wire as per B.S. 443 mesh wire 3 mm die & edge wire dia 3.9mm dia of maccaferri type or equivalent type & filled with 20 to 50 kg weight trap Stones ,including conveying with all leads & lifts and required placing at required places in required line , level, slope, section as directed. etc complete under tidal condition. **Gabions of Size 1.5 M X 1.5M**									
a) Excavation	1	1	2	0.5	1				
	1	1	2	0.3	0.6				
					1.6	198.6	m3	317.76	
b) Gabion Structure	1	1	1	1	1				
	1	1	1.5	0.5	0.75				
	1	1	2	0.5	1				
c) Apron	1	1	2	0.3	0.6				
					3.35	2900	m3	9715	
						Total		10032.76	10033

Note: After allowing 36% escalation for 6 years and applying 25% enhancement for Tribal areas the per cubic meter rate is Rs. 17790/-.

ESTIMATE: RETAINING WALL 1.5 X 1.5 M									
Item No	No	Length	Breadth	Depth	Quantity	Rate	Unit	Amount	Say Per Rm
Check Wall/ Retaining Wall in Gabion Providing & laying steel Gabions or equivalent type of required section including boxes made of mechanically woven, double Twisted , hexagonal shaped steel wire mesh Gabions as per En standards mesh type 10 x 12 as per EN 10223 , edges are to be mechanically selvedge made of heavily (Zn+PVC) coated G.I. wire as per B.S. 443 mesh wire 3 mm die & edge wire dia 3.9mm dia of maccaferri type or equivalent type & filled with 20 to 50 kg weight trap Stones ,including conveying with all leads & lifts and required placing at required places in required line , level, slope, section as directed. etc complete under tidal condition. Gabions of Size 1.5 X 1.5M									
a) Excavation	1	1	2	0.5	1				
	1	1	2	0.3	0.6				
					1.6	198.6	m3	317.76	
b) Gabion Structure	1	1	1	1	1				
	1	1	1.5	0.5	0.75				
	1	1	2	0.5	1				
c) Apron	1	1	2	0.3	0.6				
					3.35	2900	m3	9715	
						Total		10032.76	10033

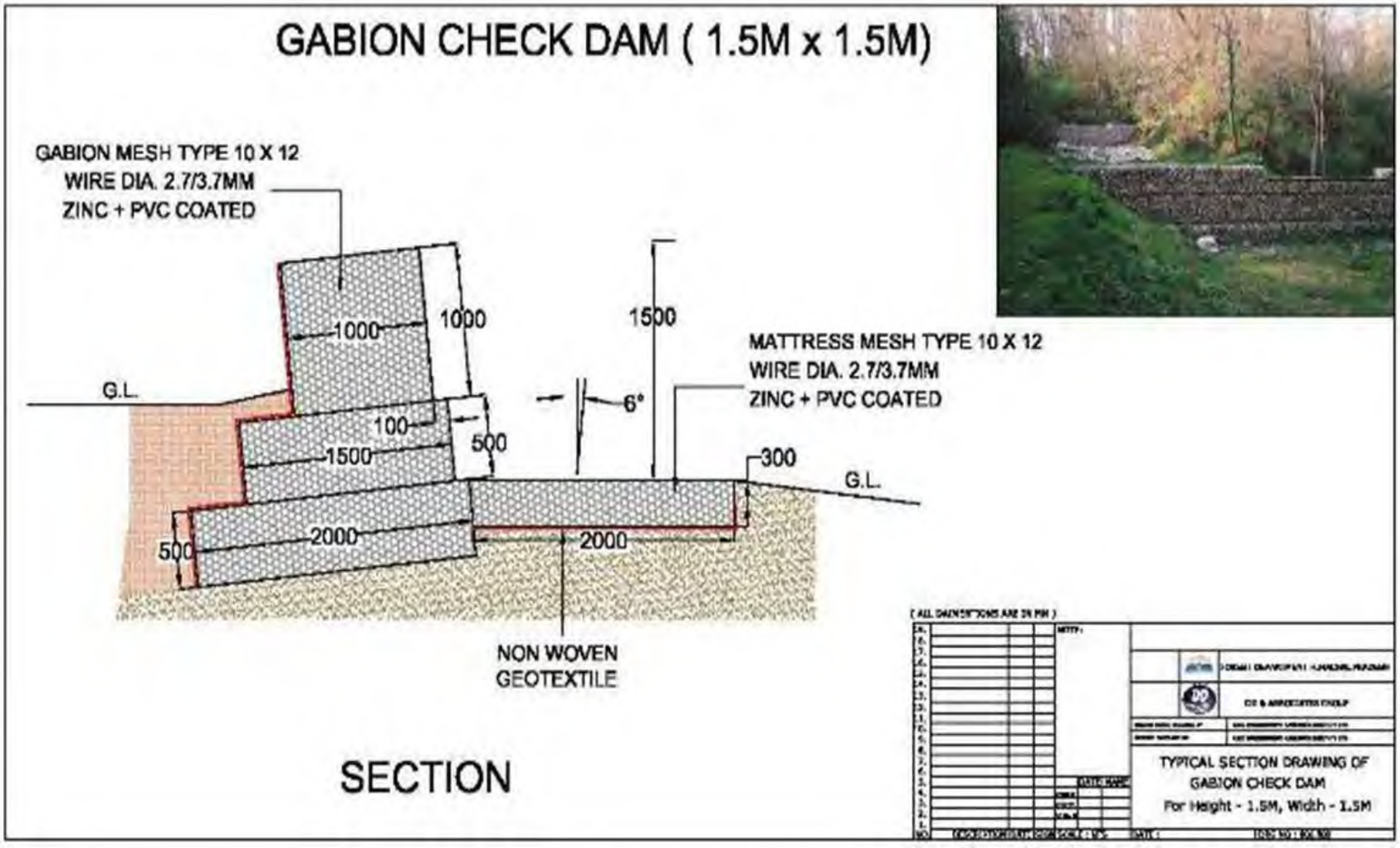
Note: After allowing 36% escalation for 6 years and applying 25% enhancement for Tribal areas the per cubic meter rate is Rs. 17790/-.

ESTIMATE: WATER HARVESTING STRUCTURE 2 X 4 M									
Item No	No	Length	Breadth	Depth	Quantity	Rate	Unit	Amount	Say Per Rm
Water Harvesting Structure Gabions of Size â€“ 2X4M									
a) Excavation	2	1	3	1	6				
	1	1	2	0.5	1				
					7	198.6	m3	1390.2	
b) Gabion Structure	2	1	1	1	2				
	2	1	1.5	1	3				
	2	1	2	1	4				
	2	1	2.5	1	5				
	2	1	3	1	6				
c) Apron	1	1	2	0.5	1				
					21	2900	m3	60900	
						Total		62290.2	62290

Note: After allowing 36% escalation for 6 years and applying 25% enhancement for Tribal areas the per unit rate for WHS is Rs. 110201/-.

SMC: DESIGNS OF SOME GABION STRUCTURES

CHECK DAM Gabion 1.50 x 1.50 ESTIMATE									
Item No	**No**	**Length**	**Breadth**	**Depth**	**Quantity**	**Rate**	**Unit**	**Amount**	**Per Rm**
Check Dam Gabion Providing & laying steel Gabions or equivalent type of required section including boxes made of mechanically woven, double Twisted , hexagonal shaped steel wire mesh Gabions as per En standards mesh type 10 x 12 as per EN 10223 , edges are to be mechanically selvedge made of heavily (Zn+PVC) coated G.I. wire as per B.S. 443 mesh wire 3 mm die & edge wire dia 3.9mm dia of maccaferri type or equivalent type & filled with 20 to 50 kg weight trap Stones ,including conveying with all leads & lifts and required placing at required places in required line , level, slope, section as directed. etc complete under tidal condition. **Gabions of Size 1.5X1.5M**									
a) Earth Work ii) Pick Work	1	1	2	0.5	1				
	1	1	2	0.3	0.6				
					1.6	178.25	M^3	285.2	
b) Gabion Structure	1	1	1	1	1				
	1	1	1.5	0.5	0.75				
	1	1	2	0.5	1				
c) Apron	1	1	2	0.3	0.6				
					3.35	2900	M^3	9715	
						Total		**10000.2**	**10000**
Note: The Rate and costing has been done @ wage rate of Rs. 170/- per Day.									



Name of the Structure – Check Wall/ Retaining Wall in Gabion Size of the Structure – 2X2.5M

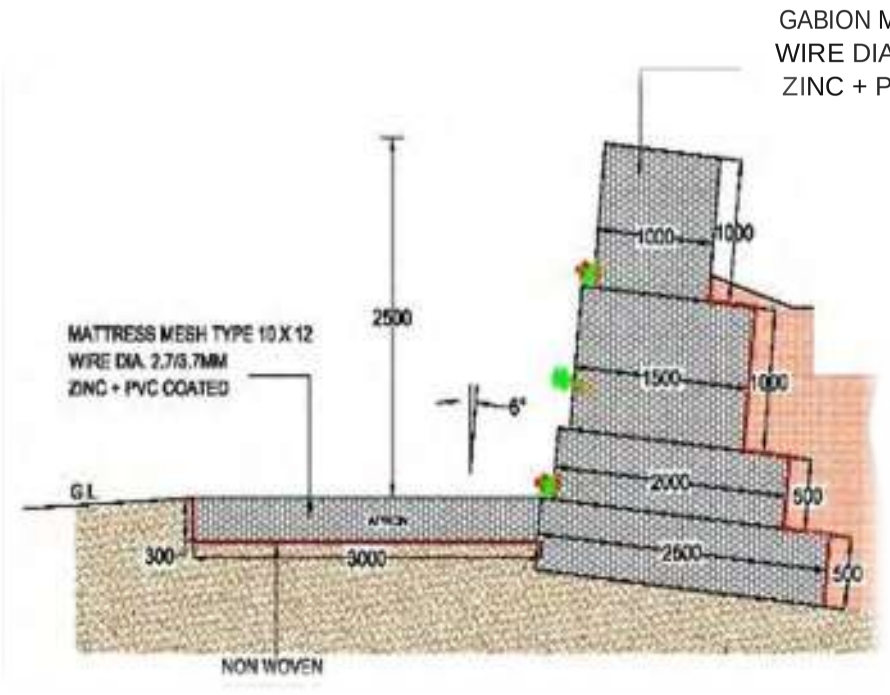
CATCHMENT AREA TREATMENT PLAN FOR RAURA HEP 12 MW BY DLI POWER (INDIA) PVT. LTD.

Name of the Structure –Check Wall/ Retaining Wall in Gabion Size of the Structure – 2X2.5M

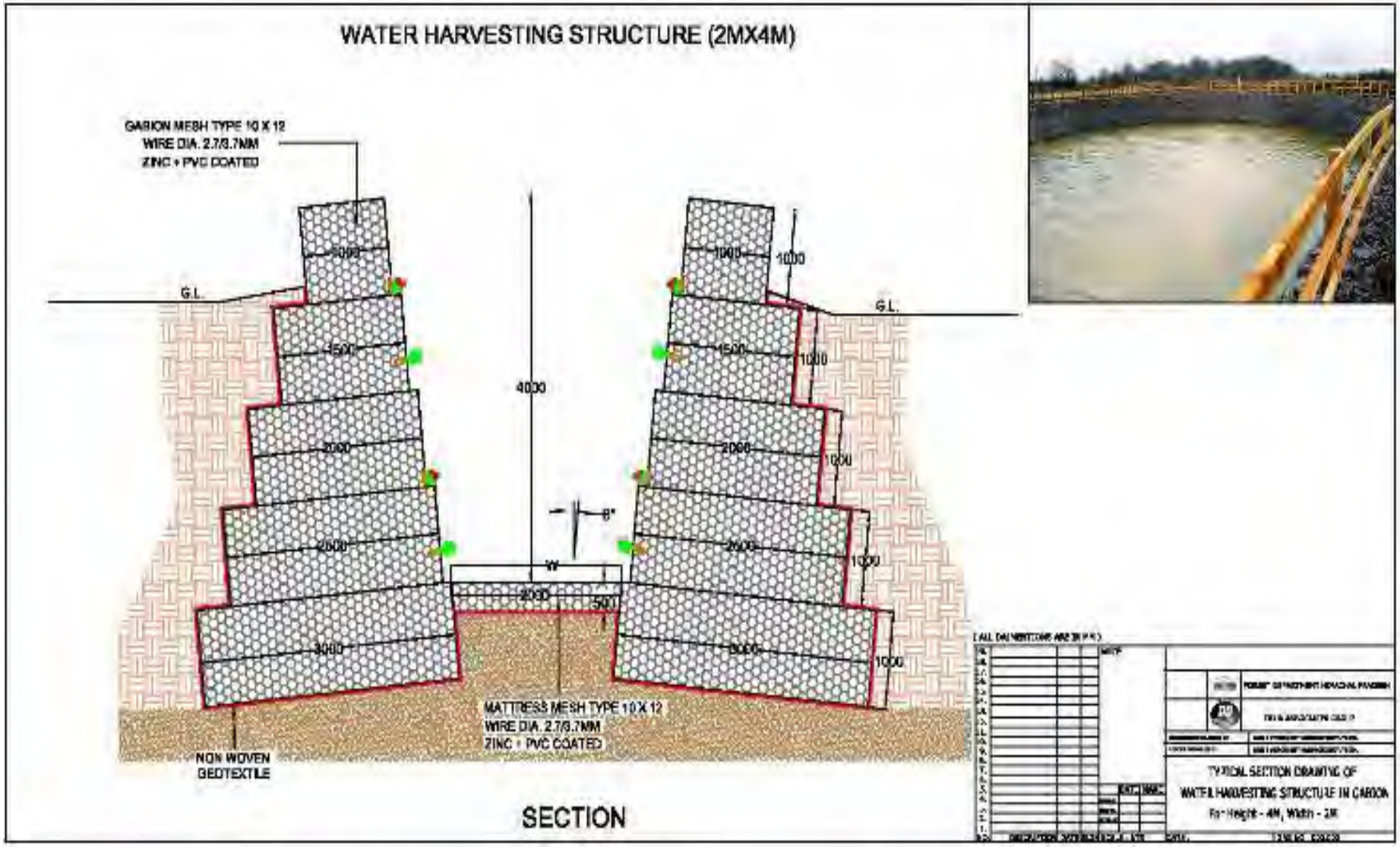
Measurement Sheet										
Sr. No	Item No.	No	Length	Breadth	Depth	Qty	Rate	Unit	Amount	Say Per Rm
5	Check Wall/ Retaining Wall in Gabion Gabions of Size – 2X2.5M									
	a) Excavation	1	1	2.5	0.5	1.25				
		1	1	3.5	0.3	1.05				
						2.30	198.60	M^3	456.78	
	b) Gabion Structure	1	1	1	1	1.00				
		1	1	1.5	1	1.50				
		1	1	2	0.5	1.00				
		1	1	2.5	0.5	1.25				
	c) Apron	1	1	3.5	0.3	1.05				
						5.80	2900.00	M^3	16820.00	
							Total		17276.78	17277.00

Note: After allowing 36% escalation for 6 years and applying 25% enhancement for Tribal areas the per cubic meter rate is Rs. 30635/-

RETAINING CHECK WALL GABION 2 M X 2.5.M



WATER HARVESTING STRUCTURE ESTIMATE									
Item No	**No**	**Length**	**Breadth**	**[illegible]**	**Quantity**	**Rate**	**Unit**	**Amount**	**Per Rm**
Gabions of Size 2 M X4 M									
a) Excavation	2	1	3	1	6				
	1	1	2	0.5	1				
					7	178.25	M^3	1247.75	
b) Gabion Structure	2	1	1	1	2				
	2	1	1.5	1	3				
	2	1	2	1	4				
	2	1	2.5	1	5				
Wet Harvesting Structure	2	1	3	1	6				
c) Apron	1	1	2	0.5	1				
					21	2900	M^3	60900	
						Total		**62147.75**	**62150**
Note: The Rate and costing has been done @ wage rate of Rs.170/- per Day.									


WATER HARVESTING STRUCTURE (2MX4M)
GABION MESH TYPE 10 X 12
WIRE DIA. 2.7/3.7MM
ZINC + PVC COATED
G.L.
G.L.
4000
1000
1500
2000
2500
3000
1000
1000
1000
1000
1000
1000
6°
W
2000
500
MATTRESS MESH TYPE 10 X 12
WIRE DIA. 2.7/3.7MM
ZINC + PVC COATED
NON WOVEN
GEOTEXTILE
SECTION
TYPICAL SECTION DRAWING OF
WATER HARVESTING STRUCTURE IN GABION
For Height - 4M, Width - 2M

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APPENDICES : D

No.Ft. 1790-/71(D)2011-12/Vol-IX(Norms)
Himachal Pradesh Forest Department

Dated Shimla, the

From: Pr. CCF (HoFF)HP

To: 1. Pr. CCF (WL) HP
2. APCCF(IT); APCCFs(R&T) Sundernagar; APCCF (CAMPA)Shimla
3. CPDs IDP Solan; HPFECPP (KfW)D/shala & HPFEMLP Shimla
4. All CCFS/CFs (T & WL) in HP
5. DCF (Projects) & Registrar (Bud) O/o CCF(HoFF)HP

Subject: Cost norms for raising **Tall Plantations** for Non-Tribal & Tribal Areas for the year 2021-22.

Memo

Consequent upon the revision of daily wage rates from existing ₹275/- to ₹ 300/- per day in the state of Himachal Pradesh vide Finance Department letter No. FIN-(PR)B(7)-33/2010 dated 16.04.2021, the cost norms for raising tall plantation in Non-Tribal & Tribal areas approved vide H.P. Government letter No. FFE-B-F(5)1-2017 dated 8th May, 2017 (circulated to the field offices vide this office endst. of even number dated 12th May, 2017) have been calculated on increased wage rates and are enclosed herewith for taking further necessary action.

2. The guiding principles laid down by the Govt. while approving the cost norms for raising tall plantation vide letter quoted above shall remain enforced and should be followed in letter and spirit.

3. Necessary parameters for tall plants have been defined and circulated to the field offices separately vide this office memo No. Ft.15-434/10(D) DAP/2017-18/Vol-III dated 21.02.2018.

4. The plantation norms indicate the upper limits. The DFOs will choose items and book actual costs such that the total expenditure will not exceed 80% of the total cost per hectare for plantations as indicated in the norms. Efforts should be made that 60% species should be of fodder and 40% species should be of fruits in case of broad leaved species.

Encl: As above.

Pr. Chief Conservator of Forests(HoFF),
Himachal Pradesh
Dated 26 APR 2021

Endst. No. As above.

Copy alongwith enclosures is forwarded to IT Wing o/o Pr. CCF(HoFF) Shimla for information and necessary action. These cost norms may please be uploaded on departmental website.

Encl: As above

Pr. Chief Conservator of Forests(HoFF),
Himachal Pradesh

Abstract of cost norms for raising tall plantation during the year 2021-22 {Wage rate ₹300/- per day for Non-Tribal areas and ₹ 375/- per day for Tribal areas}		
Plantation model	Non-Tribal (₹/ha)	Tribal (₹/ha)
800 Plants/Ha with RCC Fencing	118600	141800
800 Plants/Ha with CC Fencing	108500	131700
800 Plants/Ha with wooden Fencing	95900	117900
700 Plants/Ha with RCC Fencing	110000	129000
700 Plants/Ha with CC Fencing	99900	118900
700 Plants/Ha with wooden Fencing	87300	107200
600 Plants/Ha with RCC Fencing	101400	118300
600 Plants/Ha with CC Fencing	91200	108200
600 Plants/Ha with wooden Fencing	78700	96400
500 Plants/Ha with RCC Fencing	92700	107600
500 Plants/Ha with CC Fencing	82600	97500
500 Plants/Ha with wooden Fencing	70000	85700
400 Plants/Ha with RCC Fencing	84100	96900
400 Plants/Ha with CC Fencing	74000	86700
400 Plants/Ha with wooden Fencing	61200	74800
300 Plants/Ha with RCC Fencing	75500	86100
300 Plants/Ha with CC Fencing	65300	76000
300 Plants/Ha with wooden Fencing	52800	64200
200 Plants/Ha with RCC Fencing	66900	75400
200 Plants/Ha with CC Fencing	56700	65300
200 Plants/Ha with wooden Fencing	44100	53500

Pr. Chief Conserator of Forests (HoFF)
Himachal Ptradesh

Annexure-A

Cost Norms (per Ha) for raising 800 tall plants with RCC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate	Amount (basic wage rate applied ₹150/- per day)	
				(in Rs)	(N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	800	No.	1745%	13960.00	17450.00
6	Filling of pits 60cmx60cmx60cm	800	No.	254%	2032.00	2540.00
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	800	No.	1476%	11808.00	14760.00
8	Planting of tall plants i/c ramming	800	No.	654.30%	5234.40	6543.00
9	Cost of RCC fence posts	50	No.	358	17900.00	17900.00
10	Carriage of RCC Fence post	50	No.	L/S	4000.00	5000.00
11	Fixing of RCC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000	64.00	64.00
16	Mulching of plants	800	No.	84.80%	678.40	848.00
17	Irrigation as per need/photography etc.		L/s		2500.00	2500.00
	Total				**72306.98**	**83900.63**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				46374.58	57968.23
	G.Total				**118681.56**	**141868.86**
				Or say	**118600.00**	**141800.00**

1. The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   - 1st year ₹ 6400/- per Ha.
   - 2nd year ₹ 3540/- per Ha.
   - 3rd year ₹ 2100/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

22/07/2021

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-B

Norms (per Ha) for raising 800 tall plants with CC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate (in Rs)	Amount (basic wage rate applied ₹150/- per day) (N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	800	No.	1745%	13960.00	17450.00
6	Filling of pits 60cmx60cmx60cm	800	No.	254%	2032.00	2540.00
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	800	No.	1476%	11808.00	14760.00
8	Planting of tall plants i/c ramming	800	No.	654.30%	5234.40	6543.00
9	Cost of CC fence posts	50	No.	155	7750.00	7750.00
10	Carriage of CC Fence post	50	No.	L/S	4000.00	5000.00
11	Fixing of CC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000	64.00	64.00
16	Mulching of plants	800	No.	84.80%	678.40	848.00
17	Irrigation as per need/photography etc.		L/s		2500.00	2500.00
	Total				**62156.98**	**73750.63**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				46374.58	57968.23
	G.Total				**108531.56**	**131718.86**
				Or say	**108500.00**	**131700.00**

1. The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   - 1st year ₹ 6400/- per Ha.
   - 2nd year ₹ 3540/- per Ha.
   - 3rd year ₹ 2100/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-C

Norms (per Ha) for raising 800 tall plants with Wooden Fence Posts(Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate	Amount (basic wage rate applied ₹150/- per day)	
				(in Rs)	(N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	800	No.	1745%	13960.00	17450.00
6	Filling of pits 60cmx60cmx60cm	800	No.	254%	2032.00	2540.00
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	800	No.	1476%	11808.00	14760.00
8	Planting of tall plants i/c ramming	800	No.	654.30%	5234.40	6543.00
9	Cutting & preparation of wooden fence post 1.80m and 8 to 10 cm dia i/c debarking and fastening the top 15 cm in conical shape.	50	No.	1295.00%	647.50	809.38
10	Carriage of wooden Fence post	50	No.	681.80%	340.90	426.13
11	Charring & coal tarring of the ends of the posts 45 cm bottom and 15 cm conical tip	50	No.	279.50%	139.75	174.69
12	Digging of holes 20-30 cm dia & 45 cm deep	50	No.	906.80%	453.40	566.75
13	Fixing of wooden posts i/c strutting	50	No.	716.00%	358.00	447.50
14	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
15	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
16	Cost of barbed wire	0.084	MT	65100.00	5468.40	5468.40
17	Cost of U-staple	0.001	MT	64000.00	64.00	64.00
18	Mulching of plants	800	No.	84.80%	678.40	848.00
19	Irrigation as per need/photography etc.		L/s		2500.00	2500.00
	Total				**51998.35**	**62989.85**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs.300/- per day} except item nos. 16, 17 & 19				43965.95	54957.45
	G.Total				**95964.30**	**117947.30**
				Or say	**95900.00**	**117900.00**

1. The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   - 1st year ₹ 6400/- per Ha.
   - 2nd year ₹ 3540/- per Ha.
   - 3rd year ₹ 2100/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-D

Revised Cost Norms (per Ha) for raising 700 tall plants with RCC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate (in Rs)	Amount (basic wage rate applied ₹150/- per day) (N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	700	No.	1745%	12215.00	15268.75
6	Filling of pits 60cmx60cmx60cm	700	No.	254%	1778.00	2222.50
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	700	No.	1476%	10332.00	12915.00
8	Planting of tall plants i/c ramming	700	No.	654.30%	4580.10	5725.13
9	Cost of RCC fence posts	50	No.	358	17900.00	17900.00
10	Carriage of RCC Fence post	50	No.	L/S	4000.00	4000.00
11	Fixing of RCC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000	64.00	64.00
16	Mulching of plants	700	No.	84.80%	593.60	742.00
17	Irrigation as per need/photography etc.		L/s		2300.00	2300.00
	Total				**67892.88**	**77433.01**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				42160.48	51700.61
	G.Total				**110053.36**	**129133.62**
				Or say	**110000.00**	**129000.00**

1. The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   - 1st year ₹ 5830/- per Ha.
   - 2nd year ₹ 3110/- per Ha.
   - 3rd year ₹ 1700/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-E

Norms (per Ha) for raising 700 tall plants with CC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate	Amount (basic wage rate applied ₹150/- per day)	
				(in Rs)	(N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	700	No.	1745%	12215.00	15268.75
6	Filling of pits 60cmx60cmx60cm	700	No.	254%	1778.00	2222.50
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	700	No.	1476%	10332.00	12915.00
8	Planting of tall plants i/c ramming	700	No.	654.30%	4580.10	5725.13
9	Cost of CC fence posts	50	No.	155	7750.00	7750.00
10	Carriage of CC Fence post	50	No.	L/S	4000.00	4000.00
11	Fixing of CC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000	64.00	64.00
16	Mulching of plants	700	No.	84.80%	593.60	742.00
17	Irrigation as per need/photography etc.		L/s		2300.00	2300.00
	Total				**57742.88**	**67283.01**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				42160.48	51700.61
	G.Total				**99903.36**	**118983.62**
				Or say	**99900.00**	**118900.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   - 1st year ₹ 5830/- per Ha.
   - 2nd year ₹ 3110/- per Ha.
   - 3rd year ₹ 1700/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-F

Norms (per Ha) for raising 700 tall plants with Wooden Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate	Amount (basic wage rate applied ₹150/- per day)	
				(in Rs)	(N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	700	No.	1745%	12215.00	15268.75
6	Filling of pits 60cmx60cmx60cm	700	No.	254%	1778.00	2222.50
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	700	No.	1476%	10332.00	12915.00
8	Planting of tall plants i/c ramming	700	No.	654.30%	4580.10	5725.13
9	Cutting & preparation of wooden fence post 1.80m and 8 to 10 cm dia i/c debarking and fastening the top 15 cm in conical shape.	50	No.	1295.00%	647.50	809.38
10	Carriage of wooden Fence post	50	No.	681.80%	340.90	426.13
11	Charring & coal tarring of the ends of the	50	No.	279.50%	139.75	174.69
12	Digging of holes 20-30 cm dia & 45 cm deep	50	No.	906.80%	453.40	566.75
13	Fixing of wooden posts i/c strutting	50	No.	716.00%	358.00	447.50
14	Stretching and fixing of barbed wire with U-	585	Rmt	4.80	2808.00	3510.00
15	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
16	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
17	Cost of U-staple	0.001	MT	64000	64.00	64.00
18	Mulching of plants	700	No.	84.80%	593.60	742.00
19	Irrigation as per need/photography etc.		L/s		2300.00	2300.00
	Total				**47584.25**	**57522.23**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs.300/- per day} except item nos. 16, 17 & 19				39751.85	49689.83
	G.Total				**87336.10**	**107212.06**
				Or say	**87300.00**	**107200.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   - 1st year ₹ 5830/- per Ha.
   - 2nd year ₹ 3110/- per Ha.
   - 3rd year ₹ 1700/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-G

Revised Cost Norms (per Ha) for raising 600 tall plants with RCC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate (in Rs)	Amount (basic wage rate applied ₹150/- per day) (N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	600	No.	1745%	10470.00	13087.50
6	Filling of pits 60cmx60cmx60cm	600	No.	254%	1524.00	1905.00
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	600	No.	1476%	8856.00	11070.00
8	Planting of tall plants i/c ramming	600	No.	654.30%	3925.80	4907.25
9	Cost of RCC fence posts	50	No.	358	17900.00	17900.00
10	Carriage of RCC Fence post	50	No.	L/S	4000.00	4000.00
11	Fixing of RCC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000	64.00	64.00
16	Mulching of plants	600	No.	84.80%	508.80	636.00
17	Irrigation as per need/photography etc.		L/s		2100.00	2100.00
	Total				**63478.78**	**71965.38**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				37946.38	46432.98
	G.Total				**101425.16**	**118398.36**
				Or say	**101400.00**	**118300.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   1st year ₹ 5110/- per Ha.
   2nd year ₹ 2830/- per Ha.
   3rd year ₹ 1400/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-H

Norms (per Ha) for raising 600 tall plants with CC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate (in Rs)	Amount (basic wage rate applied ₹150/- per day) (N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	600	No.	1745%	10470.00	13087.50
6	Filling of pits 60cmx60cmx60cm	600	No.	254%	1524.00	1905.00
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	600	No.	1476%	8856.00	11070.00
8	Planting of tall plants i/c ramming	600	No.	654.30%	3925.80	4907.25
9	Cost of CC fence posts	50	No.	155	7750.00	7750.00
10	Carriage of CC Fence post	50	No.	L/S	4000.00	4000.00
11	Fixing of CC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000	64.00	64.00
16	Mulching of plants	600	No.	84.80%	508.80	636.00
17	Irrigation as per need/photography etc.		L/s		2100.00	2100.00
	Total				**53328.78**	**61815.38**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				37946.38	46432.98
	G.Total				**91275.16**	**108248.36**
				Or say	**91200.00**	**108200.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   1st year ₹ 5110/- per Ha.
   2nd year ₹ 2830/- per Ha.
   3rd year ₹ 1400/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-I

Norms (per Ha) for raising 600 tall plants with Wooden Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate	Amount (basic wage rate applied ₹150/- per day)	
				(in Rs)	(N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	600	No.	1745%	10470.00	13087.50
6	Filling of pits 60cmx60cmx60cm	600	No.	254%	1524.00	1905.00
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	600	No.	1476%	8856.00	11070.00
8	Planting of tall plants i/c ramming	600	No.	654.30%	3925.80	4907.25
9	Cutting & preparation of wooden fence post 1.80m and 8 to 10 cm dia i/c debarking and fastening the top 15 cm in conical shape.	50	No.	1295.00%	647.50	809.38
10	Carriage of wooden Fence post	50	No.	681.80%	340.90	426.13
11	Charring & coal tarring of the ends of the posts 45 cm bottom and 15 cm conical tip	50	No.	279.50%	139.75	174.69
12	Digging of holes 20-30 cm dia & 45 cm deep	50	No.	906.80%	453.40	566.75
13	Fixing of wooden posts i/c strutting	50	No.	716.00%	358.00	447.50
14	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
15	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
16	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
17	Cost of U-staple	0.001	MT	64000	64.00	64.00
18	Mulching of plants	600	No.	84.80%	508.80	636.00
19	Irrigation as per need/photography etc.		L/s		2100.00	2100.00
	Total				**43170.15**	**52054.60**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs.300/- per day} except item nos. 16, 17 & 19				35537.75	44422.20
	G.Total				**78707.90**	**96476.80**
				Or say	**78700.00**	**96400.00**

1. The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   - 1st year ₹ 5110/- per Ha.
   - 2nd year ₹ 2830/- per Ha.
   - 3rd year ₹ 1400/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-J

Revised Cost Norms (per Ha) for raising 500 tall plants with RCC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate (in Rs)	Amount (basic wage rate applied ₹150/- per day) (N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	500	No.	1745%	8725.00	10906.25
6	Filling of pits 60cmx60cmx60cm	500	No.	254%	1270.00	1587.50
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	500	No.	1476%	7380.00	9225.00
8	Planting of tall plants i/c ramming	500	No.	654.30%	3271.50	4089.38
9	Cost of RCC fence posts	50	No.	358	17900.00	17900.00
10	Carriage of RCC Fence post	50	No.	L/S	4000.00	4000.00
11	Fixing of RCC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000	64.00	64.00
16	Mulching of plants	500	No.	84.80%	424.00	530.00
17	Irrigation as per need/photography etc.		L/s		1900.00	1900.00
	Total				**59064.68**	**66497.76**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				33732.28	41165.36
	G.Total				**92796.96**	**107663.12**
				Or say	**92700.00**	**107600.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   - 1st year ₹ 4390/- per Ha.
   - 2nd year ₹ 2420/- per Ha.
   - 3rd year ₹ 1120/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-K

Norms (per Ha) for raising 500 tall plants with CC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate	Amount (basic wage rate applied ₹150/- per day)	
				(in Rs)	(N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	500	No.	1745%	8725.00	10906.25
6	Filling of pits 60cmx60cmx60cm	500	No.	254%	1270.00	1587.50
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	500	No.	1476%	7380.00	9225.00
8	Planting of tall plants i/c ramming	500	No.	654.30%	3271.50	4089.38
9	Cost of CC fence posts	50	No.	155	7750.00	7750.00
10	Carriage of CC Fence post	50	No.	L/S	4000.00	4000.00
11	Fixing of CC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000	64.00	64.00
16	Mulching of plants	500	No.	84.80%	424.00	530.00
17	Irrigation as per need/photography etc.		L/s		1900.00	1900.00
	Total				**48914.68**	**56347.76**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				33732.28	41165.36
	G.Total				**82646.96**	**97513.12**
				Or say	**82600.00**	**97500.00**

1. The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   - 1st year ₹ 4390/- per Ha.
   - 2nd year ₹ 2420/- per Ha.
   - 3rd year ₹ 1120/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-L

Norms (per Ha) for raising 500 tall plants with Wooden Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate	Amount (basic wage rate applied ₹150/- per day)	
				(in Rs)	(N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	500	No.	1745%	8725.00	10906.25
6	Filling of pits 60cmx60cmx60cm	500	No.	254%	1270.00	1587.50
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	500	No.	1476%	7380.00	9225.00
8	Planting of tall plants i/c ramming	500	No.	654.30%	3271.50	4089.38
9	Cutting & preparation of wooden fence post 1.80m and 8 to 10 cm dia i/c debarking and fastening the top 15 cm in conical shape.	50	No.	1295.00%	647.50	809.38
10	Carriage of wooden Fence post	50	No.	681.80%	340.90	426.13
11	Charring & coal tarring of the ends of the posts 45 cm bottom and 15 cm conical tip	50	No.	279.50%	139.75	174.69
12	Digging of holes 20-30 cm dia & 45 cm deep	50	No.	906.80%	453.40	566.75
13	Fixing of wooden posts i/c strutting	50	No.	716.00%	358.00	447.50
14	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
15	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
16	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
17	Cost of U-staple	0.001	MT	64000	64.00	64.00
18	Mulching of plants	500	No.	84.80%	424.00	530.00
19	Irrigation as per need/photography etc.		L/s		1900.00	1900.00
	Total				**38756.05**	**46586.98**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs.300/- per day} except item nos. 16, 17 & 19				31323.65	39154.58
	G.Total				**70079.70**	**85741.56**
				Or say	**70000.00**	**85700.00**

1. The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   - 1st year ₹ 4390/- per Ha.
   - 2nd year ₹ 2420/- per Ha.
   - 3rd year ₹ 1120/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-M

Revised Cost Norms (per Ha) for raising 400 tall plants with RCC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate	Amount (basic wage rate applied ₹150/- per day)	
				(in Rs)	(N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	400	No.	1745%	6980.00	8725.00
6	Filling of pits 60cmx60cmx60cm	400	No.	254%	1016.00	1270.00
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	400	No.	1476%	5904.00	7380.00
8	Planting of tall plants i/c ramming	400	No.	654.30%	2617.20	3271.50
9	Cost of RCC fence posts	50	No.	358	17900.00	17900.00
10	Carriage of RCC Fence post	50	No.	L/S	4000.00	4000.00
11	Fixing of RCC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000	64.00	64.00
16	Mulching of plants	400	No.	84.80%	339.20	424.00
17	Irrigation as per need/photography etc.		L/s		1700.00	1700.00
	Total				**54650.58**	**61030.13**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				29518.18	35897.73
	G.Total				**84168.76**	**96927.86**
				Or say	**84100.00**	**96900.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   - 1st year ₹ 3540/- per Ha.
   - 2nd year ₹ 1980/- per Ha.
   - 3rd year ₹ 850/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-N

Norms (per Ha) for raising 400 tall plants with CC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate	Amount (basic wage rate applied ₹150/- per day)	
				(in Rs)	(N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	400	No.	1745%	6980.00	8725.00
6	Filling of pits 60cmx60cmx60cm	400	No.	254%	1016.00	1270.00
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	400	No.	1476%	5904.00	7380.00
8	Planting of tall plants i/c ramming	400	No.	654.30%	2617.20	3271.50
9	Cost of CC fence posts	50	No.	155	7750.00	7750.00
10	Carriage of CC Fence post	50	No.	L/S	4000.00	4000.00
11	Fixing of CC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000	64.00	64.00
16	Mulching of plants	400	No.	84.80%	339.20	424.00
17	Irrigation as per need/photography etc.		L/s		1700.00	1700.00
	Total				**44500.58**	**50880.13**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				29518.18	35897.73
	G.Total				**74018.76**	**86777.86**
				Or say	**74000.00**	**86700.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   1st year ₹ 3540/- per Ha.
   2nd year ₹ 1980/- per Ha.
   3rd year ₹ 850/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-O

Norms (per Ha) for raising 400 tall plants with Wooden Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate	Amount (basic wage rate applied ₹150/- per day)	
				(in Rs)	(N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	400	No.	1745%	6980.00	8725.00
6	Filling of pits 60cmx60cmx60cm	400	No.	254%	1016.00	1270.00
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	400	No.	1476%	5904.00	7380.00
8	Planting of tall plants i/c ramming	400	No.	654.30%	2617.20	3271.50
9	Cutting & preparation of wooden fence post 1.80m and 8 to 10 cm dia i/c debarking and fastening the top 15 cm in conical shape.	50	No.	1295.00%	647.50	809.38
10	Carriage of wooden Fence post	50	No.	681.80%	340.90	426.13
11	Charring & coal tarring of the ends of the posts 45 cm bottom and 15 cm conical tip	50	No.	279.50%	139.75	174.69
12	Digging of holes 20-30 cm dia & 45 cm deep	50	No.	906.80%	453.40	566.75
13	Fixing of wooden posts i/c strutting	50	No.	716.00%	358.00	447.50
14	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
15	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
16	Cost of barbed wire	0.084	MT	63000.00	5292.00	5292.00
17	Cost of U-staple	0.001	MT	62000.00	62.00	62.00
18	Mulching of plants	400	No.	84.80%	339.20	424.00
19	Irrigation as per need/photography etc.		L/s		1700.00	1700.00
	Total				**34163.55**	**40940.95**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs.300/- per day} except item nos. 16, 17 & 19				27109.55	33886.95
	G.Total				**61273.10**	**74827.90**
				Or say	**61200.00**	**74800.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   1st year ₹ 3540/- per Ha.
   2nd year ₹ 1980/- per Ha.
   3rd year ₹ 850/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-P

Revised Cost Norms (per Ha) for raising 300 tall plants with RCC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate (in Rs)	Amount (basic wage rate applied ₹150/- per day) (N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	300	No.	1745%	5235.00	6543.75
6	Filling of pits 60cmx60cmx60cm	300	No.	254%	762.00	952.50
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	300	No.	1476%	4428.00	5535.00
8	Planting of tall plants i/c ramming	300	No.	654.30%	1962.90	2453.63
9	Cost of RCC fence posts	50	No.	358	17900.00	17900.00
10	Carriage of RCC Fence post	50	No.	L/S	4000.00	4000.00
11	Fixing of RCC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000	64.00	64.00
16	Mulching of plants	300	No.	84.80%	254.40	318.00
17	Irrigation as per need/photography etc.		L/s		1500.00	1500.00
	Total				**50236.48**	**55562.51**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				25304.08	30630.11
	G.Total				**75540.56**	**86192.62**
				Or say	**75500.00**	**86100.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   1st year ₹ 2830/- per Ha.
   2nd year ₹ 1700/- per Ha.
   3rd year ₹ 680/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-Q

Norms (per Ha) for raising 300 tall plants with CC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate (in Rs)	Amount (N/T) (in Rs.)	Amount (T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	300	No.	1745%	5235.00	6543.75
6	Filling of pits 60cmx60cmx60cm	300	No.	254%	762.00	952.50
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	300	No.	1476%	4428.00	5535.00
8	Planting of tall plants i/c ramming	300	No.	654.30%	1962.90	2453.63
9	Cost of CC fence posts	50	No.	155	7750.00	7750.00
10	Carriage of CC Fence post	50	No.	L/S	4000.00	4000.00
11	Fixing of CC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000	64.00	64.00
16	Mulching of plants	300	No.	84.80%	254.40	318.00
17	Irrigation as per need/photography etc.		L/s		1500.00	1500.00
	Total				**40086.48**	**45412.51**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				25304.08	30630.11
	G.Total				**65390.56**	**76042.62**
				Or say	**65300.00**	**76000.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   1st year ₹ 2830/- per Ha.
   2nd year ₹ 1700/- per Ha.
   3rd year ₹ 680/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-R

Norms (per Ha) for raising 300 tall plants with Wooden Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate	Amount (basic wage rate applied ₹150/- per day)	
				(in Rs)	(N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	300	No.	1745%	5235.00	6543.75
6	Filling of pits 60cmx60cmx60cm	300	No.	254%	762.00	952.50
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	300	No.	1476%	4428.00	5535.00
8	Planting of tall plants i/c ramming	300	No.	654.30%	1962.90	2453.63
9	Cutting & preparation of wooden fence post 1.80m and 8 to 10 cm dia i/c debarking and fastening the top 15 cm in conical shape.	50	No.	1295.00%	647.50	809.38
10	Carriage of wooden Fence post	50	No.	681.80%	340.90	426.13
11	Charring & coal tarring of the ends of the posts 45 cm bottom and 15 cm conical tip	50	No.	279.50%	139.75	174.69
12	Digging of holes 20-30 cm dia & 45 cm deep	50	No.	906.80%	453.40	566.75
13	Fixing of wooden posts i/c strutting	50	No.	716.00%	358.00	447.50
14	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
15	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
16	Cost of barbed wire	0.084	MT	65100.00	5468.40	5468.40
17	Cost of U-staple	0.001	MT	64000.00	64.00	64.00
18	Mulching of plants	300	No.	84.80%	254.40	318.00
19	Irrigation as per need/photography etc.		L/s		1500.00	1500.00
	Total				**29927.85**	**35651.73**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day} except item nos. 16, 17 & 19				22895.45	28619.33
	G.Total				**52823.30**	**64271.06**
				Or say	**52800.00**	**64200.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   1st year ₹ 2830/- per Ha.
   2nd year ₹ 1700/- per Ha.
   3rd year ₹ 680/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-S

Revised Cost Norms (per Ha) for raising 200 tall plants with RCC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate (in Rs)	Amount (N/T) (in Rs.)	Amount (T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	200	No.	1745%	3490.00	4362.50
6	Filling of pits 60cmx60cmx60cm	200	No.	254%	508.00	635.00
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	200	No.	1476%	2952.00	3690.00
8	Planting of tall plants i/c ramming	200	No.	654.30%	1308.60	1635.75
9	Cost of RCC fence posts	50	No.	358	17900.00	17900.00
10	Carriage of RCC Fence post	50	No.	L/S	4000.00	4000.00
11	Fixing of RCC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000	64.00	64.00
16	Mulching of plants	200	No.	84.80%	169.60	212.00
17	Irrigation as per need/photography etc.		L/s		1300.00	1300.00
	Total				**45822.38**	**50094.88**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				21089.98	25362.48
	G.Total				**66912.36**	**75457.36**
				Or say	**66900.00**	**75400.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   1st year ₹ 1980/- per Ha.
   2nd year ₹ 1260/- per Ha.
   3rd year ₹ 540/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-T

Norms (per Ha) for raising 200 tall plants with CC Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate (in Rs)	Amount (basic wage rate applied ₹150/- per day) (N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	200	No.	1745%	3490.00	4362.50
6	Filling of pits 60cmx60cmx60cm	200	No.	254%	508.00	635.00
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	200	No.	1476%	2952.00	3690.00
8	Planting of tall plants i/c ramming	200	No.	654.30%	1308.60	1635.75
9	Cost of CC fence posts	50	No.	155	7750.00	7750.00
10	Carriage of CC Fence post	50	No.	L/S	4000.00	4000.00
11	Fixing of CC posts i/c strutting	50	No.	696.35%	348.18	435.23
12	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
13	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
14	Cost of barbed wire	0.084	MT	65100.00	5468.40	5468.40
15	Cost of U-staple	0.001	MT	64000.00	64.00	64.00
16	Mulching of plants	200	No.	84.80%	169.60	212.00
17	Irrigation as per need/photography etc.		L/s		1300.00	1300.00
	Total				**35672.38**	**39944.88**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs. 300/- per day } except item nos. 9, 14,15 & 17				21089.98	25362.48
	G.Total				**56762.36**	**65307.36**
				Or say	**56700.00**	**65300.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   1st year ₹ 1980/- per Ha.
   2nd year ₹ 1260/- per Ha.
   3rd year ₹ 540/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

Annexure-U

Norms (per Ha) for raising 200 tall plants with Wooden Fence Posts (Non-Tribal & Tribal) for the year 2021-22

S. No.	Description of work	Quantity	Unit	Rate	Amount (basic wage rate applied ₹150/- per day)	
				(in Rs)	(N/T) (in Rs.)	(T) (in Rs.)
1	Survey and demarcation of plantation area	1	Ha	101.00	101.00	126.25
2	Bush cutting in strips	1	Ha	1192.80	1192.80	1491.00
3	Collection of debris and burning	1	Ha	681.80	681.80	852.25
4	Preparation of inspection path 60 cm wide	250	m	11.00	2750.00	3437.50
5	Digging of pits 60cmx60cmx60cm	200	No.	1745%	3490.00	4362.50
6	Filling of pits 60cmx60cmx60cm	200	No.	254%	508.00	635.00
7	Carriage of plants in polythene bags from nursery to work site O/D 1 km (level)	200	No.	1476%	2952.00	3690.00
8	Planting of tall plants i/c ramming	200	No.	654.30%	1308.60	1635.75
9	Cutting & preparation of wooden fence post 1.80m and 8 to 10 cm dia i/c debarking and fastening the top 15 cm in conical shape.	50	No.	1295.00%	647.50	809.38
10	Carriage of wooden Fence post	50	No.	681.80%	340.90	426.13
11	Charring & coal tarring of the ends of the posts 45 cm bottom and 15 cm conical tip	50	No.	279.50%	139.75	174.69
12	Digging of holes 20-30 cm dia & 45 cm deep	50	No.	906.80%	453.40	566.75
13	Fixing of wooden posts i/c strutting	50	No.	716.00%	358.00	447.50
14	Stretching and fixing of barbed wire with U-staple in four strands	585	Rmt	4.80	2808.00	3510.00
15	Interlacing of thorny bushes with barbed wire	195	Rmt.	4.00	780.00	975.00
16	Cost of barbed wire	0.084	MT	65100.00	5468.40	5468.40
17	Cost of U-staple	0.001	MT	64000.00	64.00	64.00
18	Mulching of plants	200	No.	84.80%	169.60	212.00
19	Irrigation as per need/photography etc.		L/s		1300.00	1300.00
	Total				**25513.75**	**30184.10**
	Add 100% increase {Due to increase of wage rates from Rs. 150/- to Rs.300/- per day} except item nos. 16, 17 & 19				18681.35	23351.70
	G.Total				**44195.10**	**53535.80**
				Or say	**44100.00**	**53500.00**

1.The proposed cost norms would be upper limit. the exp. shall be charged as per actuals, if lower than the norms.
2. For water conservation, moisture retention interventions be undertaken.
3. Maintenance will be carried out for 3 years for which the norms are as under:-
   1st year ₹ 1980/- per Ha.
   2nd year ₹ 1260/- per Ha.
   3rd year ₹ 540/- per Ha.
4. Photographs of plantation site before and after planting
5. GPS Co-ordinates of plantation area
6. The objective is better survival.

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh

NERIL
Naik Environment Research Institute Ltd

DLI

No.Ft. 1790-/71(D)2011-12/Vol-IX(Norms)
Himachal Pradesh Forest Department

Dated Shimla, the 26 APR 2021

From: Pr. CCF (HoFF)HP

To: 1. Pr. CCF (WL) HP
2. APCCF(IT); APCCFs(R&T) Sundernagar; APCCF (CAMPA)Shimla
3. CPDs IDP Solan; HPFECPP (KfW)D/shala & HPFEMLP Shimla
4. All CCFS/CFs (T & WL) in HP
5. DCF (Projects) & Registrar (Bud) O/o CCF(HoFF)HP

Subject: Cost norms for raising **New Plantations** and **Maintenance of Old Plantations (Normal Plantations)** for Non-Tribal & Tribal Areas for the year 2021-22.

Memo

Consequent upon the revision of daily wage rates from existing ₹275/- to ₹ 300/- per day in the state of Himachal Pradesh vide Finance Department letter No. FIN-(PR)B(7)-33/2010 dated 16.04.2021, the cost norms for raising of new plantation and maintenance of old plantations for 5 years **(Normal Plantations)** in Non-Tribal & Tribal-I & Tribal –II areas have been calculated on increased wage rates and are enclosed herewith for taking further necessary action.

These cost norms indicate the upper limits and DFOs will choose items and book actual cost such that the total expenditure should not exceed the indicated per hectare cost norms.

Encl: As above.

22/04/2021

Pr. Chief Conservator of Forests(HoFF),
Himachal Pradesh

Endst. No. As above. Dated

Copy alongwith enclosures is forwarded to IT Wing o/o Pr. CCF(HoFF) Shimla for information and necessary action. These cost norms may please be uploaded on departmental website.

Encl: As above

Pr. Chief Conservator of Forests(HoFF),
Himachal Pradesh

Abstract of Per Ha. Norms for raising Normal plantation & maintenance of 5 year old maintenance during the year 2021-22 (Based on basic wage rate of ₹300/- per day)			
Name of scheme	New Plantation		
	N/Tribal	Tribal-1	Tribal-II
Afforestation/Re-afforestation of Scrub Areas/ Protective Afforestion(Soil and Water Conservation)	52100	63800	122900
Enrichment	43900	53500	112700
Dev. Of Pasture & Grazing lands			
a) Alpine Pasture	33000	39900	--
b)Low lying grazing lands	39000	47400	--
Maintenance			
Afforestation/Re-afforestation of Scrub Areas/Soil and Water Conservation			
1st Year Maintenance	6850	8550	41000
2nd Year Maintenance	4600	5800	26700
3rd Year Maintenance	3500	4400	15700
4th & 5th Year Maintenance	2400	3000	7600
Enrichment			
1st Year Maintenance	5000	6300	29800
2nd Year Maintenance	3400	4250	19400
3rd Year Maintenance	2600	3200	11400
4th & 5th Year Maintenance	1800	2200	5500
Dev. Of Pasture & Grazing lands			
a) Alpine Pasture			
1st Year Maintenance	4490	5600	5600
2nd Year Maintenance	2990	3710	3710
3rd Year Maintenance	1490	1850	1850
4th & 5th Year Maintenance	740	920	820
b)Low lying grazing lands			
1st Year Maintenance	4660	5870	5870
2nd Year Maintenance	3400	4220	4220
3rd Year Maintenance	1950	2450	2450
4th & 5th Year Maintenance	1000	1250	1250

Pr. Chief Conserator of Forests (HoFF)
Himachal Ptradesh

Norms for New Plantations (Normal) for the year 2021-22 {Non-Tribal; Tribal-I & Tribal-II areas} w.e.f. 01.04.2021

(In Rupees)

S. No	Name of Scheme		Plants per ha	Component	Non Tribal	Tribal I	Tribal II	Remarks
1	i)	Afforestation	1100	Fencing Cost including material component	17148	20135	85485	B/wire fencing in Non-Tribal & Tribal-I areas and Stone Fencing in Tribal -II (Keylong & Jhalma Ranges of Lahaul Division) Areas - Wage rate ₹ 300/- per day for non-tribal & ₹ 375/- per day for tribal areas.
	ii)	Re-afforestation of Scrub Areas		Planting Cost	35028	43672	37500	
	iii)	Protective Afforestation,						
				Total	52176	63807	122985	
				OR SAY	52100	63800	122900	
2	i)	Enrichment Planting	800	Fencing Cost including material component	17148	20135	85485	
				Planting Cost	26847	33446	27266	
				Total	43995	53581	112751	
				OR SAY	43900	53500	112700	

Pr. Chief Conserator of Forests (HoFF)
Himachal Ptradesh

3

Revised Cost Norms per hectare for raising Normal Plantation for the year 2021-22 in respect of Schemes Afforestation/Re-afforestation of Scrub Areas & Protective Afforestation under Soil Conservation (1100 Plants/Ha)								
Sr. No.	Particulars of Works	Unit	Quantity	Rate per Unit at wage rate of Rs.150/-	Amount at wage rate of Rs. 150/- for Non-Tribal areas	Mandays involved	Amount at wage rate of Rs. 300/- for Non-Tribal areas	Amount at wage rate of Rs. 375/- for Tribal areas
A	**SURVEY, DEMARCATION & FENCING:-**							
1	Survey & Demarcation of Plantation Area	ha.	1	101.00	101.00	**0.67**	201.00	251.25
2	cutting and preparation of wooden fence posts 1.85 mt long and 8 to 10 cm dia including debarking and fashioning the top 1.5 cms in conical shape	No.	50	12.95	647.50	**4.32**	1296.00	1620.00
3	Carriage of wooden Fence Post over a distance of 2 km	KM/No.	50	6.82	682.00	**4.55**	1365.00	1706.25
4	Charring and coaltaring of ends of fence posts up to 45 at bottom and 15 cms at conical end	No.	50	2.8	140.00	**0.93**	279.00	348.75
5	Preparation /Digging of Holes of 20 to 30 cm dia and 45 cm deep	No.	50	9.07	453.50	**3.02**	906.00	1132.50
6	Fixing of wooden Fence Post i/c Strutting	No.	50	7.16	358.00	**2.39**	717.00	896.25
7	Carriage of B/Wire over a distance of 2 Kms	KM/ Qtl.	0.75	73.65	110.48	**0.74**	222.00	277.50
8	Stretching & Fixing of Barbed Wire in 4 Strands	Rmt.	600	4.80	2880.00	**19.20**	5760.00	7200.00
9	Interlacing of Thorny Bushes along the Fence	Rmt.	150	4.00	600.00	**4.00**	1200.00	1500.00
10	Cost of Barbed Wire	Qtl.	0.75	6510	4882.50	**0.00**	4882.50	4882.50
11	Cost of U-Nails	Qtl.	0.05	6400	320.00		320.00	320.00
	Total -A-Survey, Demarcation & Fencing:				**11174.98**	**39.82**	**17148.50**	**20135.00**
B.	**PLANTING:-**							
1	Bush Cutting in Strips (3m x 3m)	ha.	1	1192.80	1192.80	**7.95**	2385.00	2981.25
2	Digging of Pits of 45x45x45 cm Size	No.	550	9.54	5247.00	**34.98**	10494.00	13117.50
3	Digging of Pits of 30x30x30 cm Size	No.	550	4.77	2623.50	**17.49**	5247.00	6558.75
4	Filling of Pits of 45x45x45 cm size	No.	550	2.72	1496.00	**9.97**	2991.00	3738.75
5	Filling of Pits of 30x30x30 cm size	No.	550	1.91	1050.50	**7.00**	2100.00	2625.00
6	Carriage of Plants in P. Bags over distance 2 Km uphill/downhill	KM/No.	550	1.9	2090.00	**13.93**	4179.00	5223.75
7	Carriage of naked root Plants over a distance 2 Km uphill/downhill	KM/No.	550	0.26	286.00	**1.91**	573.00	716.25
8	Planting of Plants Raised in P/Bags	No.	550	2.18	1199.00	**7.99**	2397.00	2996.25
9	Planting of Plants with naked roots	No.	550	1.83	1006.50	**6.71**	2013.00	2516.25
10	Construction of Inspection Path	Rmt.	100	11	1100.00	**7.33**	2199.00	2748.75
11	Cost of Sign Board, Carriage & Fixing	No.	0	LS		**0.00**	450.00	450.00
	Total -B-Planting:				**17291.30**	**115.26**	**35028.00**	**43672.50**
	Grand Total (A+B):				**22950**		**52176.50**	**63807.50**
	Or Say						**52100.00**	**63800.00**

Principal Chief Conservator of Forests (HoFF),
Himachal Pradesh, Shimla

4

Revised Cost Norms per hectare for raising Normal Plantation for the year 2021-22 in respect of Schemes Enrichment Planting (800 Plants/Ha) w.e.f. 01.04.2021								
Sr. No.	Particulars of Works	Unit	Quantity	Rate per Unit at wage rate of Rs.150/-	Amount at wage rate of Rs. 150/- for Non- Tribal areas	Mandays involved	Amount at wage rate of Rs. 300/- for Non-Tribal areas	Amount at wage rate of Rs. 375/- for Tribal areas
A	**SURVEY, DEMARCATION & FENCING:-**							
1	Survey & Demarcation of Plantation Area	ha.	1	101.00	101.00	**0.67**	201.00	251.25
2	Cutting and preparation of wooden fence posts 1.85 mt long and 8 to 10 cm dia including debarking and fashioning the top 1.5 cms in conical shape	No.	50	12.95	647.50	**4.32**	1296.00	1620.00
3	Carriage of wooden Fence Post over a distance of 2 km	KM/No.	50	6.82	682.00	**4.55**	1365.00	1706.25
4	Charring and coaltaring of ends of fence posts up to 45 at bottom and 15 cms at conical end	No.	50	2.8	140.00	**0.93**	279.00	348.75
5	Preparation /Digging of Holes of 20 to 30 cm dia and 45 cm deep	No.	50	9.07	453.50	**3.02**	906.00	1132.50
6	Fixing of wooden Fence Post i/c Strutting	No.	50	7.16	358.00	**2.39**	717.00	896.25
7	Carriage of B/Wire over a distance of 2 Kms	KM/Qtl.	0.75	73.65	110.48	**0.74**	222.00	277.50
8	Stretching & Fixing of Barbed Wire in 4 Strands	Rmt.	600	4.80	2880.00	**19.20**	5760.00	7200.00
9	Interlacing of Thorny Bushes along the Fence	Rmt.	150	4.00	600.00	**4.00**	1200.00	1500.00
10	Cost of Barbed Wire	Qtl.	0.75	6510	4882.50	**0.00**	4882.50	4882.50
11	Cost of U-Nails	Qtl.	0.05	6400	320.00		320.00	320.00
	Total -A-Survey, Demarcation & Fencing:				**11174.98**	**39.82**	**17148.50**	**20135.00**
B.	**PLANTING:-**							
1	Bush Cutting in Strips (3m x 3m)	ha.	1	1192.80	1192.80	**7.95**	2385.00	2981.25
2	Digging of Pits of 45x45x45 cm Size	No.	400	9.54	3816.00	**25.44**	7632.00	9540.00
3	Digging of Pits of 30x30x30 cm Size	No.	400	4.77	1908.00	**12.72**	3816.00	4770.00
4	Filling of Pits of 45x45x45 cm size	No.	400	2.72	1088.00	**7.25**	2175.00	2718.75
5	Filling of Pits of 30x30x30 cm size	No.	400	1.91	764.00	**5.09**	1527.00	1908.75
6	Carriage of Plants in P. Bags over distance 2 Km uphill/downhill	KM/No.	400	1.90	1520.00	**10.13**	3039.00	3798.75
7	Carriage of naked root Plants over a distance 2 Km uphill/downhill	KM/No.	400	0.26	208.00	**1.39**	417.00	521.25
8	Planting of Plants Raised in P/Bags	No.	400	2.18	872.00	**5.81**	1743.00	2178.75
9	Planting of Plants with naked roots	No.	400	1.83	732.00	**4.88**	1464.00	1830.00
10	Construction of Inspection Path	Rmt.	100	11	1100.00	**7.33**	2199.00	2748.75
11	Cost of sign board, carriage & fixing	No.	1	450	450.00		450.00	450.00
	Total -B-Planting:				**13650.80**	**87.99**	**26847.00**	**33446.25**
	Grand Total (A+B):						**43995.50**	**53581.25**
	Or Say						**43900.00**	**53500.00**

Principal Chief Conservator of Forests(HoFF),
Himachal Pradesh.

COST NORMS PER HECTARE FOR STONE FENCING AND PLANTING UNDER AFFORESTATION/RE-AFFORESTATION AND SOIL CONSERVATION FOR THE YEAR 2021-22 (1100 PLANTS/HECTARE) For Keylong and Jalma Ranges of Lahaul Division							
Sr.No.	Particulars of Works	Unit	Qnty	Rate per Unit at wage rate of Rs. 150/-	Amount (in Rs.) @ Rs. 150/-	Mandays	Amount at wage rate of Rs. 375/- for Tribal areas
A	SURVEY, DEMARCATION & FENCING:-						
1	Survey & Demarcation of Plantation Area	ha.	1	102.32	102.32	0.68	255.00
2	Stonewall fence 0.5x1.5 mtrs high	Rmt.	100	340.92	34092.00	227.28	85230.00
Total - A-Survey, Demarcation & Fencing:				**0.00**	**34194.32**	**227.96**	**85485.00**
Or Say				**0.00**	**34200.00**		**85400.00**
B.	PLANTING:-						
1	Digging of Pits of 45x45x45 cm Size	No.	550	9.54	5247.00	34.98	13117.50
2	Digging of Pits of 30x30x30 cm Size	No.	550	4.77	2623.50	17.49	6558.75
3	Filling of Pits of 45x45x45 cm size	No.	550	2.72	1496.00	9.97	3738.75
4	Filling of Pits of 30x30x30 cm size	No.	550	1.91	1050.50	7.00	2625.00
5	Carriage of Plants in P. Bags over distance 2 Km uphill	KM/ No.	550	1.91	2101.00	14.01	5253.75
6	Carriage of naked root Plants over a distance 2 Km uphill	KM/ No.	550	0.26	286.00	1.91	716.25
7	Planting of Plants Raised in P/Bags	No.	550	2.18	1199.00	7.99	2996.25
8	Planting of Plants with naked roots	No.	550	1.83	1006.50	6.71	2516.25
Total -B-Planting:					**15009.50**	**100.06**	**37522.50**
Or Say							**37500.00**
Grand Total (A+B):							**122900.00**

PER HECTARE COST NORM FOR STONE FENCING AND PLANTING UNDER ENRICHMENT PLANTING (800 PLANTS/HECTARE) FOR THE YEAR 2021-22 For Keylong and Jhalma Ranges of Lahaul Division							
A	SURVEY, DEMARCATION & FENCING:-						
1	Survey & Demarcation of Plantation Area	ha.	1	102.32	102.32	0.68	255.00
2	Stonewall fence 0.5x1.5 mtrs high	Rmt.	100	340.92	34092.00	227.28	85230.00
Total - A-Survey, Demarcation & Fencing:				**0.00**	**34194.32**	**227.96**	**85485.00**
B.	PLANTING:-						
1	Digging of Pits of 45x45x45 cm Size	No.	400	9.54	3816.00	25.44	9540.00
2	Digging of Pits of 30x30x30 cm Size	No.	400	4.77	1908.00	12.72	4770.00
3	Filling of Pits of 45x45x45 cm size	No.	400	2.72	1088.00	7.25	2718.75
4	Filling of Pits of 30x30x30 cm size	No.	400	1.91	764.00	5.09	1908.75
5	Carriage of Plants in P. Bags over distance 2 Km uphill	KM/No.	400	1.90	1520.00	10.13	3798.75
6	Carriage of naked root Plants over a distance 2 Km uphill	KM/No.	400	0.26	208.00	1.39	521.25
7	Planting of Plants Raised in P/Bags	No.	400	2.18	872.00	5.81	2178.75
8	Planting of Plants with naked roots	No.	400	1.83	732.00	4.88	1830.00
Total -B-Planting:					**10908.00**	**72.71**	**27266.25**
Grand Total (A+B):					**45102.32**	**300.67**	**112751.25**
			Or Say		**45000.00**		**112700.00**

Principal Chief Conservator of Forests,
Himachal Pradesh.

6

Himachal Pradesh Forest Department				
Norms for Dev. of Pasture & Grazing Lands for the year 2021-22(Non-Tribal & Tribal areas) w.e.f. 01.04.2021				
				(in Rupees)
Sr. No.	Name of Scheme	Component	Non-Tribal wage rate ₹300/- per day	Tribal wage rate ₹375/- per day
1	Development of Pasture & Grazing Lands			
a)	Alpine Pasture	Fencing cost (wage component)	12837.85	16047.31
		Fencing material	5202.50	5202.50
		Removal of weeds	14972.12	18715.15
		Sowing of grass seeds/tufts in trenches/ patches of size 2mx1m(400-500/ha)		
		Moisture retention interventions gully plugging, water ponds etc.)		
		Total	33012.47	39964.96
		Or Say	33000.00	39900.00
b)	Low Lying Grazing Lands	Fencing cost (wage component)	12837.85	16047.31
		Fencing material	5202.50	5202.50
		Removal of weeds	20960.95	26201.19
		Sowing of grass seeds/tufts in trenches/ patches of size 2mx1m(400-500/ha)		
		Planting of 200 plants of fodder species		
		Moisture retention interventions gully plugging, water ponds etc.)		
		Application of farm yard manure		
		Total	39001.30	47451.00
		Or say	39000.00	47400.00

Pr. Chief Conserator of Forests (HoFF)
Himachal Ptradesh

Per hectare cost norm for 5 year maintenace of old Plantation for the year 2021-22 In respect of Schemes Afforestation/Re-afforestation of Scrub Areas/ Protective Afforestation under Soil Conservation

Sr. No.	Particulars of Works	Unit	Quantity	Rate per Unit at wage rate of Rs.150/-	Amount at wage rate of Rs. 150/- for Non-Tribal areas	Mandays involved	Amount at wage rate of Rs. 300/- for Non-Tribal areas	Amount at wage rate of Rs. 375/- for Tribal areas
	1st YEAR MAINTENANCE (30 % BEATING UP):							
1	Re-digging of Pits 45x45x45 cm	No.	165	4.77	787.05	5.25	1575.00	1968.75
2	Re-digging of Pits 30x30x30 cm	No.	165	2.38	392.70	2.62	786.00	982.50
3	Filling of Pits 45x45x45 cm	No.	165	2.72	448.80	2.99	897.00	1121.25
4	Filling of Pits 30x30x30 cm	No.	165	1.91	315.15	2.10	630.00	787.50
5	Planting of Plants raised in P/Bags	No.	165	2.18	359.70	2.40	720.00	900.00
6	Planting of Plants with naked roots	No.	165	1.83	301.95	2.01	603.00	753.75
7	Carriage of Plants in P. Bags over distance 2 Km uphill/downhill	KM/No.	165	1.9	627.00	4.18	1254.00	1567.50
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	KM/No.	165	0.26	85.80	0.57	171.00	213.75
9	Repair of Fencing	Rmt	60	1.80	108.00	0.72	216.00	270.00
	Total/Ist Year Maintenance:				**3426.15**	**22.84**	**6852.00**	**8565.00**
				Or Say			**6850.00**	**8550.00**
	2nd YEAR MAINTENANCE (20 % BEATING UP):							
1	Re-digging of Pits 45x45x45 cm	No.	110	4.77	524.70	3.50	1050.00	1312.50
2	Re-digging of Pits30x30x30cm	No.	110	2.38	261.80	1.75	525.00	656.25
3	Filling of Pits 45x45x45 cm	No.	110	2.72	299.20	1.99	597.00	746.25
4	Filling of Pits 30x30x30 cm	No.	110	1.91	210.10	1.40	420.00	525.00
5	Planting of Plants raised in P/Bags	No.	110	2.18	239.80	1.60	480.00	600.00
6	Planting of Plants with naked roots	No.	110	1.83	201.30	1.34	402.00	502.50
7	Carriage of Plants in P. Bags over a distance of 2 Km uphill/downhill	No.	110	1.9	418.00	2.79	837.00	1046.25
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	110	0.26	57.20	0.38	114.00	142.50
9	Repair of Fencing	Rmt	60	1.80	108.00	0.72	216.00	270.00
	Total/2nd Year Maintenance:				**2320.10**	**15.47**	**4641.00**	**5801.25**
				Or Say	**3350.00**		**4600.00**	**5800.00**
	3rd YEAR MAINTENANCE (15 % BEATING UP):							
1	Re-digging of Pits 45x45x45 cm	No.	82	4.77	391.14	2.61	783.00	978.75
2	Re-digging of Pits 30x30x30 cm	No.	83	2.38	197.54	1.32	396.00	495.00
3	Filling of Pits 45x45x45 cm	No.	82	2.72	223.04	1.49	447.00	558.75
4	Filling of Pits 30x30x30 cm	No.	83	1.91	158.53	1.06	318.00	397.50
5	Planting of Plants raised in P/Bags	No.	82	2.18	178.76	1.19	357.00	446.25
6	Planting of Plants with naked roots	No.	83	1.83	151.89	1.01	303.00	378.75
7	Carriage of Plants in P. Bags over a distance 2 Km uphill/downhill	No.	82	1.9	311.60	2.08	624.00	780.00
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	83	0.26	43.16	0.29	87.00	108.75
9	Repair of Fencing	Rmt	60	1.80	108.00	0.72	216.00	270.00
	Total/3rd Year Maintenance:				**1763.66**	**11.77**	**3531.00**	**4413.75**
				Or Say			**3500.00**	**4400.00**
	4th/5th YEAR MAINTENANCE (10 % BEATING UP):							
1	Re-digging of Pits 45x45x45 cm	No.	55	4.77	262.35	1.75	525.00	656.25
2	Re-digging of Pits 30x30x30 cm	No.	55	2.38	130.90	0.87	261.00	326.25
3	Filling of Pits 45x45x45 cm	No.	55	2.72	149.60	1.00	300.00	375.00
4	Filling of Pits 30x30x30 cm	No.	55	1.91	105.05	0.70	210.00	262.50
5	Planting of Plants raised in P/Bags	No.	55	2.18	119.90	0.80	240.00	300.00
6	Planting of Plants with naked roots	No.	55	1.83	100.65	0.67	201.00	251.25
7	Carriage of Plants in P. Bags over a distance 2 Km uphill/downhill	No.	55	1.9	209.00	1.39	417.00	521.25
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	55	0.26	28.60	0.19	57.00	71.25
9	Repair of Fencing	Rmt	60	1.80	108.00	0.72	216.00	270.00
	Total 4th & 5th Year Maintenance:				**1214.05**	**8.09**	**2427.00**	**3033.75**
				Or Say			**2400.00**	**3000.00**

Principal Chief Conservator of Forests(HoFF),
Himachal Pradesh.

Sr. No.	Particulars of Works	Unit	Quantity	Rate per Unit at the wage rate of Rs.150/-	Amount at wage rate of Rs. 150/- for Non-Tribal areas	Mandays involved	Amount at wage rate of Rs. 300/- for Non-Tribal areas	Amount at wage rate of Rs. 375/- for Tribal areas
	1st YEAR MAINTENANCE (30 % BEATING UP):							
1	Re-digging of Pits 45x45x45 cm	No.	120	4.77	572.40	3.82	1146.00	1432.50
2	Re-digging of Pits 30x30x30 cm	No.	120	2.38	285.60	1.90	570.00	712.50
3	Filling of Pits 45x45x45 cm	No.	120	2.72	326.40	2.18	654.00	817.50
4	Filling of Pits 30x30x30 cm	No.	120	1.91	229.20	1.53	459.00	573.75
5	Planting of Plants raised in P/Bags	No.	120	2.18	261.60	1.74	522.00	652.50
6	Planting of Plants with naked roots	No.	120	1.83	219.60	1.46	438.00	547.50
7	Carriage of Plants in P. Bags over distance 2 Km uphill/downhill	KM/No.	120	1.9	456.00	3.04	912.00	1140.00
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	KM/No.	120	0.26	62.40	0.42	126.00	157.50
9	Repair of Fencing	Rmt	60	1.80	108.00	0.72	216.00	270.00
	Total Ist Year Maintenance:				**2521.20**	**16.81**	**5043.00**	**6303.75**
	Or Say						**5000.00**	**6300.00**
	2nd YEAR MAINTENANCE (20 % BEATING UP):							
1	Re-digging of Pits 45x45x45 cm	No.	80	4.77	381.60	2.54	762.00	952.50
2	Re-digging of Pits30x30x30cm	No.	80	2.38	190.40	1.27	381.00	476.25
3	Filling of Pits 45x45x45 cm	No.	80	2.72	217.60	1.45	435.00	543.75
4	Filling of Pits 30x30x30 cm	No.	80	1.91	152.80	1.02	306.00	382.50
5	Planting of Plants raised in P/Bags	No.	80	2.18	174.40	1.16	348.00	435.00
6	Planting of Plants with naked roots	No.	80	1.83	146.40	0.98	294.00	367.50
7	Carriage of Plants in P. Bags over a distance of 2 Km uphill/downhill	No.	80	1.9	304.00	2.03	609.00	761.25
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	80	0.26	41.60	0.28	84.00	105.00
9	Repair of Fencing	Rmt	60	1.80	108.00	0.72	216.00	270.00
	Total 2nd Year Maintenance:				**1716.80**	**11.45**	**3435.00**	**4293.75**
	Or Say						**3400.00**	**4250.00**
	3rd YEAR MAINTENANCE (15 % BEATING UP):							
1	Re-digging of Pits 45x45x45 cm	No.	60	4.77	286.20	1.91	573.00	716.25
2	Re-digging of Pits 30x30x30 cm	No.	60	2.38	142.80	0.95	285.00	356.25
3	Filling of Pits 45x45x45 cm	No.	60	2.72	163.20	1.09	327.00	408.75
4	Filling of Pits 30x30x30 cm	No.	60	1.91	114.60	0.76	228.00	285.00
5	Planting of Plants raised in P/Bags	No.	60	2.18	130.80	0.87	261.00	326.25
6	Planting of Plants with naked roots	No.	60	1.83	109.80	0.73	219.00	273.75
7	Carriage of Plants in P. Bags over a distance 2 Km uphill/downhill	No.	60	1.9	228.00	1.52	456.00	570.00
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	60	0.26	31.20	0.21	63.00	78.75
10	Repair of Fencing	Rmt	60	1.80	108.00	0.72	216.00	270.00
	Total 3rd Year Maintenance:				**1314.60**	**8.76**	**2628.00**	**3285.00**
	Or Say						**2600.00**	**3200.00**
	4th/5th YEAR MAINTENANCE (10 % BEATING UP):							
1	Re-digging of Pits 45x45x45 cm	No.	40	4.77	190.80	1.27	381.00	476.25
2	Re-digging of Pits 30x30x30 cm	No.	40	2.38	95.20	0.63	189.00	236.25
3	Filling of Pits 45x45x45 cm	No.	40	2.72	108.80	0.73	219.00	273.75
4	Filling of Pits 30x30x30 cm	No.	40	1.91	76.40	0.51	153.00	191.25
5	Planting of Plants raised in P/Bags	No.	40	2.18	87.20	0.58	174.00	217.50
6	Planting of Plants with naked roots	No.	40	1.83	73.20	0.49	147.00	183.75
7	Carriage of Plants in P.Bags over a distance 2 Km uphill/downhill	No.	40	1.9	152.00	1.01	303.00	378.75
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	40	0.26	20.80	0.14	42.00	52.50
10	Repair of Fencing	Rmt	60	1.80	108.00	0.72	216.00	270.00
	Total 4th & 5th Year Maintenance:				**912.40**	**6.08**	**1824.00**	**2280.00**
	Or Say						**1800.00**	**2200.00**

Principal Chief Conservator of Forests(HoFF),
Himachal Pradesh.

PER HECTARE COST NORM FOR 5 YEAR MAINTENANCE OF OLD PLANTATION WITH STONE FENCING IN RESPECT OF AFFORESTATION/RE-AFFORESTATION/SOIL CONSERVATION FOR THE YEAR 2021-22 (Tribal-II for Keylong and Jhalma Ranges of Lahaul Division)							
1st YEAR MAINTENANCE (30 % BEATING UP):							
Sr.No.	Particulars of Works	Unit	Qnty	Rate per Unit at wage rate of Rs. 150/-	Amount (In Rs.) @ Rs. 150/-	Mandays	Norm at wage rate of Rs 375/-
1st YEAR MAINTENANCE (30 % BEATING UP):							
1	Re-digging of Pits 45x45x45 cm	No.	165	4.77	787.05	5.25	1968.75
2	Re-digging of Pits 30x30x30 cm	No.	165	2.38	392.70	2.62	982.50
3	Filling of Pits 45x45x45 cm	No.	165	2.72	448.80	2.99	1121.25
4	Filling of Pits 30x30x30 cm	No.	165	1.91	315.15	2.10	787.50
5	Planting of Plants raised in P/Bags	KM/	165	2.18	359.70	2.40	900.00
6	Planting of Plants with naked roots	KM/ No.	165	1.83	301.95	2.01	753.75
7	Carriage of Plants in P. Bags over distance 2 Km uphill/downhill	No.	165	1.9	627.00	4.18	1567.50
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	165	0.26	85.80	0.57	213.75
9	Cost of watering of plants	L/s					32800.00
Total Ist Year Maintenance:					**3318.15**	**22.12**	**41095.00**
	Or Say						**41000.00**
2nd YEAR MAINTENANCE 20 % BEATING UP):							
1	Re-digging of Pits 45x45x45 cm	No.	110	4.77	524.70	3.50	1312.50
2	Re-digging of Pits 30x30x30 cm	No.	110	2.38	261.80	1.75	656.25
3	Filling of Pits 45x45x45 cm	No.	110	2.72	299.20	1.99	746.25
4	Filling of Pits 30x30x30 cm	No.	110	1.91	210.10	1.40	525.00
5	Planting of Plants raised in P/Bags	KM/ No.	110	2.18	239.80	1.60	600.00
6	Planting of Plants with naked roots	KM/ No.	110	1.83	201.30	1.34	502.50
7	Carriage of Plants in P. Bags over distance 2 Km uphill/downhill	No.	110	1.9	418.00	2.79	1046.25
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	110	0.26	57.20	0.38	142.50
9	Cost of watering of plants	L/s					21200.00
Total 2nd Year Maintenance:					**2212.10**	**14.75**	**26731.25**
	Or Say						**26700.00**
3rd YEAR MAINTENANCE 15 % BEATING UP):							
1	Re-digging of Pits 45x45x45 cm	No.	82	4.77	391.14	2.61	978.75
2	Re-digging of Pits 30x30x30 cm	No.	83	2.38	197.54	1.32	495.00
3	Filling of Pits 45x45x45 cm	No.	82	2.72	223.04	1.49	558.75
4	Filling of Pits 30x30x30 cm	No.	83	1.91	158.53	1.06	397.50
5	Planting of Plants raised in P/Bags	KM/ No.	82	2.18	178.76	1.19	446.25
6	Planting of Plants with naked roots	KM/ No.	83	1.83	151.89	1.01	378.75
7	Carriage of Plants in P. Bags over distance 2 Km uphill/downhill	No.	82	1.9	311.60	2.08	780.00
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	83	0.26	43.16	0.29	108.75
9	Cost of watering of plants	L/s					11600.00
Total 3rd Year Maintenance:					**1655.66**	**11.05**	**15743.75**
	Or Say						**15700.00**

Sr.No.	Particulars of Works	Unit	Qnty	Rate per Unit at wage rate of Rs. 150/-	Amount (In Rs.) @ Rs. 150/-	Mandays	Norm at wage rate of Rs 375/-
	4th/5th YEAR MAINTENANCE 10 % BEATING UP):						
1	Re-digging of Pits 45x45x45 cm	No.	55	4.77	262.35	1.75	656.25
2	Re-digging of Pits 30x30x30 cm	No.	55	2.38	130.90	0.87	326.25
3	Filling of Pits 45x45x45 cm	No.	55	2.72	149.60	1.00	375.00
4	Filling of Pits 30x30x30 cm	No.	55	1.91	105.05	0.70	262.50
5	Planting of Plants raised in P/Bags	KM/ No.	55	2.18	119.90	0.80	300.00
6	Planting of Plants with naked roots	KM/ No.	55	1.83	100.65	0.67	251.25
7	Carriage of Plants in P. Bags over distance 2 Km uphill/downhill	No.	55	1.9	209.00	1.39	521.25
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	55	0.26	28.60	0.19	71.25
9	Cost of watering of plants	L/s					4890.00
Total 4th & 5th Year Maintenance:					**1106.05**	**7.37**	**7653.75**
	Or Say						**7600.00**

Principal Chief Conservator of Forests,
Himachal Pradesh.

Sr.No.	Particulars of Works	Unit	Qnty	Rate per Unit at wage rate of Rs. 150/-	Amount (In Rs.) @ Rs. 150/-	Mandays	Norm at wage rate of Rs 375/-
	PER HECTARE COST NORM FOR 5 YEAR MAINTENANCE OF OLD PLANTATION WITH STONE FENCING IN RESPECT OF ENRICHMENT PLANTATION FOR THE YEAR 2021-22 (Tribal-II for Keylong and Jhalma Ranges of Lahaul Division)						
	1st YEAR MAINTENANCE (30 % BEATING UP):						
Sr.No.	Particulars of Works	Unit	Qnty	Rate per Unit at wage rate of Rs. 150/-	Amount (In Rs.) @ Rs. 150/-	Mandays	Norm at wage rate of Rs 375/-
	1st YEAR MAINTENANCE (30 % BEATING UP):						
1	Re-digging of Pits 45x45x45 cm	No.	120	4.77	572.40	3.82	1432.50
2	Re-digging of Pits 30x30x30 cm	No.	120	2.38	285.60	1.90	712.50
3	Filling of Pits 45x45x45 cm	No.	120	2.72	326.40	2.18	817.50
4	Filling of Pits 30x30x30 cm	No.	120	1.91	229.20	1.53	573.75
5	Planting of Plants raised in P/Bags	KM/ No.	120	2.18	261.60	1.74	652.50
6	Planting of Plants with naked roots	KM/ No.	120	1.83	219.60	1.46	547.50
7	Carriage of Plants in P. Bags over distance 2 Km uphill/downhill	No.	120	1.9	456.00	3.04	1140.00
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	120	0.26	62.40	0.42	157.50
9	Cost of watering of plants	L/s					23848.00
Total Ist Year Maintenance:					**2413.20**	**16.09**	**29881.75**
	Or Say						**29800.00**
	2nd YEAR MAINTENANCE 20 % BEATING UP):						
1	Re-digging of Pits 45x45x45 cm	No.	80	4.77	381.60	2.54	952.50
2	Re-digging of Pits 30x30x30 cm	No.	80	2.38	190.40	1.27	476.25
3	Filling of Pits 45x45x45 cm	No.	80	2.72	217.60	1.45	543.75
4	Filling of Pits 30x30x30 cm	No.	80	1.91	152.80	1.02	382.50
5	Planting of Plants raised in P/Bags	KM/ No.	80	2.18	174.40	1.16	435.00
6	Planting of Plants with naked roots	KM/ No.	80	1.83	146.40	0.98	367.50
7	Carriage of Plants in P. Bags over distance 2 Km uphill/downhill	No.	80	1.9	304.00	2.03	761.25
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	80	0.26	41.60	0.28	105.00
9	Cost of watering of plants	L/s					15416.00
Total 2nd Year Maintenance:					**1608.80**	**10.73**	**19439.75**
	Or Say						**19400.00**
	3rd YEAR MAINTENANCE 15 % BEATING UP):						
1	Re-digging of Pits 45x45x45 cm	No.	60	4.77	286.20	1.91	716.25
2	Re-digging of Pits 30x30x30 cm	No.	60	2.38	142.80	0.95	356.25
3	Filling of Pits 45x45x45 cm	No.	60	2.72	163.20	1.09	408.75
4	Filling of Pits 30x30x30 cm	No.	60	1.91	114.60	0.76	285.00
5	Planting of Plants raised in P/Bags	KM/ No.	60	2.18	130.80	0.87	326.25
6	Planting of Plants with naked roots	KM/ No.	60	1.83	109.80	0.73	273.75
7	Carriage of Plants in P. Bags over distance 2 Km uphill/downhill	No.	60	1.9	228.00	1.52	570.00
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	60	0.26	31.20	0.21	78.75
9	Cost of watering of plants	L/s					8440.00
Total 3rd Year Maintenance:					**1206.60**	**8.04**	**11455.00**
	Or Say						**11400.00**

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Sr.No.	Particulars of Works	Unit	Qnty	Rate per Unit at wage rate of Rs. 150/-	Amount (In Rs.) @ Rs. 150/-	Mandays	Norm at wage rate of Rs 375/-
	4th/5th YEAR MAINTENANCE 10 % BEATING UP):						
1	Re-digging of Pits 45x45x45 cm	No.	40	4.77	190.80	1.27	476.25
2	Re-digging of Pits 30x30x30 cm	No.	40	2.38	95.20	0.63	236.25
3	Filling of Pits 45x45x45 cm	No.	40	2.72	108.80	0.73	273.75
4	Filling of Pits 30x30x30 cm	No.	40	1.91	76.40	0.51	191.25
5	Planting of Plants raised in P/Bags	KM/ No.	40	2.18	87.20	0.58	217.50
6	Planting of Plants with naked roots	KM/ No.	40	1.83	73.20	0.49	183.75
7	Carriage of Plants in P. Bags over distance 2 Km uphill/downhill	No.	40	1.9	152.00	1.01	378.75
8	Carriage of naked root plants over a distance 2 Km uphill/downhill	No.	40	0.26	20.80	0.14	52.50
9	Cost of watering of plants	L/s					3560.00
Total 4th & 5th Year Maintenance:					**804.40**	**5.36**	**5570.00**
	Or Say						**5500.00**

Principal Chief Conservator of Forests(HoFF),
Himachal Pradesh.

No.Ft. 1790-/71(D)2011-12/Vol-IX(Norms)
Himachal Pradesh Forest Department

Dated Shimla, the

From: Pr. CCF (HoFF)HP

To: 1. Pr. CCF (WL) HP
2. APCCF(IT), APCCFs(R&T) Sundernagar; APCCF (CAMPA)Shimla
3. CPDs IDP Solan; HPFECPP (KfW)D/shala & HPFEMLP Shimla
4. All CCFS/CFs (T & WL) in HP
5. DCF (Projects) & Registrar (Bud) O/o CCF(HoFF)HP

Subject: Cost norms for raising plants **(Normal and Tall plants)** in nurseries for Non-Tribal & Tribal Areas for the year 2021-22.

Memo

Consequent upon the revision of daily wage rates from existing ₹275/- to ₹ 300/- per day in the state of Himachal Pradesh vide Finance Department letter No. FIN-(PR)B(7)-33/2010 dated 16.04.2021, the cost norms for raising plants **(Normal and Tall plants)** in nurseries in Non-Tribal & Tribal areas approved vide H.P. Government letter No. FFE-B-F(5)1/2017 dated 12.03.2018 (circulated to the field offices vide this office endst. of even number dated 16th March, 2018) have been calculated on increased wage rates and are enclosed herewith for taking further necessary action.

2. The conditions laid down by the Govt. while approving the cost norms for raising plants in nurseries vide letter quoted above shall remain enforced and should be followed in letter and spirit.

These cost norms indicate the upper limits but the expenditure should be restricted to the actual requirement as specified by the Govt. while approving cost norms.

Encl: As above.

Pr. Chief Conservator of Forests(HoFF),
Himachal Pradesh

Endst. No. As above. Dated 26 APR 2021

Mr. Hemant Mehra Done as ful.

Copy alongwith enclosures is forwarded to IT Wing o/o Pr. CCF(HoFF) Shimla for information and necessary action. These cost norms may please be uploaded on departmental website.

Encl: As above

22/04/2021

Pr. Chief Conservator of Forests(HoFF),
Himachal Pradesh

Financial Year Wise split of per Plant Nursery Cost for different Species to be raised in Poly Bags for the year 2021-22 at the basic wage rate of ₹300/- per day

Financial Year	Chil/ Other BLs				Ban				Deodar				Fir/ Spruce	
	Normal (1½ Year Old)		Tall (2½ Year Old)		Normal (2½ Year Old)		Tall (3½ Year Old)		Normal (2½ Year Old)		Tall (3½ Year Old)		Normal (4½ Year Old)	
	Non Tribal	Tribal	Non Tribal	Tribal	Non Tribal	Tribal	Non Tribal	Tribal	Non Tribal	Tribal	Non Tribal	Tribal	Non Tribal	Tribal
Ist	9.56	11.40	9.56	11.40	10.52	12.36	10.52	12.36	1.85	2.22	1.85	2.22	1.81	2.18
2nd	5.73	7.16	37.24	42.95	5.73	7.16	5.73	7.16	14.23	17.29	14.23	17.29	9.49	11.56
3rd	2.87	3.58	8.60	10.75	5.73	7.16	37.24	42.95	5.01	6.26	36.52	42.05	5.01	6.26
4th	--	--	5.05	6.31	2.87	3.58	9.37	11.72	2.15	2.69	8.66	10.82	22.22	25.93
5th	--	--	--	--	--	--	5.05	6.31	--	--	4.33	5.42	5.01	6.26
6th	--	--	--	--	--	--	--	--	--	--	--	--	2.15	2.69
Total Cost	**18.16**	**22.14**	**60.45**	**71.41**	**24.85**	**30.26**	**67.91**	**80.50**	**23.24**	**28.46**	**65.59**	**77.80**	**45.69**	**54.88**

Pr. Chief Conservator of Forests (HoFF)
Himachal Pradesh, Shimla

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COST NORMS FOR RAISING NORMAL & TALL PLANTS IN NURSERIES Calculated for 100 plants on the wage rate of ₹ 300 for Non Tribal areas and ₹ 375 for Tribal areas						
Sr. No.	Activity	Unit	Rate (for Wages @₹210)	Qty.	2021-22 Amount (in ₹)	
					For Non Tribal areas	For Tribal Areas
1. COST OF RAISING NORMAL CHIL & BROAD LEAVED PLANTS IN POLYBAGS IN THE NURSERY (1½ year old)						
First Financial Year Activities (From Seed sowing to March)						
1	Preparing of nursery beds including layout	Sqm	28.70	0.69	28.22	35.28
2	Filling of P/bags of size 5"x9" including collection, carriage, sieving of soil, mixing of mannure/humus, insecticide/ pesticide	No./100	381.99	1	544.68	680.85
3	Lining of P/bags	No./100	27.30	1	38.93	48.66
4	Sowing of seed in polythene bags	%	23.80	1	33.94	42.43
5	Mulching of polythene bags	%	7.42	1	10.57	13.21
6	Resowing of seed (20%)	%	23.80	0.2	6.79	8.49
7	Hand watering of P/bags (20 days)	No./100	2.52	20	71.86	89.83
8	Cost of vermi compost	Eg	7.00	17	119.00	119.00
9	Cost of insecticide/ pesticide	LS	-	-	15.00	15.00
10	Cost of polythene bags	Eg	160.00	0.3	48.00	48.00
11	Cost of seed	LS	20.00	LS	20.00	20.00
12	Cost of procurement of sand including its carriage upto nursery	Cu Mt	500.00	0.039	19.50	19.50
	Total Cost in First Financial Year				**956.49**	**1140.25**
	Or say				**956.00**	**1140.00**
	Per plant cost for 1st year				**9.56**	**11.40**
Second Financial Year Activities (April to March)						
1	Hand watering of P/bags (120 days)	No./100	2.52	120	431.19	538.99
2	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
3	Shifting and grading of plants	No./100	33.60	1	47.92	59.90
	Total Cost in Second Financial Year				**573.34**	**716.68**
	Or say				**573.00**	**716.00**
	Per plant cost for 2nd year				**5.73**	**7.16**
Third Financial Year Activities (April to March)						
1	Hand watering of P/bags (60 days)	No./100	2.52	60	215.60	269.50
2	Weeding and hoeing of plants (1 time)	No./100	16.52	1	23.57	29.46
3	Shifting and grading of plants	No./100	33.60	1	47.92	59.90
	Total Cost in Third Financial Year				**287.09**	**358.86**
	Or say				**287.00**	**358.00**
	Per plant cost for 3rd year				**2.87**	**3.58**
	G. TOTAL of costs for 3 years				**1816.00**	**2214.00**
	Total cost per Plant				**18.16**	**22.14**

Sr. No.	Activity	Unit	Rate (for Wages @₹210)	Qty.	2021-22 Amount (in ₹) For Non Tribal areas	2021-22 Amount (in ₹) For Tribal Areas
2. COST OF RAISING TALL CHIL & BROAD LEAVED PLANTS IN POLY BAGS IN NURSERY (2½ year old)						
First Financial Year Activities (Seed sowing to March)						
1	Preparing of nursery beds including layout	Sqm	28.70	0.69	28.22	35.28
2	Filling of P/bags of size 5"x9" including collection, carriage and sieving of soil, mixing of mannure/humus, insecticide/ pesticide	No./100	381.99	1	544.68	680.85
3	Lining of P/bags	No./100	27.30	1	38.93	48.66
4	Sowing of seed in polythene bags	%	23.80	1	33.94	42.43
5	Mulching of polythene bags	%	7.42	1	10.57	13.21
6	Resowing of seed (20%)	%	23.80	0.2	6.79	8.49
7	Hand watering of P/bags (20 days)	No./100	2.52	20	71.86	89.83
8	Cost of vermi compost	Eg	7.00	17	119.00	119.00
9	Cost of insecticide/ pesticide	LS	-	-	15.00	15.00
10	Cost of polythene bags	Eg	160.00	0.3	48.00	48.00
11	Cost of seed	LS	20.00	LS	20.00	20.00
12	Cost of procurement of sand including its carriage upto nursery	Cu Mt	500.00	0.039	19.50	19.50
	Total Cost in First Financial Year				**956.49**	**1140.25**
	or say				**956.00**	**1140.00**
	Per plant cost for 1st year				**9.56**	**11.40**
Second Financial Year Activities (April to March)						
1	Preparing of nursery beds including layout for accomodating 9"x16" P/Bags	Sqm	28.70	2.04	83.48	104.35
2	Filling of P/bags of size 9"x16" by collection, sieving and carriage of soil, mixing of Sand/manure/ humus/vermicompost/ insecticide/ pesticide including transplanting of plants already grown in 5"x9" P/bags into 9"x16" size P/bag which also include the removal of a part of ball of earth and untwining of roots.	No./100	1111.88	1	1585.45	1981.81
3	Lining of P/bags	No./100	61.21	1	87.28	109.10
4	Hand watering of P/bags (120 days)	No./100	2.52	120	431.19	538.99
5	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
6	Cost of vermi compost	Eg	7.00	134	938.00	938.00
7	Cost of insecticide/ pesticide	LS	-	-	80.00	80.00
8	Cost of polythene bags	Eg	160.00	2	320.00	320.00
9	Cost of procurement of sand including its carriage upto nursery	Cu Mt	500.00	0.21	105.00	105.00
	Total Cost in Second Financial Year				**3724.63**	**4295.04**
	or Say				**3724.00**	**4295.00**
	Per plant cost for 2nd year				**37.24**	**42.95**

Sr. No.	Activity	Unit	Rate (for Wages @₹210)	Qty.	2021-22 Amount (in ₹) For Non Tribal areas	2021-22 Amount (in ₹) For Tribal Areas
Third Financial Year Activities (April to March)						
1	Preparing nursery beds to shift 9"x16" P bags at a spacing of 9" row to row	Sq Mtr	28.70	3.57	146.11	182.64
2	Shifting and Grading of Plants at a spacing of 9" row to row	No./100	186.80	1	266.37	332.96
3	Hand watering of P/bags (120 days)	No./100	2.52	120	431.19	538.99
4	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
	Total Cost in 3rd Financial Year				**937.90**	**1172.38**
	or say				**860.00**	**1075.00**
	Per plant cost for 3rd year				**8.60**	**10.75**
Fourth Financial Year Activities (April to June)						
1	Hand watering of P/bags (60 days)	No./100	2.52	60	215.60	269.50
2	Weeding and hoeing of plants (1 time)	No./100	16.52	1	23.57	29.46
3	Shifting and Grading of Plants	No./100	186.80	1	266.37	332.96
	Total Cost in fourth Financial Year				**505.54**	**631.92**
	or say				**505.00**	**631.00**
	Per plant cost for 4th year				**5.05**	**6.31**
	G. TOTAL of costs for 4 years				**6045.00**	**7141.00**
	Total cost per Plant				**60.45**	**71.41**
3. COST OF RAISING NORMAL BAN PLANTS IN POLY BAGS IN NURSERY (2½ year old)						
First Financial Year Activities (From Seed sowing to March)						
1	Preparing of nursery beds including layout	Sqm	28.70	0.69	28.22	35.28
2	Filling of P/bags of size 5"x9" including collection, carriage, sieving of soil, mixing of mannure/humus, insecticide/ pesticide	No./100	381.99	1	544.68	680.85
3	Lining of P/bags	No./100	27.30	1	38.93	48.66
4	Sowing of seed in polythene bags	%	23.80	1	33.94	42.43
5	Mulching of polythene bags	%	7.42	1	10.57	13.21
6	Resowing of seed (20%)	%	23.80	0.2	6.79	8.49
7	Hand watering of P/bags (20 days)	No./100	2.52	20	71.86	89.83
8	Cost of vermi compost	Eg	7.00	17	119.00	119.00
9	Cost of insecticide/ pesticide	LS	-	-	15.00	15.00
10	Cost of polythene bags	Eg	160.00	0.3	48.00	48.00
11	Cost of seed	Eg	152.60	0.76	115.98	115.98
12	Cost of procurement of sand including its carriage upto nursery	Cu Mt	500.00	0.039	19.50	19.50
	Total Cost in First Financial Year				**1052.47**	**1236.23**
	Or say				**1052.00**	**1236.00**
	Per plant cost for 1st year				**10.52**	**12.36**

Sr. No.	Activity	Unit	Rate (for Wages @₹210)	Qty.	2021-22 Amount (in ₹) For Non Tribal areas	2021-22 Amount (in ₹) For Tribal Areas
Second Financial Year Activities (April to March)						
1	Hand watering of P/bags (120 days)	No./100	2.52	120	431.19	538.99
2	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
3	Shifting and grading of plants	No./100	33.60	1	47.92	59.90
	Total Cost in Second Financial Year				**573.34**	**716.68**
	Or say				**573.00**	**716.00**
	Per plant cost for 2nd year				**5.73**	**7.16**
Third Financial Year Activities (April to March)						
1	Hand watering of P/bags (120 days)	No./100	2.52	120	431.19	538.99
2	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
3	Shifting and grading of plants	No./100	33.60	1	47.92	59.90
	Total Cost in Third Financial Year				**573.34**	**716.68**
	Or say				**573.00**	**716.00**
	Per plant cost for 3rd year				**5.73**	**7.16**
Fourth Financial Year Activities (April to June)						
1	Hand watering of P/bags (60 days)	No./100	2.52	60	215.60	269.50
2	Weeding and hoeing of plants (1 time)	No./100	16.52	1	23.57	29.46
3	Shifting and grading of plants	No./100	33.60	1	47.92	59.90
	Total Cost in Fourth Financial Year				**287.09**	**358.86**
	Or say				**287.00**	**358.00**
	Per plant cost for 4th year				**2.87**	**3.58**
	G. TOTAL of costs for 4 years				**2485.00**	**3026.00**
	Total cost per Plant				**24.85**	**30.26**
4. COST OF RAISING TALL BAN PLANTS IN POLY BAGS IN NURSERY (3½ year old)						
First Financial Year Activities (Seed sowing to March)						
1	Preparing of nursery beds including layout	Sqm	28.70	0.69	28.22	35.28
2	Filling of P/bags of size 5"x9" including collection, carriage, sieving of soil, mixing of mannure/humus,	No./100	381.99	1	544.68	680.85
3	Lining of P/bags	No./100	27.30	1	38.93	48.66
4	Sowing of seed in polythene bags	%	23.80	1	33.94	42.43
5	Mulching of polythene bags	%	7.42	1	10.57	13.21
6	Resowing of seed (20%)	%	23.80	0.2	6.79	8.49
7	Hand watering of P/bags (20 days)	No./100	2.52	20	71.86	89.83
8	Cost of vermi compost	Eg	7.00	17	119.00	119.00
9	Cost of insecticide/ pesticide	LS	-	-	15.00	15.00
10	Cost of polythene bags	Eg	160.00	0.3	48.00	48.00
11	Cost of seed	Eg	152.60	0.76	115.98	115.98
12	Cost of procurement of sand including its carriage upto nursery	Cu Mt	500.00	0.039	19.50	19.50
	Total Cost in First Financial Year				**1052.47**	**1236.23**
	or say				**1052.00**	**1236.00**
	Per plant cost for 1st year				**10.52**	**12.36**

Sr. No.	Activity	Unit	Rate (for Wages @₹210)	Qty.	2021-22 Amount (in ₹) For Non Tribal areas	2021-22 Amount (in ₹) For Tribal Areas
Second Financial Year Activities (April to March)						
1	Hand watering of P/bags (120 days)	No./100	2.52	120	431.19	538.99
2	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
3	Shifting and grading of plants	No./100	33.60	1	47.92	59.90
	Total Cost in Second Financial Year				**573.34**	**716.68**
	Or say				**573.00**	**716.00**
	Per plant cost for 2nd year				**5.73**	**7.16**
Third Financial Year Activities (April to March)						
1	Preparing of nursery beds including layout for accomodating 9"x16" P/Bags	Sqm	28.70	2.04	83.48	104.35
2	Filling of P/bags of size 9"x16" by collection, sieving and carriage of soil, mixing of Sand/manure/ humus/vermicompost/ insecticide/ pesticide including transplanting of plants already grown in 5"x9" P/bags into 9"x16" size P/bag which also include the removal of a part of ball of earth and untwining of roots.	No./100	1111.88	1	1585.45	1981.81
3	Lining of P/bags	No./100	61.21	1	87.28	109.10
4	Hand watering of P/bags (120 days)	No./100	2.52	120	431.19	538.99
5	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
6	Cost of vermi compost	Eg	7.00	134	938.00	938.00
7	Cost of insecticide/ pesticide	LS	-	-	80.00	80.00
8	Cost of polythene bags	Eg	160.00	2	320.00	320.00
9	Cost of procurement of sand including its carriage upto nursery	Cu Mt	500.00	0.21	105.00	105.00
	Total Cost in Third Financial Year				**3724.63**	**4295.04**
	or Say				**3724.00**	**4295.00**
	Per plant cost for 3rd year				**37.24**	**42.95**
Fourth Financial Year Activities (April to March)						
1	Preparing nursery beds to shift 9"x16" P bags at a spacing of 9" row to row	Sq Mtr	28.70	3.57	146.11	182.64
2	Shifting and Grading of Plants at a spacing of 10" row to row	No./100	186.80	1	266.37	332.96
3	Hand watering of P/bags (120 days)	No./100	2.52	120	431.19	538.99
4	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
	Total Cost in 4th Financial Year				**937.90**	**1172.38**
	or say				**937.00**	**1172.00**
	Per plant cost for 4th year				**9.37**	**11.72**

Sr. No.	Activity	Unit	Rate (for Wages @₹210)	Qty.	2021-22 Amount (in ₹) For Non Tribal areas	2021-22 Amount (in ₹) For Tribal Areas
	Fifth Financial Year Activities (April to June)					
1	Hand watering of P/bags (60 days)	No./100	2.52	60	215.60	269.50
2	Weeding and hoeing of plants (1 time)	No./100	16.52	1	23.57	29.46
3	Shifting and Grading of Plants	No./100	186.80	1	266.37	332.96
	Total Cost in Fifth Financial Year				**505.54**	**631.92**
	or say				**505.00**	**631.00**
	Per plant cost for 5th year				**5.05**	**6.31**
	G. TOTAL of costs for 5 years				**6791.00**	**8050.00**
	Total cost per Plant				**67.91**	**80.50**
	5. COST OF RAISING NORMAL DEODAR PLANTS IN POLY BAGS IN NURSERY (2½ year old)					
	First Financial Year Activities (From Sowing to March)					
1	Preparation of nursery beds including layout	Sqm	28.70	1	40.92	51.15
2	Mixing of vermi compost in the gemination bed	Sqm	3.92	1	5.59	6.99
3	Application of insecticide/pesticide in the bed	Sqm	2.80	1	3.99	4.99
4	Line sowing of seed	Sqm	11.62	1	16.57	20.71
5	Hand watering of plants in bed (20 Times)	Sqm	2.52	20	71.86	89.83
6	Mulching in nursery beds	Sqm	5.74	1	8.19	10.24
7	Cost of deodar seed	Eg	372.00	0.025	9.30	9.30
8	Cost of insecticide/ pesticide	LS	-	-	15.00	15.00
9	Cost of vermi compost	Eg	7.00	2.00	14.00	14.00
	Total cost in first Financial year				**185.42**	**222.21**
	or say				**185.00**	**222.00**
	Per plant cost for 1st year				**1.85**	**2.22**
	Second Financial Year Activities (April to March)					
1	Preparing of nursery beds including layout for accomodating p bags	Sqm	28.70	0.69	28.22	35.28
2	Filling of P/bags of size 5"x9" including collection carriage sieving of soil, mixing of mannure/humus,	No./100	381.99	1	544.68	680.85
3	Lining of P/bags	No./100	27.30	1	38.93	48.66
4	PricEing and setting of seedlings in P/bags	No./100	76.30	1	108.79	135.99
5	Hand watering of P/bags (100 days)	No./100	2.52	100	359.33	449.16
6	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
7	Shifting and grading of Plants	No./100	33.60	1	47.92	59.90
8	Cost of vermi compost	Eg	7.00	17	119.00	119.00
9	Cost of insecticide/ pesticide	LS	-	-	15.00	15.00
10	Cost of polythene bags	Eg	160.00	0.3	48.00	48.00
11	Cost of procurement of sand including its carriage upto nursery	Cu Mt	500.00	0.039	19.50	19.50
	Total cost in second Financial year				**1423.60**	**1729.13**
	or say				**1423.00**	**1729.00**
	Per plant cost for 2nd year				**14.23**	**17.29**

Sr. No.	Activity	Unit	Rate (for Wages @₹210)	Qty.	2021-22 Amount (in ₹) For Non Tribal areas	2021-22 Amount (in ₹) For Tribal Areas
Third Financial Year Activities (April to March)						
1	Hand watering of P/bags (100 days)	No./100	2.52	100	359.33	449.16
2	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
3	Shifting and Grading of plants	No./100	33.60	1	47.92	59.90
	Total cost in third Financial year				**501.48**	**626.85**
	or say				**501.00**	**626.00**
	Per plant cost for 3rd year				**5.01**	**6.26**
Fourth Financial Year Activities (April to June)						
1	Hand watering of P/bags (40 days)	No./100	2.52	40	143.74	179.68
2	Weeding and hoeing of plants (1 time)	No./100	16.52	1	23.57	29.46
3	Shifting and Grading of plants	No./100	33.60	1	47.92	59.90
	Total cost in Fourth Financial year				**215.23**	**269.04**
	or say				**215.00**	**269.00**
	Per plant cost for 4th year				**2.15**	**2.69**
	G. TOTAL of costs for 4 years				**2324.00**	**2846.00**
	Total cost per plant				**23.24**	**28.46**
6. COST OF RAISING TALL DEODAR PLANTS IN POLY BAGS IN NURSERY (3½ year old)						
First Financial Year Activities (Sowing to March)						
1	Preparation of nursery beds including layout	Sqm	28.70	1	40.92	51.15
2	Mixing of vermi compost in the gemination bed	Sqm	3.92	1	5.59	6.99
3	Application of insecticide/pesticide in the bed	Sqm	2.80	1	3.99	4.99
4	Line sowing of seed	Sqm	11.62	1	16.57	20.71
5	Hand watering of plants in bed 20 Times	Sqm	2.52	20	71.86	89.83
6	Mulching in nursery beds	Sqm	5.74	1	8.19	10.24
7	Cost of vermi compost including carriage upto nursery	Eg	7.00	2	14.00	14.00
8	Cost of seed	Eg	372.00	0.025	9.30	9.30
9	Cost of insecticide/ pesticide	LS	-	-	15.00	15.00
	Total cost in first Financial year				**185.42**	**222.21**
	or say				**185.00**	**222.00**
	Per plant cost for 1st year				**1.85**	**2.22**
Second Financial Year Activities (April to March)						
1	Preparing of nursery beds including layout for accomodating 5"x9" P/Bags	Sqm	28.70	0.69	28.22	35.28
2	Filling of P/bags of size 5"x9" including collection, carriage & sieving of soil, mixing of mannure/humus, insecticide/ pesticide including collection & carriage of soil	No./100	381.99	1	544.68	680.85
3	Lining of P/bags	No./100	27.30	1	38.93	48.66
4	PricEing and setting of seedlings in P/bags	No./100	76.30	1	108.79	135.99
5	Hand watering of P/bags (100 days)	No./100	2.52	100	359.33	449.16
6	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
7	Shifting and grading of Plants	No./100	33.60	1	47.92	59.90
8	Cost of vermi compost	Eg	7.00	17	119.00	119.00
9	Cost of insecticide/ pesticide	LS	-	-	15.00	15.00
10	Cost of polythene bags	Eg	160.00	0.3	48.00	48.00

Sr. No.	Activity	Unit	Rate (for Wages @₹210)	Qty.	2021-22 Amount (in ₹) For Non Tribal areas	2021-22 Amount (in ₹) For Tribal Areas
11	Cost of procurement of sand including its carriage upto nursery	Cu Mt	500.00	0.039	19.50	19.50
	Total cost in 2nd Financial year				**1423.60**	**1729.13**
	or say				**1423.00**	**1729.00**
	Per plant cost for 2nd year				**14.23**	**17.29**
Third Financial Year Activities (April to March)						
1	Preparing of nursery beds including layout for accomodating 9"x16" P/Bags	Sqm	28.70	2.04	83.48	104.35
2	Filling of P/bags of size 9"x16" by collection, carriage sieving of soil, mixing of Sand/manure/ humus/vermicompost/ insecticide/ pesticide including transplanting of plants already grown in 5"x9" P/bags into 9"x16" size P/bag which also include the removal of a part of ball of earth and untwining of roots.	No./100	1111.88	1	1585.45	1981.81
3	Lining of P/bags	No./100	61.21	1	87.28	109.10
4	Hand watering of P/bags (100 days)	No./100	2.52	100	359.33	449.16
5	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
6	Cost of vermi compost	Eg	7.00	134	938.00	938.00
7	Cost of insecticide/ pesticide	LS	-	-	80.00	80.00
8	Cost of polythene bags	Eg	160.00	2	320.00	320.00
9	Cost of procurement of sand including its carriage upto nursery	Cu Mt	500.00	0.21	105.00	105.00
	Total cost in third Financial year				**3652.77**	**4205.21**
	or say				**3652.00**	**4205.00**
	Per plant cost for 3rd year				**36.52**	**42.05**
Fourth Financial Year Activities (April to March)						
1	Preparing nursery beds to increase the spacing of 9"x16" P bags to 9" row to row	Sq Mtr	28.70	3.57	146.11	182.64
2	Shifting and Grading of Plants at a spacing of 9" row to row	No./100	186.80	1	266.37	332.96
3	Hand watering of P/bags (100 days)	No./100	2.52	100	359.33	449.16
4	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
	Total cost in Fourth Financial year				**866.04**	**1082.55**
	or say				**866.00**	**1082.00**
	Per plant cost for 4th year				**8.66**	**10.82**
Fifth Financial Year Activities (April to June)						
1	Hand watering of P/bags (40 days)	No./100	2.52	40	143.74	179.68
2	Weeding and hoeing of plants (1 times)	No./100	16.52	1	23.57	29.46
3	Shifting and Grading of P/Bags	No./100	186.80	1	266.37	332.96
	Total cost in 5th Financial year				**433.68**	**542.10**
	or say				**433.00**	**542.00**
	Per plant cost for 5th year				**4.33**	**5.42**
	G. TOTAL of costs for 5 years				**6559.00**	**7780.00**
	Total cost per plant				**65.59**	**77.80**

Sr. No.	Activity	Unit	Rate (for Wages @₹210)	Qty.	2021-22 Amount (in ₹) For Non Tribal areas	2021-22 Amount (in ₹) For Tribal Areas
7. COST OF RAISING NORMAL FIR/SPRUCE PLANTS IN POLY BAGS IN NURSERY (4½ year old)						
First Financial Year Activities (Sowing to March)						
1	Preparation of nursery beds including layout	Sqm	28.70	1	40.92	51.15
2	Mixing of vermi compost in the gemination bed	Sqm	3.92	1	5.59	6.99
3	Application of insecticide/pesticide in the bed	Sqm	2.80	1	3.99	4.99
4	Line sowing of seed	Sqm	11.62	1	16.57	20.71
5	Hand watering of plants in bed (20 Times)	Sqm	2.52	20	71.86	89.83
6	Mulching in nursery beds	Sqm	5.74	1	8.19	10.24
7	Cost of seed	Eg	525.00	0.01	5.25	5.25
8	Cost of insecticide/ pesticide	LS	-	-	15.00	15.00
9	Cost of vermi compost	Eg	7	2	14.00	14.00
	Total cost in first Financial year				**181.37**	**218.16**
	or say				**181.00**	**218.00**
	Per plant cost for 1st year				**1.81**	**2.18**
Second Financial Year Activities (April to March)						
1	Preparing of nursery beds including layout	Sqm	28.70	0.44	18.01	22.51
2	Filling of P/bags of size 4"x6" including collection, carriage, sieving of soil, mixing of mannure/humus, insecticide/ pesticide	No./100	147.14	1	209.81	262.26
3	Lining of P/bags	No./100	27.30	1	38.93	48.66
4	PricEing and setting of seedlings in P/bags	No./100	76.30	1	108.79	135.99
5	Hand watering of P/bags (100 days)	No./100	2.52	100	359.33	449.16
6	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
7	Cost of vermi compost	Eg	7.00	9.3	65.10	65.10
8	Cost of insecticide/ pesticide	LS	-	-	15.00	15.00
9	Cost of polythene bags	Eg	160.00	0.2	32.00	32.00
10	Cost of procurement of sand including its carriage upto nursery	Cu Mt	500.00	0.0166	8.30	8.30
	Total cost in second Financial year				**949.50**	**1156.77**
	or say				**949.00**	**1156.00**
	Per plant cost for 2nd year				**9.49**	**11.56**
Third Financial Year Activities (April to March)						
1	Hand watering of P/bags (100 days)	No./100	2.52	100	359.33	449.16
2	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
3	Shifting and Grading of plants	No./100	33.60	1	47.92	59.90
	Total cost in third Financial year				**501.48**	**626.85**
	or say				**501.00**	**626.00**
	Per plant cost for 3rd year				**5.01**	**6.26**
Fourth Financial Year Activities (April to March)						
1	Preparing of nursery beds including layout for accomodating 7"x15" P/Bags	Sqm	28.70	1.23	50.34	62.93
2	Filling of P/bags of size 7"x15" by collection, carriage sieving of soil, mixing of Sand/manure/ humus/vermicompost/ insecticide/ pesticide including transplanting of plants already grown in 4"x6" P/bags into 7"x15" size P/bag which also include the removal of a part of ball of earth and	No./100	624.82	1	890.94	1113.68
3	Lining of P/bags	No./100	61.21	1	87.28	109.10

Sr. No.	Activity	Unit	Rate (for Wages @₹210)	Qty.	2021-22 Amount (in ₹) For Non Tribal areas	2021-22 Amount (in ₹) For Tribal Areas
4	Hand watering of P/bags (100 days)	No./100	2.52	100	359.33	449.16
5	Weeding and hoeing of plants (4 times)	No./100	16.52	4	94.23	117.79
6	Cost of vermi compost	Eg	7.00	74	518.00	518.00
7	Cost of insecticide/ pesticide	LS	-	-	80.00	80.00
8	Cost of polythene bags	Eg	160.00	0.5	80.00	80.00
9	Cost of procurement of sand including its carriage upto nursery	Cu Mt	500.00	0.125	62.50	62.50
	Total cost in third Financial year				**2222.62**	**2593.16**
	or say				**2222.00**	**2593.00**
	Per plant cost for 3rd year				**22.22**	**25.93**
Fifth Financial Year Activities (April to March)						
1	Hand watering of P/bags (100 days)	No./100	2.52	100	359.33	449.16
2	Weeding and hoeing of plants (4 time)	No./100	16.52	4	94.23	117.79
3	Shifting and Grading of plants	No./100	33.60	1	47.92	59.90
	Total cost in Fourth Financial year				**501.48**	**626.85**
	or say				**501.00**	**626.00**
	Per plant cost for 5th year				**5.01**	**6.26**
Sixth Financial Year Activities (April to June)						
1	Hand watering of P/bags (40 days)	No./100	2.52	40	143.74	179.68
2	Weeding and hoeing of plants (1Time)	No./100	16.52	1	23.57	29.46
3	Shifting and Grading of plants	No./100	33.60	1	47.92	59.90
	Total cost in 6th Financial year				**215.23**	**269.04**
	or say				**215.00**	**269.00**
	Per plant cost for 6th year				**2.15**	**2.69**
	G. TOTAL of costs for 6 years				**4569.00**	**5488.00**
	Total cost per plant				**45.69**	**54.88**
		Principal Chief Conservator of Forests(HoFF), Himachal Pradesh				

DIRECTORATE OF ENERGY
GOVERNMENT OF HIMACHAL PRADESH
SHANTI BHAWAN, PHASE-III, SECTOR-VI, NEW SHIMLA-171009(HP)

OFFICE ORDER

In supersession to Office Order endorsement No. HPSEB(Sectt)/401-Raura/02-44214-21 dated 08.07.2002, Directorate of Energy (DoE), Govt. of Himachal Pradesh, is pleased to accord Revised Concurrence to Raura SHP (12.00 MW) on Raura khad a tributary of Satluj river, District Kinnaur, Himachal Pradesh, allotted to "M/S DLI Power(India) Private Limited, 6-Shiv Wastu, Tejpal Scheme, Road No. 5, Vile Parle (East), Mumbai-400057", at an estimated cost of Rs. 94.91 crore (Rupees ninety four crore ninety one lac) only including Interest During construction(IDC), Escalation, Financial Charges(FC) and LADC @ 1.50% of total project cost with the following stipulations:

1.i) The completion cost shall not exceed the above cost except on account of the following:
   a) Interest During Construction(IDC) and Financial Charges(FC) shall be as per actuals but not exceeding the amount as indicated at Annex-I, unless revised by DoE, GoHP while according Concurrence under Section-8 of Indian Electricity Act, 2003 after review of the financial package.
   b) Change in rates of Indian taxes and duties such as Excise Duty, Sales Tax/VAT, Custom Duty and levy of any other taxes/duties subsequent to issue of Concurrence.
   c) Change in Indian law resulting in change in the cost.

ii) The abstract of the Estimated Cost approved by DoE, GoHP is furnished at Annex-I, summary of the Financial Package as considered by DoE, GoHP is at Annex-II and the Salient Features of the scheme are at Annex-III.

2. The Concurrence is subject to the fulfilment of the following conditions:

i) Completed cost/Concurrence shall not be re-opened due to the following:
   a) Non acquisition of land.
   b) Non- finalization of Power Purchase Agreement (PPA)
   c) Delay in financial closure.

ii) The final financial arrangement shall not be inferior to the financing arrangement projected in the Detailed Project Report (DPR) for Concurrence.

iii) The cost of the project cleared by the DoE, GoHP is indicative and shall have no binding on the regulator while fixing the tariff. The tariff of the project shall be regulated by the appropriate Electricity Regulatory Commission.

iv) The public issue expenses, if any, shall be reconsidered at the time of approval of completion cost based on documentary proof and in accordance with Security Exchange Board of India (SEBI) guidelines regarding regulation of public issue expenses.

v) Fulfilment of conditions stipulated in Central Electricity Authority (CEA)/Central Water Commission (CWC) guidelines in respect of civil works at the stage of detailed designs/execution.

vi) In case, changes are made in design parameters during construction due to site conditions or otherwise, the same shall be intimated and got concurred from DoE, GoHP before implementation of such changes.

vii) Any increase in the cost estimate due to design modifications and geological surprises would be absorbed by the Independent Power Producer (IPP) i.e. "M/S DLI Power (India) Private Limited, Vile Parle (East), Mumbai-400057."

viii) No additional cost shall be allowed due to Resettlement & Rehabilitation (R&R) Plan.

ix) Normal operation life of the hydro power plant shall be as per provisions of CWC/CEA guidelines or CERC/HPERC regulations.

x) The Concurrence is subject to clearance of the project and transmission line by MoEF from environmental and forests angle. The statutory and administrative clearances as per Annex-IV shall be obtained before execution/ implementation of the project.

xi) The interconnection point with the State grid and interconnection facilities at the interconnection point shall be provided, operated and maintained at the cost of the IPP.

xii) The cost of providing and/or strengthening/ additions etc. of the system at and beyond the Interconnecting Sub-station which may also include the cost of replacement of switchgear/ protection and provision of shunt capacitors, strengthening of bus bars, apart from other works required at injection voltage level and other one or more successively higher voltages, civil works relocation of existing bays etc. shall be recovered by HPSEBL/HPPTCL, as per the regulations of HPERC read with the clarifications/decisions by HPERC and/or any other competent authority as may be finally applicable. The share of IPP on this account shall be paid by the IPP to HPSEBL/HPPTCL as per the final decision of the competent authority.

xiii) Whereas the HPSEBL/HPPTCL shall endeavour to provide the evacuation system at the earliest, the scheduled date for providing evacuation arrangements shall be spelt out in the PPAs on case to case basis inter-alia, keeping in view the time lines indicated in the relevant plan and approved by HPERC.

xiv) The powerhouse generating equipment as well as other electrical equipment to be provided by the developer shall be compatible for parallel operation with the State grid after interfacing. The IPP shall be responsible for any loss of generation on this account.

xv) O&M charges for maintenance of inter connection facilities at the interconnection sub-station shall be paid by the IPP to HPSEBL/HPPTCL throughout the period, the IPP runs the project and the same shall be reviewed at the beginning of every financial year.

xvi) For evacuation of power the IPP shall interface this project with 66 kV switching station of HPPTCL planned at Urni by constructing 66 kV S/C line on double circuit structures with 0.15 sq. in ACSR "WOLF" conductor from Raura switchyard to Urni.

xvii) The project line shall be provided, operated and maintained by the IPP at his cost as per normal conditions after obtaining approval of HP Govt. under Section 68(1) of Electricity Act, 2003.

xviii) The above mentioned evacuation arrangements shall be subject to the HPERC approval of "Comprehensive area wise plan for augmenting and establishing of transmission/ sub-transmission system for evacuation of power from small HEPs" which has already been submitted to HPERC. The Transmission/Distribution Licensee may however also evolve alternate system(s) depending on the site conditions and subsequent developments with the approval of HPERC.

xix) The IPP shall develop operate and maintain the Project including the dedicated transmission system subject to compliance with the following:

a) Grid code and standards of grid connectivity.
b) Technical as well as Mechanical standards for construction of Electrical lines.
c) Norms of System Operation of the concerned State Load Dispatch Center (SLDC) or Regional Load Dispatch Center (RLDC).
d) Directions of the concerned SLDC or RLDC regarding operation of dedicated transmission line.
e) The IPP will only be allowed to inject power in HP system with the undertaking that necessary action to provide tele-metering to SLDC shall be provided by them and specifications required to be got approved from the office of SE(SLDC), HP Load Despatch Society, Totu, Shimla from compatibility point of view with existing SCADA system.

xx) The IPP shall carry out the Geological explorations as per CWC guidelines before taking up project construction and submit the report to the DoE, GoHP.

xxi) The conditions on these lines shall have to be suitably included by the developer in the PPA etc. apart from other standard conditions.

xxii) The observations of DoE, GoHP on the DPR and replies thereof shall form an integral part of the DPR.

xxiii) Minimum 15% release of water immediately downstream of diversion structure shall be ensured all the times including lean season as per Power Policy of HP Govt., 2006 and subsequent amendments thereof. The necessary monitoring equipment as per recommendations of the Pollution Control Board shall be installed by the IPP during execution of the project.

xxiv) LADC/LADF amount and activities shall be implemented as per Power policy of HP Govt., 2006 and subsequent amendments thereof.

xxv) The additional 1% (one percent) free power from the project shall be provided and earmarked for a Local Area Development Fund (LADF) as per HP Govt. Notification No. MPP-F(1)-2/2005-V dated 30.11.2009 and subsequent amendments thereof.

xxvi) The Concurrence is based on the reports and data furnished by the IPP in the DPR and it is presumed that information furnished is correct and has been collected reliably after carrying out detailed field investigations and surveys under the supervision of competent personnel. The broad technical aspects of the project proposal in the DPR have been scrutinized and it does not cover the examination of the detailed designs and working drawings of project components in regard to their structural, hydraulic and mechanical performance & safety which shall be ensured by the project authority/IPP.

3. The project shall be completed within 36 months from the date of start of the construction work.
4 The completion cost of the scheme shall be submitted to DoE, GoHP within 3 months from the Commercial Operation Date (COD) of the plant.
5 The Project Promoters/Project Authorities shall give free accessibility to the officers and staff of DoE, GoHP to have on the spot assessment of various aspects of the project.
6 The firm financial package and tie-up of balance inputs/clearances shall be completed within the period as stipulated in the HP Govt. power Policy, 2006 and subsequent amendments thereof /Implementation Agreement.
7 In case the time gap between the Concurrence to the scheme by DoE, GoHP and actual start of work by the Project Developer is three years or more, a fresh Concurrence of DoE, GoHP shall be obtained by the Developer before start of actual work.
8 Monthly Progress Report of the project shall be submitted to the DoE, GoHP. Three(3) copies of the semi-annual physical progress report of the scheme and expenditure actually incurred, duly certified by statutory auditors shall be submitted to the DoE, GoHP till the Commercial Operation of the plant.
9 The DoE, GoHP reserve the right to revoke the concurrence, if the conditions stipulated above are not complied with to the satisfaction of the GoHP.

BY ORDER OF THE GoHP

Director,
Directorate of Energy, GoHP,
New Shimla 71009(HP).

No. DOE/CE/TEC-Raura/2015- 6508 - 16 **Dated:** 08-10-2015

Copy for information and necessary action to the:

1. Principal Secretary (MPP & Power) to H.P. Govt., Shimla-171002(HP).
2. Principal Secretary (NES) to H.P. Govt., Shimla-171002(HP).
3. Secretary, Ministry of Non-Conventional Energy Sources (MNES), Block No.14,CGO Complex, Lodhi Road, New Delhi-110003.
4. Director, Environmental & Scientific Technologies, Narayan Villa, Near Wood Villa Palace, Shimla-171002(HP).
5. General Manager(C&D), HPPTCL, Borowalia House, Khalini, Shimla-171002(HP).
6. Chief Engineer (SO&P), HPSEB Ltd, VidyutBhawan, Shimla-171004(HP).
7. Chief Engineer(Commercial), HPSEB Ltd, VidyutBhawan, Shimla –171004(HP).
8. Chief Executive Officer, Himurja, 8A-SDA Complex, Kasumpti, Shimla-171009(HP).
9. "M/S DLI Power (India) Private Limited, 6- Shiv Wastu, Tejpal Scheme,Road No 5,Vile Parle (East), Mumbai-400057".

Director,
Directorate of Energy, GoHP,
New Shimla- 171009(HP)

ANNEXURE-I

Raura SHP (12.00 MW) in District Kinnaur of Himachal Pradesh of "M/S DLI Power (India) Private Limited, 6-Shiv Wastu, Tejpal Scheme, Road No 5, Vile Parle(East), Mumbai-400057."

ABSTRACT OF COST ESTIMATE

Sr. No.	Description of works	Amount (In Rs. lac)	
(a)			
1.	Civil works i/c other Misc. Expenses	5563.74	Price Level March, 2015
2.	Electro Mechanical works	1966.52	
3.	Transmission works	214.56	
	Sub Total (a)	**7744.82**	
(b)			
1.	Interest During Construction (IDC)	1121.85	
2.	Escalation	416.27	
3.	Financial Charges(FC)	68.23	
	Sub Total (b)	**1606.35**	
	Total (a+b)	**9351.17**	
(c)	LADC @ 1.50 % of (a+b)	140.26	
	GRAND TOTAL (a+b+c)	**9491.43 lac**	

Say Rs. 94.91 crore

(Rupees ninety four crore ninety one lac only)

Director,
Directorate of Energy, GoHP,
New Shimla- 171009(HP).

DLI POWER (INDIA) PRIVATE LIMITED
A DLZ Company
Office : House No. 16, H.P. Officers Colony (West End), Panthaghati, Shimla-171009, Himachal Pradesh, India
Telephone : 0177-2627915 ● Fax : 0177-2627916 ● E-mail : dlishimla@dlzcorp.com

Ref: DLI/RAU/21
Date: July 6, 2021

UNDERTAKING

This is to certify that that Raura Hydro Electric Project (12 MW) of M/s. DLI Power (India) Private Limited, is an operating plant since September 2019. The project has been built and under operation as per the Techno-economic Clearance and cost approved by the Directorate of Energy, Government of Himachal Pradesh. In case there is any revision in the TEC and the project cost in future, the difference of the same will be suitably deposited with the Forest Department by DLIPL.

For DLI Power (India) Private Limited

Divisional Manager – Commercial &
Authorized Signatory

Appendix G

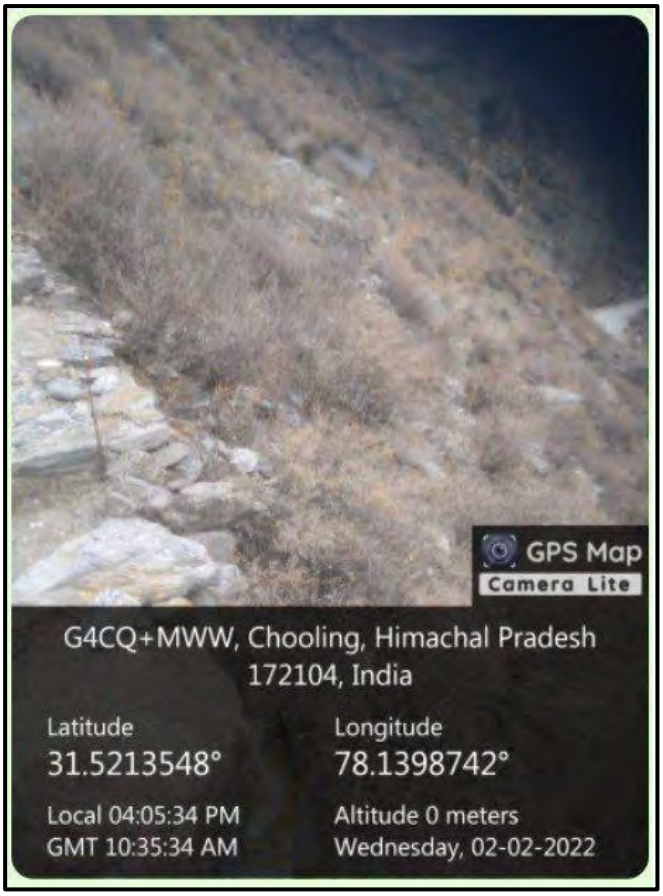
Photographs of proposed interventions in Treatable Catchment Area.

Enrichment Plantation at Tharoo, Runang

Pasture Development at Runang Kanda, Runang

Energy Plantation

Energy Plantation at Kakasthal, Tapri

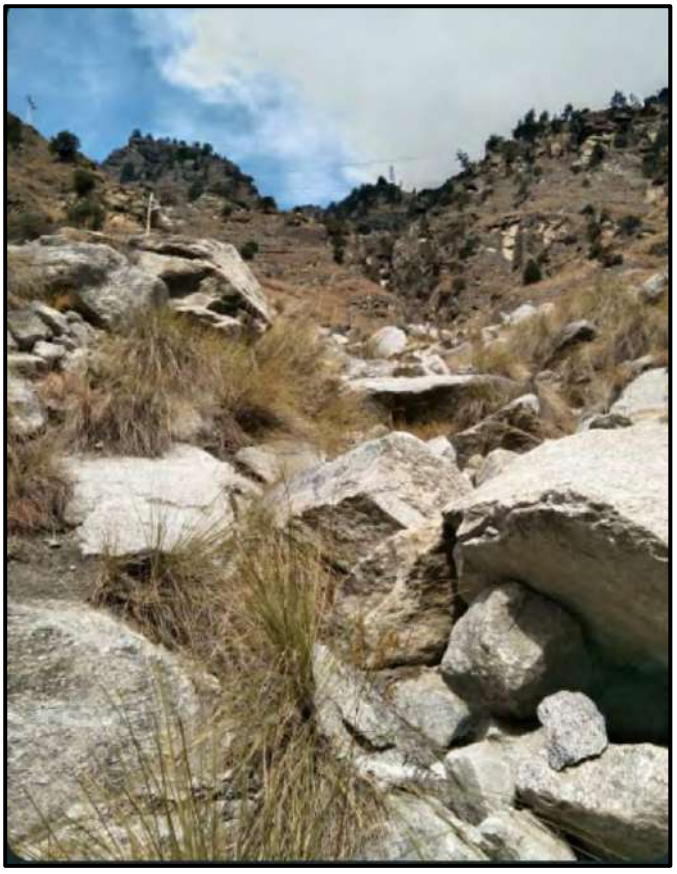


Energy Plantation at U.F Kutano, Urni

Energy Plantation at Yuldang, Urni

Soil Conservation at Runang

Soil Conservation at Rangdhul Nalla, Runang



Soil Conservation at Cholling Nala. Tapri

Soil Conservation at Janak puri Nala. Tapri

Soil Conservation at Kakasthal,Tapri

Soil Conservation at Pagal Nalla, Tapri

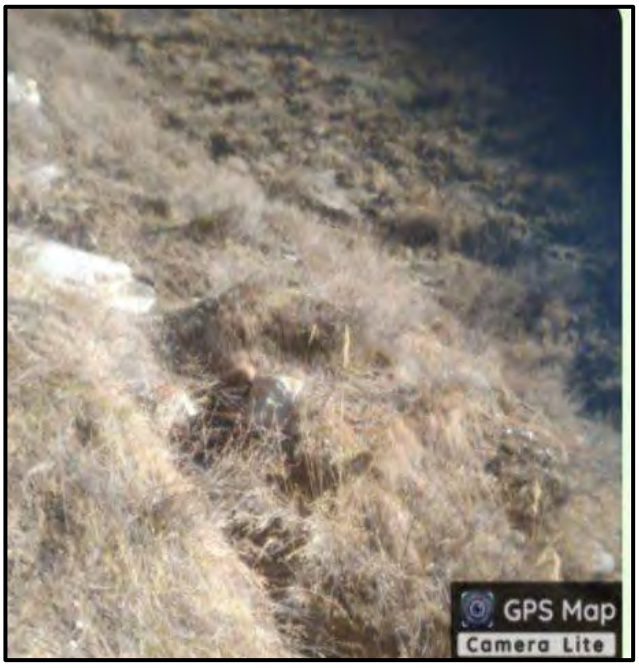
Gabion Check dam -soil conservation at Khange, Tapri

Gabion Check dam -soil conservation at Dharpo, Urni

Gabion Check dam -soil conservation at Dharpo, Urni

Medicinal Herbs Plantations at Cholling, Runang

Medicinal Herbs Plantations at Khange Nalla, Tapri



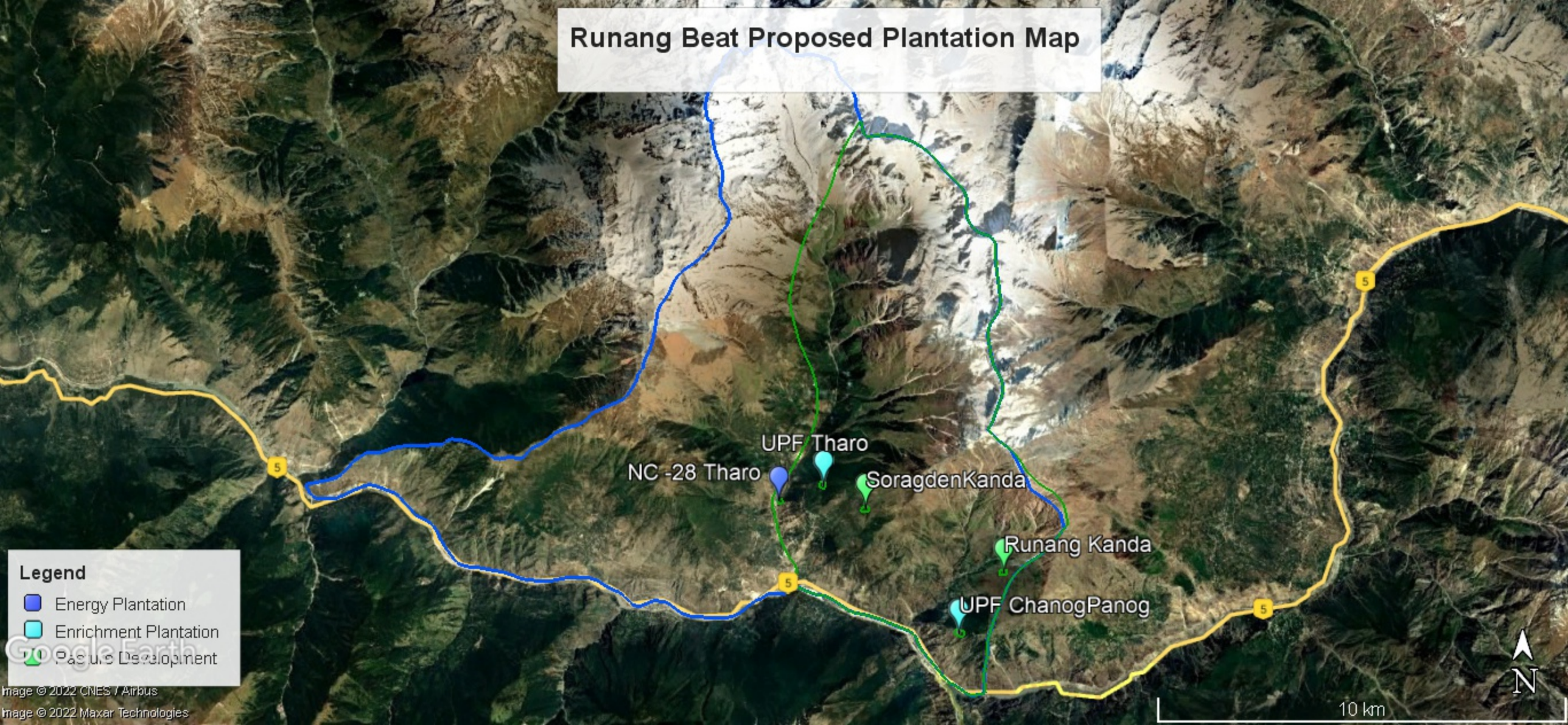
Medicinal Herbs Plantations at Dharpo Nalla, Urni

Medicinal Herbs Plantations at Dharpo Nalla, Urni

Water harvesting site for Wildlife, Runang

APPENDIX H

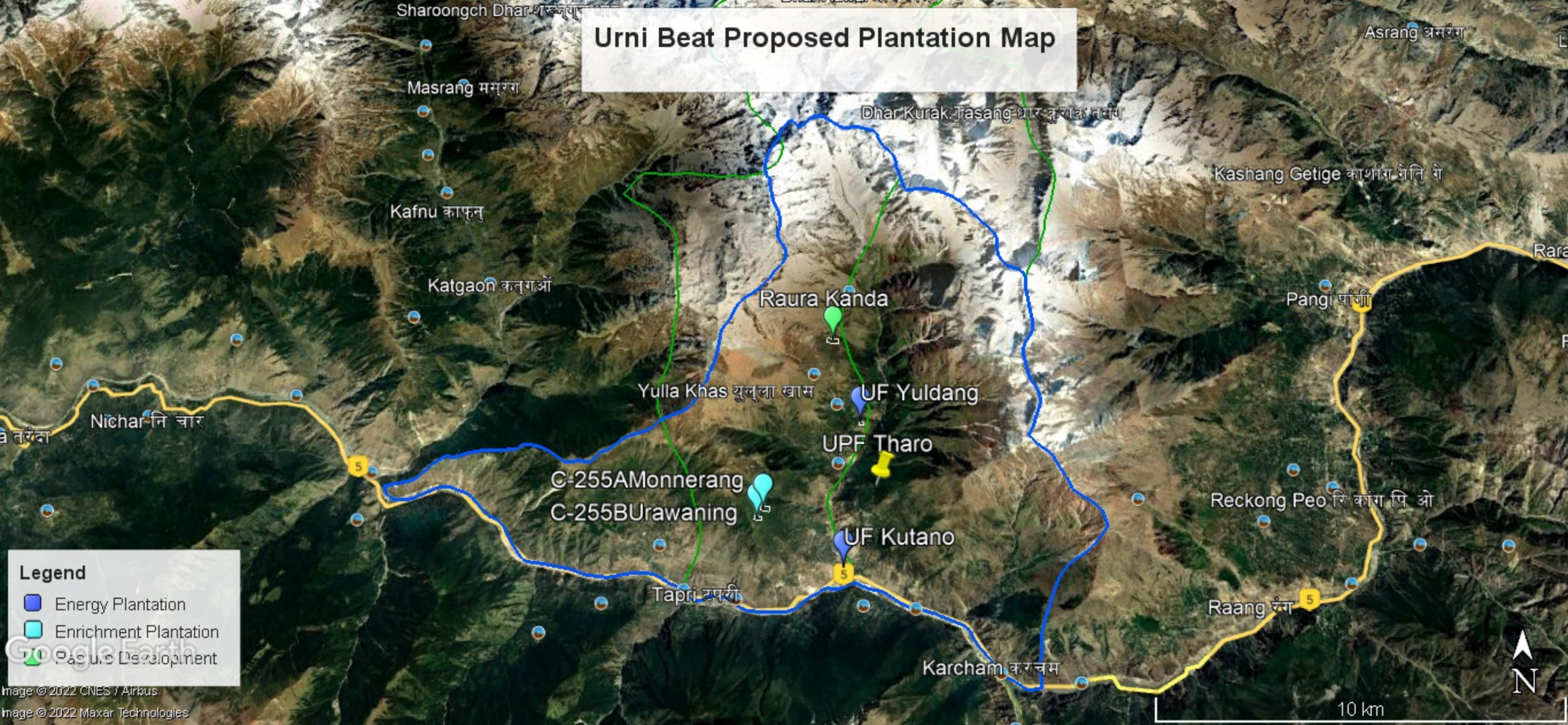
Runang Beat Proposed Plantation Map



APPENDIX I


Tapri Beat Proposed Plantation Map
Talibe Kanda
Chagaon Kanda
UPF kakashtal
C-258
NC-21
C-258 A
Legend
Energy Plantation
Enrichment Plantation
Pasture Development
Google Earth
Image © 2022 CNES / Airbus
Image © 2022 Maxar Technologies
N
9 km

APPENDIX J


Urni Beat Proposed Plantation Map
Sharoongch Dhar शरुंगच धार
Masrang मस्रंग
Kafnu काफ्नु
Katgaon कत्गओं
Dhar Kurak Tasang धार कुराक तसंग
Asrang असरंग
Kashang Getige काशांग गेति गे
Pangi पांगी
Rara
Raura Kanda
Yulla Khas युल्ला खास
UF Yuldang
UPF Tharo
C-255AMonnerang
C-255BUrawaning
UF Kutano
Nichar नि चार
Tapri टपरी
Reckong Peo रि कांग पि ओ
Raang रंग
Karcham करचम
Legend
Energy Plantation
Enrichment Plantation
Pasture Development
Google Earth
Image © 2022 CNES / Airbus
Image © 2022 Maxar Technologies
10 km
N