Annex C

Management Plans - throughout life of the Project

Annex C1

Resettlement Action Plan (RAP)

C1 INTRODUCTION

The resettlement and rehabilitation action plan comprised of the entitlement matrix and rehabilitation measures to ensure that livelihoods are restored.

C1.1 PRINCIPLES

The policy objective influencing the resettlement action plan is to avoid or minimize, to the extent possible, the hardships and impoverishment that land acquisition may cause, and to mitigate any adverse impacts thereof at the household and community levels. These objectives are detailed and made more specific in terms of the principles and guidelines to be followed for land acquisition, adoption of compensation/entitlement policies and planning and implementation of rehabilitation activities.

These principles, definitions and entitlement framework will be applicable when assessing and compensating social impacts due to the transmission line also.

C1.2 DEFINITIONS AND ELIGIBILITY FOR COMPENSATION AND REHABILITATION

C1.2.1 Project Affected Family

A Project Affected Family (PAF) is one which, as a consequence of the project, sustains losses by reasons of impact on a) land b) structure c) immovable asset and/ or d) livelihood/ incomes. A PAF will be identified through a census survey that shall be undertaken after all the design component of the project is frozen.

PAFs may include the following one or more of the following categories:

C1.2.2 Agricultural PAFs

- Titleholders
- Sharecroppers
- Tenants/ Lessee
- Non-legal Users/ Occupants

The project does not propose to impact any structure or homestead land. The sample survey also did not come across PAFs in the tenant and lessee categories.

C1.2.3 Non-legal Cultivators

All the families who are directly impacted in terms of loss of livelihood and income through loss of land, and other assets, whether they have a legal right over the land/ structure/ asset or not, are to be recognized as project affected

families and will be covered in the entitlement framework. For non-legal cultivators, no compensation will be paid for loss of land to which they do not have legal titles, but rehabilitation assistance shall be provided for loss of livelihood and income. Compensation for loss of land will be paid to the owner of that land. In case of family members have informal arrangements for use of land, the compensation money to be paid to the legal owner, may be shared by the members on the basis of their mutual understanding. It would be the responsibility of the village Panchayat and the District Administration to ensure that the compensation money would be proportionately distributed among all the rightful shareholders of the concerned property.

C1.2.4 Cut-off Dates

The project has already conducted 100% census survey of all the project affected families impacted by the land acquisition. *The cut off dates are the dates on which the census of the affected families and their assets are completed*. Any claim after the cut off dates are considered ineligible for compensation.

C1.2.5 Non-resident Owners

Compensation for loss of land/ structure/ assets will be made to owner/ owners of the land/ structure/ assets. Non-resident owners of structures/ land who do not live in the project area and have not been covered under the census survey, will have to come forward to claim their compensations. Their claim will be individually verified before disbursement of entitlements.

C1.2.6 Family Unit

Family unit, in the project context, would be household members living in one house and sharing a kitchen. All cash payments to each family unit shall be made in joint accounts (of the husband and the wife). Every family member above the age of 18 years (i.e., adult sons, unmarried/ widowed/ separated/ abandoned daughters) will be considered for specific rehabilitation assistance in form of skill up-gradation and income restoration.

C1.2.7 Vulnerable Families

Families with income below the poverty line (Rs 20,000 per annum per family)[1], families with mentally or physically challenged members, senior citizens (above the age of 60) and women headed households have been identified as vulnerable and are eligible for special assistance. In addition families losing more than 25% of their land through acquisition would be also identified as vulnerable.

[1] Source: Department of Land Revenue

C1.2.8 Most Vulnerable Families

Families losing more than 75% of their actual land holding (and not only as per land records), and Scheduled Tribe families will be categorised as "most vulnerable".

C1.2.9 Transition Allowance:

For vulnerable families, including families losing more than 25% of their total land holding after land acquisition, the project will provide rehabilitation assistance in form of a monthly Transition Allowance for a period of 1 year. In addition Transition Allowance would be provided to sharecroppers and employees for loss of income for an appropriate period of time.

C1.2.10 Land Purchase Assistance

It is likely that public knowledge of the project would result in an artificial inflation of the land prices in the immediate vicinity, especially for people who have received compensation and intend to purchase replacement land. However, in areas beyond the immediate influence of the project, the land prices are unlikely to rise substantially. The project proponents, through their land purchase assistance program shall make an assessment of the availability of land prices of different categories in a few selected areas and provide such information to those land losers willing to purchase replacement land
The land purchase assistance will therefore:

- Assist the family in identifying alternate lands
- Provide information on market prices

C1.2.11 Tree Shifting Assistance

Wherever demanded, and technically feasible, the project proponents will assist the PAFs in shifting their apple trees to another part of their land holding not affected by the project or in new plots of land purchased. This assistance will involve providing vehicle to move trees as well as technical support from experts brought to the area for the purpose. The PAF will be responsible for the uprooting and re-planting of the tree. While the survival rate of such trees are not known, this assistance will not bar the PAF to be eligible for various other entitlements outlined under the relevant categories. This assistance will be more of a good will and confidence building measure by the project proponent, specially as PAFs have requested this assistance in various public consultations.

C1.2.12 Skill up-gradation and income restoration assistance

All Project Affected families will be eligible for special skill enhancement income restoration assistance to enable them to restore and preferably enhance their incomes through supplementary avenues.

C1.3 LAND ACQUISITION AND IMPACT MITIGATION PRINCIPLES

C1.3.1 Land Acquisition

The Government of India had initially approved the diversion of 77.272 Hectare (Ha) land for the implementation of the Allain Duhangan Hydroelectric Project. RSWL optimised the requirement to 58.77 Ha as per ***Table C-1***.

TableC-1 Details of Land Acquisition

Land Type	Prini	Jagatsukh	Aleo	Hamta	Total	%
Private, Ha	9.01	0.41	0.99	-	10.41	18
Forest, Ha	-	-	-	-	37.69	64
Government, Ha	-	-	-	10.67	10.67	18
				Total	58.77	100

The details of acquisition of private land acquisition in village Prini measuring 6.830 ha (84.41 Bigha) are as follows:

The Negotiation Committee constituted by the Government of Himachal Pradesh, under the Chairmanship of Deputy Commissioner, Kullu held negotiations with the land owners of Village Prini on 28 August 2003 to finalise the cost of land. Thereafter during a public hearing held on 20 May 2004, the villagers demanded an increase in the land rates negotiated and finalized earlier. Subsequently, the RSWL accepted the demand and agreed to a higher compensation.

The entitlement framework for land acquisition is provided in later sections.

It is estimated that approximately 185 families will be impacted through land acquisition. No tenants or sharecroppers were identified by the Census Survey.
In keeping with the policy objectives stated above, ADHPL will adopt the following measures:

- To the extent possible, negotiate and buy the land required at market price. Only in cases where negotiations break down or do not take place, the project can go in for land acquisition, the process for which is already underway.
- Explore alternative designs and alignments to minimize the need for land acquisition. Even within this the aim would be to minimize the need to acquire private land and substitute it with government or revenue land.
- Ensure that no homesteads are being impacted.
- Wherever feasible, road alignments and location and design of colonies will use land that are of lower productive value in terms of productivity and use.
- Ensure that the project activities do not impact religious sites, cultural property and common property resources.
- Wherever land holdings left after land acquisition become economically unviable, the landowners will be given option to offer the entire holding for acquisition.

Impact Mitigation

Beside provisions outlined in the law of the land for land acquisition, provisions of the IFC and World Bank will be used to supplement those.

- As opposed to the requirements in the acquisition law, absence of legal titles will not be a bar to assistance, especially for the socio-economically weaker sections.
- Vulnerability, in terms of women headed households, family with aged and physically challenged members, and families below the poverty line, will be identified and issues specific to them will be addressed through appropriate policies and support. In addition families losing more than 25% of their land, after acquisition, will also be identified as vulnerable.
- Land alienation will be prevented in the case of tribal families, through a land-for-land provision unless the PAF demands otherwise.
- At present the project does not intend to impact any Common Property Resources or cultural property. However, in case, after designs and alignments are complete, and if some elements may cause community wise impacts (restricting access to CPRs, or use of community facilities etc.) the project will re-build such facilities and provide for alternative access.

C1.3.2 Entitlement Framework.

The compensation modalities are based on the assumption that no residential structures, homestead land, CPRs and cultural property will be impacted by the project.

Compensation for loss of land and assets

- Compensation for the acquired lands will be paid at costs negotiated on the basis of current government norms. The process to determine land value will be in consultation with the landowners.
- All affected non-land property, such as structures and trees, seasonal and perennial crops, orchards and other immovable items of value, will be compensated at negotiated costs.
- Families losing more than 75% of their land after acquisition, will be identified as most vulnerable and the project will provide them an option of cash compensation or an alternative land equivalent in size, value and quality to that they are losing.[1] The land should not be far from where these families are currently located. The project proponent will seek the assistance of the revenue department for this purpose
- All affected Scheduled Tribe families will be provided a similar option of land for land.
- PAFs would be assisted in moving and re-planting of their apple trees in other plots of land owned by them or in new plots brought by them.
- Compensation and entitlements will be paid in full ***before*** the PAFs are evicted from the acquired land.
- Utilisation of compensation money will be regulated by the project proponent to ensure that the cash is not spent on waste full expenditure. The project will encourage and facilitate the PAFs to use the money for building their asset base, repayment of debts, starting some enterprise of their own etc.

Compensation for loss of livelihood and incomes

Rehabilitation assistance is to be provided to all PAFs who will lose more than 25% of their total landholding and whose livelihoods and incomes are to be affected by the loss of land and asset (mainly trees). While the compensation for the loss of land/ asset will enable them to replace their affected land/asset, the rehabilitation assistance (in the form of a transition allowance, and skill development and training schemes, etc.) will allow the PAFs to tide over the transition period immediately after incurring the loss and till the time they are able to re-establish their original economic activities or initiate new ones.

Mitigation of Impacts on Cultural Property / Access to Common Property Resources, Public Infrastructure and Amenities

The project designs till the time of the survey has ensured that no cultural or common property will be impacted. However, where impacts on cultural properties are unavoidable at a later stage, the structures will be relocated and restored in a convenient location in a culturally appropriate manner in consultation with the local community. Where common property resources

[1] Similar arrangement was made for people becoming landless in the "R & R Policy for Project Affected Persons" in the Naptha Jhakri Hydroelectric Project.

such as grazing lands are affected, alternative arrangements would be made at an appropriate location.

C1.3.3 Addressing Safety Concerns

Safety concerns and accident hazards, likely to result due to new roads will be appropriately addressed at the design stage.

C1.3.4 Participation and Consultations

Finalisation of the entitlement packages and the rehabilitation measures shall be done in a participatory manner, with active involvement of the local community and village institutions. Regular consultations shall be held with the local community at the time of implementation of the social impact mitigation plan. The implementation process shall be monitored and evaluated by independent agencies and a grievance redressal mechanism shall be established to identify problems and take appropriate corrective actions.

C1.4 ENTITLEMENTS

C1.4.1 Entitlements for Agricultural PAFs

Legal Title-owners

1. Compensation for Loss of Land: Cash compensation shall be paid to landowners for the affected parcel of land at negotiated value (minimum compensation should be the prevailing government norms for equivalent category and location of land, and to be determined by the negotiation committee.). Seasonal and perennial crops grown on that land will be compensated at 3 times the net average annual income from that land during the last three years.

1 a) If the agricultural PAF is losing more than 25% of the total landholding:

PAFs losing more than 25% of their landholding would be classified in the vulnerable category. The project authorities in such cases, shall pay, in addition to the negotiated value, rehabilitation assistance in the form of a transition allowance, skill upgradation through vocational training and income restoration programs.

1 b) If the agricultural PAF is losing more than 75% (of the total landholding:

Families losing more than 75% of their land after acquisition, will be identified as most vulnerable and the project will provide them an option of either cash compensation at negotiated value or an alternative land equivalent in size, value and quality to that they are losing. The land that will be provided free of any transaction costs such as registration fee, transfer taxes etc. The project proponent will seek the assistance of the revenue department for this purpose.

If such PAFs choose the option of alternate land, and would like to start cultivation there, the project will provide additional start-up assistance, equivalent to 3 months transition allowance.

The project authorities in such cases, shall also pay, rehabilitation assistance in the form of transition allowance, skill upgradation through vocational training and income restoration programs, irrespective of whether the remaining parcel of land is viable or not.

1c) If agricultural PAF belongs to the ST category

All ST families will be provided an option for land equivalent land (wherever feasible and available) in area and in quality to the land getting acquired. The land that will be provided free of any transaction costs such as registration fee, transfer taxes etc. The project proponent will seek the assistance of the revenue department for this purpose.

2. Rights to Use of Land: The affected landowners shall have the right to use the land till compensation has been fully paid. Also adequate notice (minimum of 3 months) has to be provided before eviction and the cultivator shall have the right to harvest standing crop sown before the eviction notice is issued. *This provision is not necessary if the compensation of land includes the compensation for standing crop.*

3. Loss of Trees: Compensation for loss of trees which are present within the affected parcel of land will be based on negotiated value of the trees, calculated on the basis of the annual productivity of the trees and the average productive life span of the trees. [1]

4 Loss of Assets, if any: If the agricultural PAF has any immovable asset /s which is located within the affected parcel of land, such as private tap-stands, other irrigation structures, cattle troughs and sheds, then loss of all such assets shall be compensated.

5. Loss of Livelihood/ Income:

7 a) Transition Allowance - A monthly transition allowance of Rs 2000[2] will be provided to all vulnerable agricultural PAFs for a period of one year.

7 b) Income Restoration Programs -Rehabilitation assistance in the form of skill upgradation through vocational training and income restoration programs will be provided to all PAFs, irrespective of vulnerability.

[1] The Department of Horticulture in HP has determined a formula for compensating fruit bearing tree. However, in our assessment, this may be lower than the present market value of the tree. Hence the value determined by the Horticulture Department would need to be appropriately "topped up". The exact amount of topping up would need to be decided by independent assessment by experts.

[2] TA amount is slightly more that the current poverty line of Rs 20,000/annum per family. The project will like to ensure that no family falls below the poverty line in the course of the project.

7 c) Land Purchase Assistance Program: Land Purchase assistance as defined in section 10.5.1 will be provided to all PAFs wanting to purchase alternate land.

7d Tree Shifting Assistance: as defined in section 10.5.1 will be provided if so demanded by the PAF.

C1.4.2 Non-legal Users/Occupants of Agricultural Land

Non-legal occupants of agricultural land are not directly eligible for compensation for loss of land. [1]They are however eligible to the following entitlements:

1. Loss of Crop Income: Seasonal and perennial crops grown on that land will be compensated at 3 times the net average annual income from that land during the last three years.

2. Rights to use of Land: The PAFs shall be provided adequate notice (minimum of 3 months) before eviction and the cultivator shall have the right to harvest standing crop sown before the eviction notice is issued. *This provision is not necessary if the compensation of land includes the compensation for standing crop.*

3. Loss of Trees: Compensation for loss of trees owned by the PAF which are present within the affected parcel of land cultivated by the PAF will be paid based on negotiated value of the trees, calculated on the basis of the annual productivity of the trees and the average productive life span of the trees.

4. Loss of Assets, if any: If the agricultural PAF has any immovable asset/s which is located within the affected parcel of land, such as private tapstands, other irrigation structures, cattle troughs and sheds, then loss of all such assets shall be compensated.

5. Loss of Livelihood / Income:

7 a) Transition Allowance - A monthly transition allowance of Rs 2000 will be provided to all vulnerable PAFs for a period of 1 year.

7 b) Income Restoration Programs -Rehabilitation assistance in the form of skill upgradation through vocational training and income restoration programs will be provided to all PAFs

7c Tree Shifting Assistance: This assistance would be provided if so demanded by the PAF.

C1.4.3 Entitlement for Sharecroppers

All sharecroppers will be identified during the census survey. If a family is practising sharecropping continuously on the land to be acquired, for over

[1] They will get a share of the money from the title holder and not directly from the LAO. The Panchayat will ensure that the land compensation will be fairly divided among rightful shareholder of the land, even if the land record are not updated and do not recognise them as owners. Mahila Mandals in each village will monitor the process.

three years, they would be eligible crop compensation for seasonal and perennial crops grown on that land. The compensation will be 3 times the net average annual income from that land during the last three years. In addition they will also be eligible for a Transition Allowance of Rs 1000 per month for 6 months[1] as entitlement against loss of income. The census survey will verify their claim through discussions with other villagers and the village Panchayat.

The sharecropper families will be eligible for rehabilitation assistance in the form of skill upgradation through vocational training and income restoration programs

C1.4.4 Entitlement for loss of employment

People, employed in land that will be acquired for the project for at least three years, will be compensated for the loss of income. **Such people will be identified by the census survey** and will be entitled to a Transition Allowance of Rs 1000 for six months. Claims for employee status will be verified through discussions with other villagers and the village Panchayat

Employees, in addition, will be eligible for rehabilitation assistance in the form of skill upgradation through vocational training and income restoration programs

C1.4.5 Entitlement for Vulnerable Families

Vulnerable families under each category of PAFs are eligible for special rehabilitation assistance, as outlines in the sections above.

C1.4.6 Entitlement for Scheduled Tribe Families

All vulnerable ST families will be eligible for the special assistance being provided for vulnerable families. In addition, and following the Himachal Pradesh's policy of prevention of land alienation among tribals in the state[2], the project will provide lands-for land option to all tribals whose land is getting acquired for the project. The land that will be provided will be equal in size, value and quality to the one they are losing.

[1] The TA is less in this case and for a shorter duration because sharecroppping is done only for a few months in a year. Sharecropping income is rarely the primarily source of income for families. It rather supplements the income from land that the family owns and cultivates.

[2] Himachal Government has various policies to ensure that tribals do not get alienated from their lands, and that such land transfers are strictly regulated. Various project specific R & R policies (e.g. Naptha Jhakri & Baspa-II HEP) provide for alternative lands or employment for tribal families.

Table 1.4 Entitlement Matrix for Allain Duhangan Hydroelectric Project

Category Of Loss	Entitled Person (EP)	Sub-Category Of EP	Entitlement	Rehabilitation Assistance
Agriculture land	Owner of land	Losing < 25% of total land holding	• Cash compensation for land at negotiated value, based on current government norms. • Cash compensation for seasonal and perennial crops at 3 time the net average income from that land during the last three years. • Compensation for loss of assets and trees at negotiated cost • Compensation for loss of standing crop at negotiated value • Right to use the land till compensation is fully paid/settled	• Land Purchase Assistance • Tree Shifting Assistance • Eligible for skill enhancement and Income Restoration Programme
		Losing between 25-75% of total landholding (vulnerable)	• Cash compensation for land at negotiated value • Cash compensation for seasonal and perennial crops at 3 time the net average income from that land during the last three years • Compensation for loss of assets and trees at negotiated cost • Compensation for loss of standing crop at negotiated value • Right to use the land till compensation is fully paid/settled	• Transition Allowance of Rs 2000 per month for 1 year. • Land Purchase Assistance • Tree Shifting Assistance • Eligible for skill enhancement and Income Restoration Programme

Category Of Loss	Entitled Person (EP)	Sub-Category Of EP	Entitlement	Rehabilitation Assistance
		Losing > 75% of total landholding (vulnerable)	• Cash compensation for land at negotiated value, or • Land equivalent in size and quality in an appropriate location. The land that will be provided free of any transaction costs such as registration fee, transfer taxes etc. The project proponent will seek the assistance of the revenue department for this purpose • Cash compensation for seasonal and perennial crops at 3 time the net average income from that land during the last three years • Compensation for loss of assets and trees at negotiated cost • Compensation for loss of standing crop at negotiated value • Right to use the land till compensation is fully paid/settled	• Transition Allowance of Rs 2000 per month for 1 year. • An additional start up assistance for families choosing the land option and aiming to start cultivation in that land. • Land Purchase Assistance • Tree Shifting Assistance • Eligible for skill enhancement and Income Restoration Programme
	Non legal users/Occupants*	Losing < 25% of total land holding	• Cash compensation for seasonal and perennial crops at 3 time the net average income from that land during the last three years • Compensation for loss of assets and trees at negotiated cost • Compensation for loss of standing crop at negotiated value • Right to use the land till compensation is fully paid/settled	• Land Purchase Assistance • Tree Shifting Assistance • Eligible for skill enhancement and Income Restoration Programme
		Losing > 25% of total land holding (vulnerable)	• Cash compensation for seasonal and perennial crops at 3 time the net average income from that land during the last three years • Compensation for loss of assets and trees at negotiated cost • Compensation for loss of standing crop at negotiated value • Right to use the land till compensation is fully paid/settled	• Transition Allowance of Rs 2000 per month for 1 year. • Land Purchase Assistance • Tree Shifting Assistance • Eligible for skill enhancement and Income Restoration Programme

Category Of Loss	Entitled Person (EP)	Sub-Category Of EP	Entitlement	Rehabilitation Assistance
	Sharecropper		Cash compensation for seasonal and perennial crops at 3 time the net average income from that land during the last three years	• Transition Allowance of Rs 1000 per month for 6 months
	Employee on that land			• Transition Allowance of Rs 1000 per month for 6 months
	Scheduled Tribe families		• Cash compensation for land at negotiated value, or • Land equivalent in size and quality in an appropriate location. The land that will be provided free of any transaction costs such as registration fee, transfer taxes etc The project proponent will seek the assistance of the revenue department for this purpose. • Cash compensation for seasonal and perennial crops at 3 time the net average income from that land during the last three years • Compensation for loss of assets and trees at negotiated cost • Compensation for loss of standing crop at negotiated value • Right to use the land till compensation is fully paid/settled	• Land Purchase Assistance • Tree Shifting Assistance • Eligible for skill enhancement and Income Restoration Programme
	Vulnerable Families**			• Transition Allowance of Rs 2000 per month for 1 year. • Land Purchase Assistance • Tree Shifting Assistance • Eligible for skill enhancement and Income Restoration Programme

**Non legal cultivators will get their share of the compensation for land from the title holders and not directly from the LAO.*

***Vulnerable families will be identified and specially supported under each loss category, including ST families.*

C1.5 REHABILITATION MEASURES

As described in the section on entitlement framework, all PAFs will be eligible for rehabilitation support. In addition vulnerable families, including those that will lose more than 25%of their land through acquisition, will be entitled to additional support. Rehabilitation support will consist of the following provisions:

- Transition Allowance for a specified period of time for loss of income and livelihood for vulnerable families (defined in the entitlement framework)
- All families who are impacted directly or indirectly by the project will be eligible for skill upgradation and income restoration programmes as well as Land Purchase Assistance.
- The project will also use the opportunity to initiate a broader Community Development Programmes, targeted at all the village community in the four villages influenced by the project.(this has been described in details in the chapter on Community Development Plan)

This section focuses specifically on the skill upgradation and the income restoration programme.

C1.5.1 Income restoration

The section on project impacts has indicated that while a majority of family incomes are getting marginally impacted (< 25%) there are still a significant number of families (upto 15%) who may have a serious to severe impacts on their family income. Following IFC guidelines, the rehabilitation plan will focus on restoration of incomes, specially for vulnerable families and use this process to initiate a larger and sustainable community development programme. The income restoration strategy will have the following components.

a) Land Based Livelihoods

Restoring Apple Orchards

For the severely affected families (losing more than 75% of land), and ST families, the project will try to offer an option of land-for land. There will also be PAFs who will have viable plots of land left after acquisition. If these PAFs so request, and if it is technically feasible (suitability of terrain, age of trees etc.) the project proponent will help the PAF in shifting apple trees from the land to be acquired to the replacement land (through vehicles and technical support). While the local people who have been growing apples for decades, would be the most knowledgeable about how feasible this option is and how best to increase survival rates, they may need advice from specialists from the Horticulture Department. The project proponent will facilitate this process by inviting such specialists for a training session, which will identify the kind of trees to be shifted for best survival, the best time and method of doing this and the risk factors and mitigation steps. Such training sessions will be held for each village separately (Prini, Hamta, Jagatsukh and Aleo).

Improving Productivity of land

As the primary occupation in the region is agriculture, the project will initiate a land productivity enhancement drive in the 4 villages of Aleo, Prini, Jagatsukh and Hamta. This will include forming a team of experts/resource persons who will discuss land productivity issue with the local villagers and GPs in the villages, assess the ground situation in the field and the current agricultural practices, and come up with a strategy for intervention in productivity enhancement. This team of experts will comprise specialists from the field of agriculture, horticulture and rural development among others, brought together from government and non-government sources. The team will also explore the possibility of multi-cropping and vegetable gardening to enhance rural incomes, without significantly disturbing the local land use.

This land productivity improvement initiative will be linked to the Community Development Planning and Implementation process outlined in the section on CDP.

b) Non-land based livelihoods

Consultation with the local community and the sample survey revealed that job and income generation opportunities are very limited in and around Manali. Tourism industry is the biggest employer in the service sector. While most family depend on agriculture for livelihood, incomes are supplemented by providing vehicles for transport and tourism, while some families lease/rent out their land and houses for hotels and other tourism related activities. The people, specially the educated youth, are looking for local employment or self-employment opportunities to enhance family incomes. This will also buffer the severe cash crunch families face during bad harvest years, which are frequent in the area.

Employment during construction phase

The construction phase of the project will require unskilled and semi-skilled labour. The project will ensure that the project affected families are given priority in such employment opportunities. Wherever some amount of skill enhancement is required, and there are eligible people among PAFs who could be trained to carry out such activities, such people will be identified during the census survey through specific skill assessment survey, and be appropriately trained. Where possible, the project proponent will aim to employ at least one member from each vulnerable family.

The project proponent are of the opinion that to provide people labour employment opportunities would be short-sighted, as often those employed labour find themselves out of work once the construction phase is over and the contractors move away. Hence the idea would be to encourage and train them to become self-employed by providing services (tea and grocery shops, restaurants, repair services etc.) to cater to the project or train them to able to

do semi-skilled work as discussed in the next section. This would be a more meaningful and sustainable support and help that the project can provide.

Skill Upgradation and micro-enterprise

In face of job constraints in the area, skill upgradation and self-employment would be a vital input in the process of income restoration. While the general level of literacy among the youth is high, they would need guidance and training, as well as initial financial support to start any venture of their own.

The project will create a Rehabilitation and Community Development Cell, which will oversee the income restoration programme as also the Community Development Programme. This cell will comprise of a Community Development Officer and at least two support staff. The cell will first conduct a skill assessment survey, and through consultations with the PAFs, identify 3-4 skills that be suitable for the local area and will have a local market. Some such skills could be automobile repair, tourist guides, drivers and tour operators, computer based skills etc. The objective would be to train the identified people to be able to avail the local employment opportunities, specially linked to the local tourism industry as well as the project population. The cell will also hold Focus Group Discussions with women to understand their choices in terms of skills to be acquired and enable them to equally avail of local opportunities. The local women are skilled weavers and one option could be to further develop and refine these skills to suit the local and outside market. Specific programmes could be identified for women in Hamta village who stay behind to look after their houses and cattle during the winter season in Hamta, while the rest of the family moves down to Prini. The winter months could be used by these women to generate additional income for the family.

The CD officer will identify an NGO or social organisation/ institution that could take over the entire responsibility of identifying skills, setting up training programmes, providing linkages to local micro-credit schemes, including through SHGs, and supporting the trained persons to find suitable jobs in the local market. This entire process could either be done as a separate exercise, or as a part of the village community development programme. The specific activities and programmes would be identified through the village micro-planning exercise.

C1.5.2 Focus on women

The entire rehabilitation exercise will undertake immediate and practical initiatives to ensure that the lives of women in the area are significantly improved and that they are able to adapt to the potential changes that the project may bring about in the local environment and economy. Some of these steps include:

- Ensuring that women play an equal role in decision making on the utilisation of compensation money. The owner of land who is entitled to

the cash compensation, would be encouraged to open a joint bank account, to be operated by both spouses.

- Reducing workloads of women by encouraging (through advice) and enabling (by contributing to the village funds) the village development programme to focus on basic necessities like provision of drinking water, access to fuelwood and fodder, improved household appliances, specially for cooking and agriculture and most importantly, access to better health services.
- Increasing incomes by setting up Self Help Group, training and access to markets.

Through a combination of the above measures, the project will ensure that incomes of the PAFs, specially the vulnerable families, ST families and women are improved over a period of 2-3 years. The process will be closely monitored by a rigorous internal monitoring as well as independent external evaluation.

Annex C2

Indigenous People's Development Plan (IPDP)

C2 INTRODUCTION

IFC guidelines require that the:

- Indigenous people benefit from the development projects
- The project should avoid or mitigate potentially adverse affects on IP caused by the Bank-assisted projects.

Special action needs to be undertaken where the Bank's investments affect indigenous peoples, tribes, ethnic minorities, or other groups whose social and economic status restricts their capacity to assert their interests and rights over land and other productive resources.

The definition of indigenous is broad and includes communities that exhibit distinct characteristics as a cultural group, have close attachment to ancestral lands, use an indigenous language, often different from the national language, primarily depend on subsistence production and adhere to customary social and political institutions.

C2.1 THE INDIAN CONTEXT

The Constitution of India identifies certain groups/communities as tribal groups and lays out special provisions for such group with the objective of promoting and safeguarding the social, educational and economic interests of the Schedules Tribes. While people use different interpretation of the term "tribes", the word has not been described in the Constitution. It rather prescribes a method and an agency for designating them as such. The President is empowered to specify, after consultations with the Governor of a state "tribes or tribal communities" to be listed under the Schedules tribe list. In the context of India, therefore, tribal groups are considered concomitant with indigenous people as defined under the IFC PS-7.

As brought out by the sample survey, the project area has only about 3% tribal population. Most of these tribals belong to Lahaul and Spiti and may have land at both Lahaul and in Manali area. They do not live in any separate clusters of hamlets but are part of the main village, and in no major way, different from the other village community.

The project area also does not fall within the "Scheduled Area" of the state. These areas are determined by the Sixth Schedule of the Constitution on the basis of preponderance of tribal population; compactness and reasonable size of the area; under-developed nature of the area; and marked disparity in economic standard of the people.

Hence a separate Indigenous People's Development Plan is not recommended under this study. The vulnerable families among STs will be eligible for special support as other such families. In addition ST families will be provided an option of land for land against land acquisition.

C2.2 RESPONDING TO OTHER COMMUNITY CONCERNS

The villagers have voiced several concerns ranging from invasion of their local culture and lifestyle by the presence of outsiders, fears about damage to crop and trees through pollution and dust, specially during construction, increase in pressure on local services and amenities etc. Some of these concerns would be addressed and assuaged through consultations and proper information dissemination, so that rumours and unnecessary issues do not get encouraged. The ESMMP will ensure that dust, pollution and safety concerns will be minimised and that there would be negligible impacts on crops and habitation. Similarly, the villagers will be informed in detail about the project activities and assured that they will continue to have adequate water, even after a part of the water in Duhangan stream is diverted.

While no major impacts are envisaged on common property resources, there may be families who may lose access to the fuelwood they used to access from the forest areas to be impacted by the project. The Community Development Programme has the scope and flexibility to address these community level issues CDP can explore possibilities of afforestation or regeneration of degraded areas or village common lands, or exploring opportunities on alternative fuels in the area.

Concerns have also been raised about loss of access to high quality potato seeds from the potato farm, which is now closed. While this issue was not brought out by villagers during various public consultations held, the project proponents will provide seeds of similar quality to the village Panchayats, if so requested.

The labour camps being constructed will have adequate infrastructure for basic services and would not in any way depend upon the infrastructure at the villages. Local communities will be trained and supported financially to set up petty business and services to cater to the needs of the labour camps and the project in general.

Annex C3

Community Development Plan

Any company, along with active support from government, has a role to play in development of an area in which it works. In most cases, it is difficult to operate and do business without the co-operation of the local communities and other stakeholders. To build a good rapport with the local communities, it is essential to engage the local community along with village level institutions in an ongoing process of consultations and discussions involving the kind of joint initiatives the project can initiate for the sustainable development in the village.

While the entitlement framework and rehabilitation action plan specifically focus on the project affected families, the project proponents see this project as an opportunity to initiate a broader community development programmes in the area.

The community development plan is based on the following principles

- Consultations with community members and key stakeholders through all the phases of the project
- Building trust among the company, community members and other stakeholders for successful implementation of the project as well as community development plan
- Roles of the company in development activities of the villages and its commitment towards the community development programmes need to be clearly defined as community members, village level institutions and local government department may have huge expectations from the company.
- The project staff will have to develop adequate skills in implementation of the community development plan if it plans to implement the programme. Otherwise the company can have a partner organisation (a local reputed NGO) to facilitate the implementation process.
- The local, state level and the central governments have many existing/on-going development programmes for up-liftment of village communities. In such cases the project need not duplicate the efforts, rather the community development programme can be dove tailed into on going programmes
- The community development plan should be able to yield long-term benefits to the community members. Therefore, these programmes have to be sustainable even beyond company's involvement. This is possible by building the capacities of the local communities to manage such programmes and develop strong partnerships with other organisations.
- The community will demonstrate its involvement in the programme through cash and labour contributions.

C-3.1 COMMUNITY DEVELOPMENT

Allian Duhangan Hydro Power Project activities would be spread over a few villages like Aleo, Prini, Jagatsukh, Hamta etc. While Aleo and Hamta would be marginally affected, as only the road would pass through the villages, Jagatsukh and Prini would be affected in a major way as colonies for the project staff are proposed in these villages. Prini would be affected by the construction of road as well. Some focus group discussions were held with the community members- separate discussions with women, GPs, men, elderly people- to understand their apprehensions and expectations from the project.

This section presents a brief outline of the processes that would be adopted for planning and implementation of CDP, which would ensure that the apprehensions of the local communities, especially those not directly affected by the project are dealt with. Some major concerns expressed by the larger community included:

- Additional pressure on local resources like water, fuel wood, fresh vegetables, milk etc
- Impact on irrigation potential, specially in Jagatsukh
- Loss of forests surrounding the villages

The CDP would like to utilise the existing local institutions and enhance the on-going programmes in these village rather than duplicate the efforts or initiate parallel institutions. Some of existing village level institutions that are also functional include:

- Gram Panchayat (GP) which is local governing body and undertakes most development works in the villages
- Village committee locally called '*nyayaik samiti*' which resolves local conflicts and discusses the main problems of the village
- Jagatsukh and Prini have Watershed Development Committees (WDCs) Jagatsukh also has a Joint Forest Management (JFM) committee and few Self-Help Groups (SHGs) (i.e. informal savings and thrift societies)

The following sub sections presents the kind of activities and the phases in which these can be initiated.

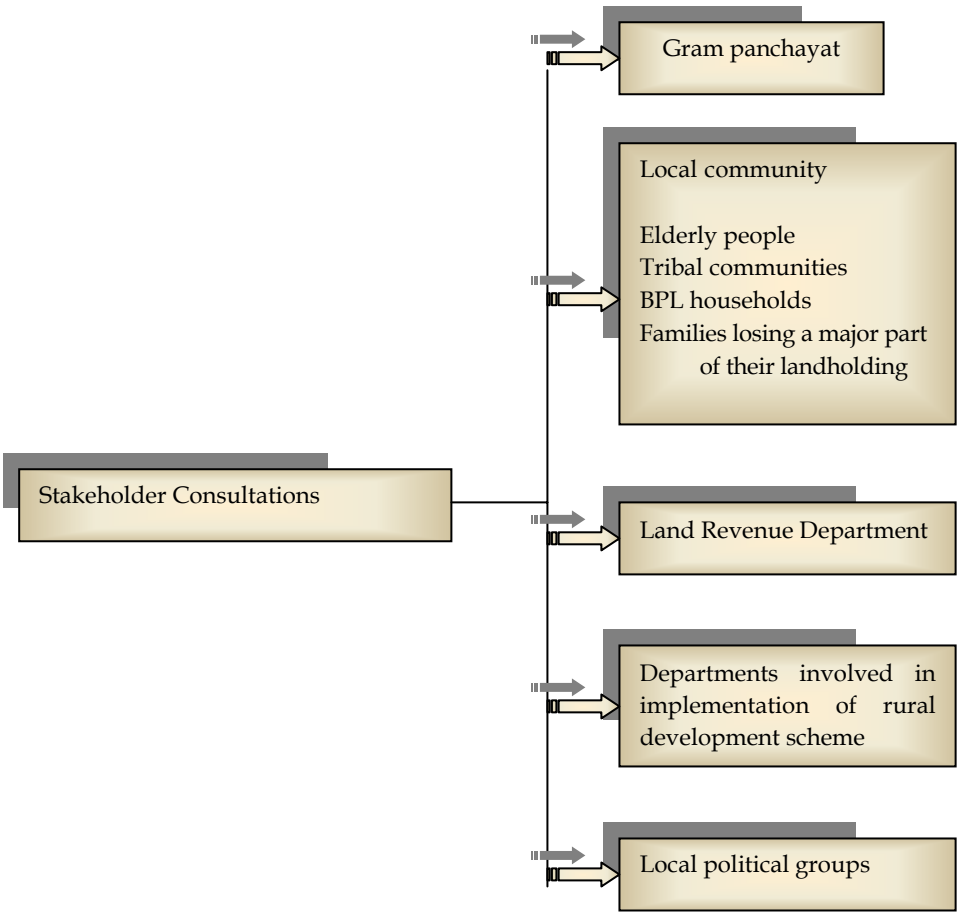
C-3.2 STAKEHOLDER CONSULTATIONS

The project proponents would need to initiate an on-going process to engage stakeholders in meaningful consultations. The main stakeholders for the project include

- Local communities, both directly and indirectly affected by the project:
- The Gram Panchayats
- Local political groups
- The Land Revenue Department
- Other government departments like Himachal Pradesh State Electricity Board, Department of Power, Department of Finance, Forest Department, Tribal Development Department, District Treasurer

While the stakeholders at the local, state and central government levels have already been engaged by the project proponent to seek the due clearances from different authorities, this CDP focuses on involving the local communities and local governing bodies and developing strong partnerships among different departments for development of the area.

The stakeholders' engagements could be held in the following steps
Initiate a dialogue with the GP: Initiating the dialogue with the GP would ensure the local support and would also earn the trust of the local communities. While initially the meetings would involve only GP members to understand their concerns, gradually the larger community could also be involved in these consultations to gain their support.



Consultations with the Community: Once the consultations with the GP have reached a stage where the project has gained some level of support and co-operation from them, the project authorities can initiate the process of consultations with the larger community.

These consultations would provide valuable information regarding their concerns and means of integrating them in the CDP. It would also provide an opportunity to the Company to present the kind of development needs that can be addressed by the project.

The details of the processes involved in stakeholder consultations are provided in Public Consultations and Disclosure Plan (PCDP).

C-3.3 TRUST BUILDING MEASURES

While the consultations with the community are being held, the project proponents can initiate small confidence building measures to prove their commitment to the community. These measures will also help to mitigate negative vibes, if any towards the project. The trust building measures can vary from repairing the water supply systems (replace a broken tap, a water tank or leaking pipes), strengthen/develop small irrigation channels, improve the existing school building or the local Primary Health Care centre or construction of community toilets etc.

C-3.4 DEVELOPING VILLAGE SPECIFIC MICRO PLANS FOR THE CDP

The stakeholder consultations will help the project proponent identify the development needs and prioritise them. The project proponents can decide to focus on few of those needs that can be managed at the community and the project. These micro plans will be developed by the community (preferably through an existing institutional body in the village or specifically formed for the project) in association with the project which should also have an approval from the GP. The micro plans would have the following details:

- The issues and problems identified by the community
- Process of selecting the issues that would be addressed by the CDP
- Implementation details like
    - Role and responsibilities of the project proponents, community and the GP.
    - Details of the intended beneficiaries
    - Time frame for implementation over a period of 2-3 years
    - Potential benefits, and methods of measuring them
    - Safeguards to ensure transparency and participation
    - Indicative budget
    - Means to ensure that the objectives of the programmes are being met
    - Ways to link CDP with on-going government programmes
    - Internal and external monitoring mechanisms by the community members and the project proponents respectively.

While some GPs may have the experience and ability to prepare micro plans along with the community, some others may require training and support from outside. In such cases, NGO implementing the income restoration programme may be involved in the micro planning process.

The systems for developing and implementation of CDP can be such that these activities can sustain beyond the life of the project.

C-3.4.1 Developing village common funds

Once the micro plans have been finalised and approved by the community, GP and the project proponents and an indicative budget has been prepared to carry out the activities, a detailed implementation plan will be prepared. As mentioned above many of the development activities might be integrated with the ongoing government programmes and the project may not need to fund all the activities on its own. As the CDP would be a joint effort between the GP (and the community) and the project, it would be preferable if the costs were also shared by the two partners.

The CDP costs would be shared between the project proponents and the GP (and indirectly by the community). At present a 50-50 partnership is envisaged. The GP will provide 50% of the costs, channelising some of the funds it receives from the state, as well as encouraging community members to contribute the remaining through a combination of cash and labour

contribution. In turn, the project proponents will pledge an equal contribution to the village fund.

C-3.5 MONITORING & EVALUATION OF THE CDP IMPLEMENTATION

To assess the impacts of CDP implementation and to ensure that it is moving in the right direction, it is important that an effective monitoring and evaluation mechanism is put in place. As the onus of CDP implementation would largely be on the GP/community, internal monitoring is essential to monitor that the activities are being implemented within the prescribed time frame and are likely to produce desirable results. An internal monthly monitoring by the community is recommended so that they are able to identify the gaps and make an effort to bring it back on the right track.

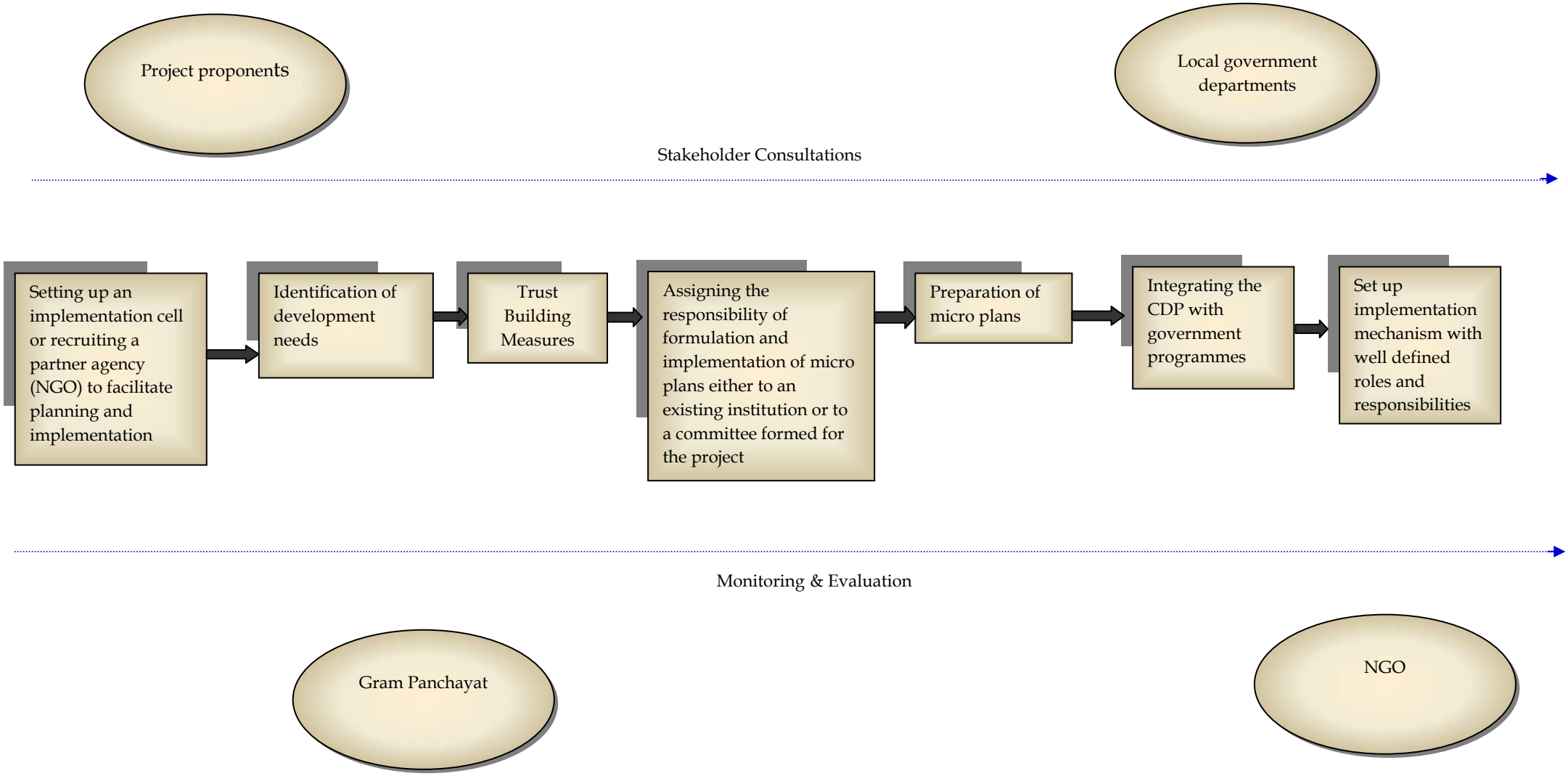
The implementation cell of the project or the facilitating NGO would be required to undertake quarterly monitoring to identify the gaps and redress them. It would also help in assessment of the impacts made so far. An independent mid-term and end term evaluation by the external agency is recommended. The mid term assessment would provide an objective view of the project activities and process of consultations during the implementation and any deviations from the micro plans. It will also suggest means to overcome the problems in implementation and ways to enhance the positive impacts of the project. The end term evaluation will evaluate whether the objectives of the CDP have been met. It will also evaluate whether the process was transparent, the needs of the vulnerable groups were met and implementation was carried out in a participatory manner.

The processes involved in the formulation and implementation of village wise CDPs are presented in the following flow chart.

C-3.6 BUDGETARY IMPLICATIONS

The Village Development Fund is envisaged to be a "joint partnership" of the village communities and the project proponents, and each has to contribute 50% of the costs of preparing and implementing village microplan. To ensure that the programmes and activities identified in the microplan are sustainable, small scale and locally suited, the consultants propose that each village fund should not exceed Rs 10,00,000 and that the contributions from both sides do not exceed Rs 5,00,000 for each village. Hence for the project proponent, this CDP should not exceed a budget of Rs 20,000 (this does not include the costs of hiring NGOs, conducting training, M & E etc.).

Processes involved in formulation & Implementation of Community Development Plans



Annex C4

Biodiversity & Wildlife Management Plan

C-4 BIODIVERSITY & WILDLIFE MANAGEMENT PLAN

C-4.1 BACKGROUND

In view of concerns regarding loss and depletion of biodiversity throughout the country, the Ministry of Environment and Forests released a note on initiated National Biodiversity Strategy and Action. There upon the Government of Himachal Pradesh developed the State level Strategy and Action Plan for the conservation of biodiversity. Studies on the biodiversity of area related to hydro power projects are included in this Strategy and Action Plan.

The biodiversity conservation plan for Allain Duhangan Hydro Electric Project (ADHEP) of 2 x 96 MW (192 MW hydropower generation facility on Allain and Duhangan tributaries of the Beas Rver) in Tehsil Manali, District Kullu, Himachal Pradesh in India. The potential impact on biodiversity and wildlife can be due to diversion of forestland, loss of forest resources, road construction, blasting, excavation of tunnels, excavated muck dumping / disposal, human interference on wildlife due to Project construction activities.

The plan includes the following:

- Ecological setting of the project catchment;
- Loss of Forestland and Resources
- Actions to be implemented as part of Catchment Area Treatment Plan and for conservation and Protection measures for wildlife.

C-4.2 ECOLOGICAL SETTING OF THE PROJECT CATCHMENT

The topography of the region is marked by hilly terrain rising from altitude of 1,700 m above mean sea level (amsl) near Beas river (western limits of the catchment area) to 4,800 m (amsl) in the glaciers of Himalayan ranges (eastern limits of the catchment area). The Allain stream is formed by Hamta and Patroi streams which originate at an elevation of 4,680 m (amsl) and 4,800 (amsl) respectively in the Himalayan ranges, while Duhangan stream originates at an elevation of 4,400 m (amsl) from Chandratal glacier in the Himalayan ranges. These two streams are joined by several streams and glaciers before these empty into Beas river downstream of Jagatsukh village.

Allain and Duhangan are the main streams of these catchments. Both these streams flow east to west before joining the Beas River. Allain stream joins Beas near village Aleo in Manali, while Duhangan stream joins Beas near village Jagatsukh located on the outskirts of Manali. The Allain stream is formed by Hamta and Patroi streams which originate at an elevation of 4680 m (amsl) and 4800 m (amsl), respectively in the Himalaya and traverse a distance of 18.5 km before joining the Beas river at an elevation of about 1800 m (amsl). The Duhangan stream originates from Chandertal glacier in the

Himalaya and traverses a distance of 19 km before it joins the Beas River. Both streams have a number of vertical falls and are joined by several streams before they merge in the Beas River. On an average, these streams have a steep gradient of 1:7 indicating suitability for hydropower generation. However, such areas are certainly prone to soil erosion.

The Hamta and Jagatsukh catchments (altitudinal range, 1800-4800m) lie between latitudes 32º 07' -32º 21'N and longitudes 77º 11' -77º 22'E. The project area falls in Biotic Province 2A (Northwest Himalaya) of bio-geographic zone of Himalaya (Rodgers and Panwar, 1988). The area exhibits dense and open forests and low forests cover at some places coupled with infrastructural development.

B-4.2.1 Plant Community & Diversity

A total of 14 communities (Forests: 12; shrubs: 2) have been identified based on Importance Value Index and Relative density, from High Project Impact Area of the Hamta and Jagatsukh Catchments between 1800-3200m. Forest communities were represented by evergreen coniferous communities (*i.e., Abies pindrow, Pinus wallichiana, Picea smithiana* and *Cedrus deodara*); broad leaved evergreen communities (*i.e., Quercus floribunda,* and *Q. semecarpifolia*); Evergreen coniferous-broad leaved deciduous communities (*i.e., Abies pindrow-Acer acuminatum* mixed*, Picea smithiana-Aesculus indica* mixed,); Evergreen- deciduous broad leaved community (i.e., *Ilex dipyrena- Pyrus pashia* mixed); broad leaved deciduous communities (*i.e., Acer acuminatum, Ulmus villosa, Juglans regia,* and *Acer acuminatum-Betula utilis* mixed). Amongst the communities, *Picea smithiana* and *Abies pindrow* community (3 sites, each), represented maximum sites, followed by *Pinus wallichiana, Acer acuminatum* and *Quercus floribunda* (2 sites, each), and remaining communities represented < 2 sites.

Over all, 324 plant species (Trees: 23; Shrubs: 53; Herbs: 249) were recorded from the Hamta- Jagatsukh catchments whereas 284 species (Trees: 18; Shrubs: 46; Herbs: 220) were recorded in the Project and surroudnig area.

Amongst the communities, *Picea smithiana* showed maximum number of species i.e., 192 species (Trees: 14; Shrubs: 29; Herbs: 149) in Hamta-Jagatsukh catchments and 137 species (Trees: 8; Shrubs: 29; Herbs: 100) from high project impact area, followed by *Abies pindrow*, 136 species (Trees: 11; Shrubs: 21; Herbs: 104) in the Hamta-Jagatsukh catchments and 94 species (Trees: 8; Shrubs: 14; Herbs: 72) from high project impact area. Minimum number of species (41) were recorded in *Quercus semecarpifolia* community (Trees: 5; Shrubs: 2; Herbs: 34) in the Hamta-Jagatsukh catchments whereas *Cedrus deodara* 44 species (Trees: 3; Shrubs: 8; Herbs: 33) from Project impact area.

A total of 49 species have been identified as rare-endangered (refer to ***Table 4.48*** in ***Section 4***). However, none of them falls in current criteria of International Union for Conservation of Nature and Natural Resources (IUCN). Five species have been categorized as **Critically Endangered** (*Saussurea obvallata, Gentiana kurroo, Arnebia benthamii, Dactylorhiza hatagirea*

and Saussurea costus); **12** species as **Endangered** (*Aconitum heterophyllum, Angelica glauca, Betula utilis, Bergenia stracheyi, Dioscorea deltoidea, Meconopsis aculeata, Paris polyphylla, Podophyllum hexandrum Polygonatum cirrhifolium, Picrorhiza kurrooa, Taxus baccata subsp. wallichiana and Zanthoxylum armatum*); **8** species as **Vulnerable** (*Aconitum violaceum, Polygonatum verticillatum, P.multiflorum, Rheum australe, R. webbianum, Rhododendron campanulatum, R. anthopogon and Valeriana jatamansi*); **1** species as **Near Threatened** (*Hippophae salicifolia*); **1** species as **Extinct in Wild** (*Saussurea costus***)** (Samant & Pal, 2003; Ved et al.,2003**).**

In general, *Saussurea costus* has been placed under Critically Endangered cartegory, however, in Himachal Pradesh this species has been placed under the category, Extinct in Wild. Twenty two (**22)** species were identified as **Rare.** Similarly, other species which have not been categorized but facing habitat degradation and over exploitation may be considered under vulnerable category whereas species presently not facing such problems may be considered under Near Threatened or leas concerned categories.

The Project catchment area is mainly inhabitated by villages i.e. Prini, Aleo, Hamta, Chhaleth, Saithan Shuru, Banara and Jagatsukh. The inhabitants are dependednt on the plant resources for medicine, wild edible.fiood, fuel, fodder, house building making of agricultureal tools, religious and various other purposes.

B-4.2.2 Wildlife Observed

The forests on Allain side are relatively drier than on Duhangan side which appeared to be relatively moister. Also the incidences of overgrazing and human interferences observed due to relatively easy terrain on Allain side than on Duhangan side.

Bird diversity was observed to be high in the lower elevation areas (2200 to 2800 m amsl) than in the upper elevation areas (2800 to 3400 m amsl). This is due to many breeding birds in Western Himalayan migrate to the lower elevation areas during winter perhaps because of better habitat and so also the dispersion of birds while the catchment and project impact area both were low mammal encounter area.

Among mammals, the observed wildlife in and surrounding the Project area included jackal, pika, langur, yellow throated marten, goral, black bear, brown bear, red fox etc.

None of the bird species observed fall in threatened list of IUCN, however, the observed pheasants like Himalayan monal, koklas and kalij fall in schedule 1 of the Wildlife Protection Act, 1972 making them important species of conservation.

B-4.2.3 Riverine Ecology

In both the Duhangan and the Allain streams there are successive waterfalls upstream of the confluence respectively. These waterfalls are over 10 meters high with deep plunge pools, and because of the nature of the fall over overhanging rock, it is not possible for fish to climb or leap over. Fish fauna was observed only up to these waterfalls in the two streams. In the Pahali stream fish were found up to about 500 meters above the bridge.

C-4.3 LOSS OF FORESTLAND & FOREST RESOURCES

The Project has got Forest Clearance for diversion of 47.179 ha of forestland, of this 5.51 ha involving underground works (tunnel development).

A total of 1746 trees are to be affected by the Project. Maximum number of individuals included of *Abies pindrow* (374 individuals), *Quercus dialtata* (320 individuals), *Quercus semecarpifolia* (314), *Picea smithiana* (238), *Pinus wallichiana* (152), *Acer acuminatum* (130) and *Cedrus deodara* (95). These tree species are being affected by the construction of tunnels, reservoir and roads

C-4.4 ECOLOGICAL CONCERNS

The impact assessment has highlighted certain concerns regarding the developmental phase of the project that may have an adverse implication on the ecology of the project catchment and surrounding area.

- Deforestation.
- Soil erosion.
- Habitat destruction.
- Threat to wildlife.
- Firewood extraction.

Deforestation

The potential impacts due to project activities on deforestation:

- During road building resulting in felling of a number of trees;
- Reservoir and submergence would lead to permanent loss of trees.

Soil Erosion

In the absence of tree cover, a number of ecological factors contribute to soil erosion. There are no deep penetrating root system to bind the rock particles and soil. Snowmelt and precipitation flow results in loss of topsoil by creating rills and gullies.

Habitat destruction

Felling of trees and filling of sites identified for muck disposal will result in destruction of habitats for terrestrial and avifauna. Also lowering of water

flow in both Allain and Duhangan streams will result in shrinkage of fresh water habitats downstream the diversion structures on these streams.

Threat to wildlife

The Project related construction activities involving noise and vibrations due to blasting for tunnel development, construction vehicle movement, illumination in the upper reaches of the road will have adverse impact on the wildlife. Road building will damage their habitats and will restrict their movements. Roads will also make these areas easily accessible and the chances of poaching incidences may also increase.

C-4.5 MITIGATION MEASURES

The Project will implement Catchment Area Treatment Plan to mitigate adverse impacts of hydrology and improve ecology of the Project catchment area. The Catchment Area for the Project extends from the Pirni Village near the proposed underground Power House up to and beyond the Allain Barrage Site and from Jagatsukh Village up to and beyond the Duhangan Weir Site. Details of various types of plantations, spurs, check walls, check dams, and compensatory afforestations which will be provided. Refer to Annex C -5 for Catchment Area Treatment wherein a provision of treatment of 800 ha of area has been identified. The plan also has provision for development of 200 ha of pastures within the Project catchment.

Specific provision for the ecological and wildlife management is provided in *Table C-4.1.*

The proposed site for discharge of water from the powerhouse is on Allain stream. At this site, the north facing slopes of Allain stream are barren steep slope. With increased water into the stream, it is likely that the water level in the stream may rise and the flow may also increase due to the steep gradient of the flow. This could cut the slopes along Allain stream leading to landslides. Therefore, slope stabilization measures would be taken on Allain after release of discharges water. These would be in the form of biological measures by planting grasses and climbers along with other soil binding plants or through measures, such as the use of wire mesh or stonewall. Many slope stabilization methods are available and these would need to be undertaken at this site;

Table C 4.1 Biodiversity & Wildlife Management Plan

S N.	Issue- Project Activity	Associated Impacts	Action Plan - Mitigation Measures	Responsibility
A	Construction Phase			
1	Forest land acquisition and forest clearance	• Forestland diversion for establishing project components; • Loss of 47.5 ha of forestland and removal of 1746 trees and other vegetation; • Forests are extremely important plant resource for it is in addition to a fodder plant, a rich repository of bio-diversity. Clearing of these forests for the construction of different components will cause loss or displacement of animals and plants and their habitats.	• Compensatory Afforestation of over 83.4 ha (on double degraded land). Afforestation to be ensured by Forest Department as per the approved afforestation plan; • Only trees enumerated by the Forest Department to be felled. The felling of trees is to be undertaken only by the Forest Department; • Identify areas prone to landslides and associated soil erosion. Ensure mitigation measures, such as, loose boulder check dams, gulley plugging and bioengineering would be implemented for preventing excess loss of soil; • The Project will also develop landscape and slope stabilisation in all the open areas involved for the Project development as an ongoing process. Indigenous species would be used for afforestation. Use of blue pine, which is one of the regeneration species, will be useful and effective. A large number of individual trees would be taken up for compensatory afforestation include *Quercus dialata, Quercus semicarpifolia, Cedrus deodara, Acer sp,* Rai and Tosh. These species should be planted in forest gaps, which are often termed as culturable blanks falling in the tree zone. Other sites, where afforestation may be undertaken are villages Prini, Sethan and Jagatsukh, upstream of reservoir area; • Soil loosened is to be fixed properly and provided with necessary embankment where sloppy area is involved; • Follow up of Catchment Area Treatment Plan by the Company as approved by the Forest department; • Besides compensatory afforestation, efforts would also be made to develop pasturelands. Since roads and other construction activities in the high altitude regions of the Project catchment will impact rich pastures (temperate, sub alpine and alpine), pasture development would be useful for maintaining the ecological continuity of habitats across the altitudinal gradients. Some of the endangered species, for example, Ibex, Musk Deer, Bharal etc also graze on alpine pastures. By developing alternate pasturelands, there will be no reduction in the availability of grazing grounds for wild animals;	Manager (Land Acquisition), State Department of Forests; Manager (Social & Environment). Project's Environment Monitoring Cell with the participation of villagers will monitor requirements under Forest Clearance, Environmental Clearance and Catchment Area Treatment Plan.

S N.	Issue- Project Activity	Associated Impacts	Action Plan - Mitigation Measures	Responsibility
2	Setting up construction camps near forest areas in upper reaches of project area	• Labourers might cut trees to meet fuel demands • Presence of labourers may cause disturbance to wildlife (e.g., noise, poaching, trapping, etc.)	• A large number of labourers and other workers are likely to be working during the project construction phase and resulting in likely pressure on the neighbouring forests for firewood both for cooking purposes and for warming the shelters during winter months. The Company is to ensure supply of fuel (LPG and Kerosene). In case of requirement of fuel wood, it should be sourced from Forest Department). The company or its Construction Contractor is to maintain log of fuel purchased and utilised in construction camps. • Proper fencing of construction camp to restrict movement of labour; • All contractors to be instructed for a complete ban of any poaching by their labourers. The Company is to ensure a check in this regard through its security personnel and regular visit of its officials; • Arrangement of sanitary waste disposal by making pits for defecation at the construction sites and covering it by soil cover on daily basis to avoid contact with flies and other vectors of diseases. Provision of temporary cover around the pits to avoid fall of any wildlife accidentally during night time.	Manager (Social & Environment). Project's Environment Monitoring Cell with the participation of villagers

S N.	Issue- Project Activity	Associated Impacts	Action Plan - Mitigation Measures	Responsibility
B	Construction Phase			
1	Access Roads- Construction of the road Clearing of trees Blasting Waste disposal	• Some species of mammals and birds will face disturbance and loss of habitat. • Loss of habitats by removal of trees. • Loose debris becoming a cause of perpetual landslides and erosion. • Disturbance caused by the presence of labour. • Herb species like *Saussurea costus, Corydalis govaniana, Salvia moorcroftiana* and *Thymus linearis, Viola odorata* and *Dioscorea deltoidea,* all of which have medicinal value may be impacted to some extent. • Increase of silt / sediments in streams along the project area which may adversely affect the benthic species.	• Alignment of road along the least impact area. • Removal and shifting of debris to dumping grounds. • Ensure that the constructed road is supported while construction itself. Check dams, culverts, stonewalls and other necessary and frequently used techniques would be employed while undertaking this activity; • No tree will be felled by the Company; only Forest Department will fell any tree based on pre-enumeration done for the same. • No dumping of debris down slope should be allowed to reduce collateral damage. • In altitude ranges of above 2,400 m and within oak and conifer forests, blasting and road building may be done in months other than May and June, the breeding season for most birds. • Restricted movement of labour; • Species which are rare if falling within the road alignment, the Company need to offset the alignment where feasible; • Follow up of measures to control silt / sediments during construction phase, provision of check walls, check dams and spurs. • Protection of slopes in the Project catchment especially of Duhangan stream as the slopes along Duhangan are rich in biodiversity and would have been damaged due to felling of trees for road construction; • All openings of all the tunnels / adits to be lighted during night time and guarded all the time. If unguarded these tunnel openings must be temporarily closed to avoid any wildlife finding refuge in such tunnels during night time or periods of no construction activities; • In case any wildlife found having taken up a refuge in any such tunnels, all construction labour to leave that place immediately, trained personnel from Department of Forests and Wildife Warden's office and approved experts should be intimated for rescue of such wildlife. Any construction activities to be taken up only after any trapped wildlife finds its safe escape;	Manager (Road / Bridge). Manager (Social & Environment). Project's Environment Monitoring Cell with the participation of villagers

S N.	Issue- Project Activity	Associated Impacts	Action Plan - Mitigation Measures	Responsibility
2	Blasting activity	• The initial phase of excavating the tunnel may become noisy with blasting and drilling which is likely to cause local disturbance to animals, which may force the animals to abandon the area temporarily. Dust (SPM) in air will increase. • The excavated material may cause collateral damage to the forest area	• Provision of enclosures and other measures for high noise generating machinery and equipment. • Blasting activity to be restricted only once in a day when exposed to surroundings. Time of blasting should be fixed (say 1400 hours) in the afternoon to ensure that domestic or wild animals and local people (mostly grazers) are not in the reaches of the impact zone. • Blasting for road building or tunnelling should be timed sequentially and not simultaneously so that disturbance is restricted to an area for a period of time rather than throughout the area. • Proper insulation of electric wires to avoid electrocution. • Regular disposal of excavated materials. Truck movement should be restricted to only day time duration.	Manager (Road / Bridge), Manager (Social & Environment) Manager (Contracts respective for various underground packages). Project's Environment Monitoring Cell with the participation of villagers
3.	Material Transportation-vehicular movement and general construction activities	• Presence of dust and noise in the ambient air may hamper ecology of the area.	• Fleet management on daily basis • Regular dust suspension measures like water sprinkling on roads. • Barrier screens near construction / excavation sites • Restricting construction activities and movement of Project traffic during day time only;	Manager (Social & Environment). Manager (Road / Bridge) having responsibility of Fleet Management, Project's Environment Monitoring Cell with the participation of villagers
4	Wastewater generation from project workshop containing high oil and grease contaminants, drilling activity etc and waste water from camp sites and colony	• Impact on aquatic and benthic life downstream	• Treatment plant for wastewater generated from workshop, drilling sites and camps sites with discharge only after ensuring standards.	Manager (Social & Environment).

S N.	Issue- Project Activity	Associated Impacts	Action Plan - Mitigation Measures	Responsibility
5	Quarrying for construction Materials. From the hillside From Stream	• Loss of habitat • Disturbance • Air (Dust) pollution • Damage to aquatic habitat • Increase turbidity • Affect fauna	• Will not be permitted. • Will not be permitted.	Manager (Social & Environment) Manager (Road / Bridge), Manager (Contracts respective for various underground packages). Project's Environment Monitoring Cell with the participation of villagers
C	Operation Phase			
1	Lighting of the project component areas during night time	• May disturb mammals and birds at night	• Minimum light to be maintained for safe and secure operations	Manager (Social & Environment).
2	Reduction of water flow in the stretch between diversion point to tailrace discharge in Allain Stream while in Duhangan stretch between diversion point to its confluence in Beas River	• Reduced flow and increased silt level may affect the aquatic and benthic life	• Provision of maintaining minimum recommended flow in both the streams immediately after diversion points. • Sewage treatment plant for domestic water. • Controlled discharge of flushing from de-silting chambers. • Provision of check walls with boulders, stone with / without meshes (gabions) at 5 locations, check dams at 4 locations and spurs at 5 locations.	Manager (Social & Environment). Manager (Civil)

Annex C5

Catchment Area Treatment Plan

C-5 INTRODUCTION

The catchment area of ADHEP lies between latitudes 32°07' to 32°21' North and longitudes 77°11' to 77°22' East in Manali Tehsil, Kullu District, Himachal Pradesh. The project lies to the east of the Beas River on its true left bank, and comprises the sub-watersheds of Allain, Pahali and Duhangan.

The terrain is mountainous, rising from about 1700m above mean sea level (amsl) at the Beas River, to about 4,800m amsl at the glaciers from where these streams originate. The ridge line above the glaciers in the Duhangan stream go to above 6000m amsl and are nival, or permanently snow-bound. The Duhangan stream originates from Chandratal glacier, at an altitude of 4400m amsl, whereas the Allain stream is formed by the Hamta and Patroi streams which originate at 4680 m amsl and 4800m amsl respectively in the Himalayan range. While both Allain and Duhangan streams are predominantly glacial, they are joined by several fluvial streams before their confluence with the Beas. The Pahali stream is purely fluvial, receiving a good deal of seasonal snow-melt as well. Located within the sub-watersheds of these streams are the villages of Prini, Hamta and Jagatsukh.

The streams have a steep gradient indicating potential for natural soil erosions and landslides. In addition to these natural erosion processes, project related construction activities would further increase soil erosion. The landslides are caused by geological, hydrological and seismic factors.

The catchment area treatment includes measures to check soil erosion by adopting various engineering measures such as check dams/walls, retaining walls, wire crates, afforestation, pasture development etc. The catchment area treatment plan extends from the Prini village near the proposed underground Power House up to and beyond the Allain Barrage Site and from Jagatsukh Village up to and beyond the Duhangan Weir Site.

C-5.1 AFFORESTATION UNDER CATCHMENT AREA TREATMENT PLAN

C-5.1.1 Area proposed for Afforestation

The Catchment Area Treatment has been suggested considering the landuse pattern, soil cover and topography. The areas where afforestation and pasture development is to be carried out is as given in the ***Table C-5.1***.

Table C-5.1 Area proposed for Afforestation and Pasture Development

S.N	Village	Afforestation (ha)	Pasture Development (ha)
1	Prini	140	-
2	Hamta	120	-
3	Sianthen	60	30
4	Jagatsukh	160	-
4	Chikka springs	120	-

S.N	Village	Afforestation (ha)	Pasture Development (ha)
5	Jabri Nallah	100	-
6	Ustream storage reservoir	100	90
7	Pahali Nallah	-	20
8	Hamta Garh	-	30
9	Tangra/ Chikka Springs	-	30
	Total	800	200

C-5.1.2 Species to be planted for Afforestation

Among a variety of trees to be planted under the afforestation scheme, the following species of trees, which were observed in the area and therefore, have been identified for plantation include as per ***Table C-5.2***.

Table C-5.2 Species Identified for Afforestation

S.N.	Plant Species to be Afforested	
	Vernacular Name	Scientific Name
1	Kail	Pinue Wallichina
2	Deodar	Cedrus Deodara
3	Devidyar	Cupressus Torulosa
4	Morus	Morus alba
5	Horse Chest Nut	Aesculus Indica
6	Kosh	Alnusnitida
7	Populus	Acupressus Torulosa

C-5.2 CATCHMENT AREA TREATMENT WORKS

To prevent incidences of soil erosion, details of various types of spurs, check walls, check dams to be provided are described in ***Table C5.3*** below.

Table C5.3 Details of Catchment Area Treatment Works

S N.	Item	Check wall with boulders & stones with/without wire mesh	Check dam with boulders & stones	Spur	Total
1	Jabri Nallah	10	10	-	20
2	Footpath to Chandratal	15	-	1	16
3	Footpath to Sainthen	19	-	4	23
4	Allain Nallah	15	25	2	42
5	Duhangan Nallah	11	16	1	28
6	Hamta Nallah	7	14	1	22
	Total	77	65	9	151

C-5.3 SOIL EROSION CONTROL

During precipitation, despite most of the project components being underground, there is potential for soil erosion from open excavation, tree cutting leaving large areas reduced of vegetation and from areas where construction spoil/muck is dumped. It is suggested that proper compaction of dumps is done and areas reduced of vegetation or other open areas are treated with rip-rap stabilization.

C-5.4 COST OF CATCHMENT AREA TREATMENT

The total cost for implementation of Catchment Area Treatment Plan works out to Rs 3,98,05,650.00 as per the details given in the ***Table C5.4*** below.

Table C5.4 Cost of Catchment Area Treatment Works

S. N.	Description	Rs.
1	Afforestation 800 ha	23612000.00
2	Pasture development 200 ha	1900000.00
3	Engineering measures such as check wall, check dam, spur farm, pond	4530000.00
4	Maintenance @ 5% per year for 6.5 years	9763650.00
	Total	39805650.00

C-5.5 MONITORING AND IMPLEMENTATION OF ENVIRONMENTAL SAFEGUARDS FOR CAT

As per the advise of the Ministry of Environment & Forest, the Government of Himachal Pradesh has constituted Committees for monitoring and implementing the environmental safeguards in respect of all state/private/joint sector hydroelectric projects in Himachal Pradesh vide notification no. FFE-B-(F)-2-25196 dated April 7, 1997. The High Level Committees are represented as ***Table C5.5***.

Table C5.5: Agencies to be involved in monitoring and implementation of CAT Plan

S N.	Committee Members	Designation
State Level		
1	F.C.-cum-Secretary (Fts)	Chairman
2	Chairman/Member (Projects) BPSEB	Member
3	Principal Chief Conservator of Forests	Member
4	Conservator of Forests (Planning)	Member Secretary
Project Level		
1	Pr. Chief Conservator of Forests	Chairman
2	General Manager of project concerned	Member
3	Conservator of Forests concerned	Member
4	Superintending Engineer concerned	Member
5	Divisional. Forest Officer concerned	Member Secretary

The above committees will be monitoring the progress achieved on catchment area treatment plans etc as approved by the Ministry of Environment & Forests, Government of India, both in terms of funding by the project authorities and implementation in the field by the State Government Forest Department. In addition to the aforesaid, participation of local people in the implementation of environmental mitigation measures will also be ensured.

In addition to the. above, through the same Notification, the Govt. of Himachal Pradesh has also appointed the Forest Department of the Govt. of

Himachal Pradesh to act as 'Nodal Agency' for implementation and monitoring of the function of the above Committees.

The Govt. of Himachal Pradesh has therefore taken necessary action to ensure that the commitments, made by the implementing Agency to the Ministry of Environment & Forests, are implemented at site and in view of the above it is submitted that the Area identified for providing Catchment Area Treatment Plan may kindly be approved.

C-5.6 ROLE OF LOCAL COMMUNITIES IN FOREST MANAGEMENT

The involvement of local communities to collaborate with the Forest Department in the monitoring of the project implementation and project performance cannot be ensured directly. However, Himachal Pradesh Government promotes role of local communities in joint forest management for better protection and management of forests. The 25% of the revenue generated from the jointly managed forests go to the local communities for development purposes.

Annex C-6

Minimum Water Discharges & Fisheries Monitoring Plan

C-6 MINIMUM WATER DISCHARGES & FISHERIES MONITORING PLAN

C-6.1 WATER AVAILABILITY IN ALLAIN & DUHANGAN STREAMS

Based on 24-year 10-daily average series obtained (with some regression of flow records to cover 2 more years), the average inflow observed in the past at diversion sites indicates a variation of flows from 1.54 to 21.78 m^3/sec in Allain and 1.38 to 7.31 m^3/sec in Duhangan stream. The average, 50% and 90% dependable flows on ten-daily basis on Allain and Duhangan streams as shown in *Table 1*.

Table 1 Dependable Flow Estimates at Diversion Sites (in Cumecs)

Catchment Diversion Site	Average	50% Dependable year	90% Dependable year
Allain Stream	9.133	5.940	3.028
Duhangan Stream	4.817	2.950	4.301
Combined Flows	13.950	8.871	4.467

Thus 90% dependable combined flow estimated is 4.467 m^3/sec. The construction of diversion structures during operation phase will result in disturbance of the existing flow pattern of the two streams. It is anticipated that present flow on Allain stream from barrage site to tailrace discharge point (about 5.6km) will be reduced, which may result in significant impact on downstream flow, velocity and levels in comparison to the present flow pattern. Similarly, on Duhangan stream the diversion is proposed to join flow into forebay reservoir and the proposed diversion will result in reduced flow in its stretch of about 6.5km downstream weir location till its confluence in Beas River. This may result in significant impact on downstream flow, velocity and levels in comparison to the present flow pattern.

C-6.1.1 Concern on Downstream Water Demand for Irrigation & Domestic Needs

The irrigation and domestic needs of Jagatsukh village are dependent upon water from Duhangan stream. Here, villagers have separated out streams (called *Kuhls* in local language) taken out of the Duhangan stream on its right and left banks for irrigation purposes.

C-6.2 PRESENCE OF FISH & BENTHIC MACRO INVERTEBRATES (BMI)

The riverine ecological baseline assessment on fish species shows that the fish are found in Allain and Duhangan streams at the lower levels before their confluence with the Beas River. Both Allain and Duhangan streams have successive waterfalls of about 1 km and 1.5 km upstream of the confluence respectively. These waterfalls are over 10 meters high with deep plunge pools, and because of the nature of the fall over overhanging rock, it is not possible for fish to climb or leap over. Fish fauna was observed only up to these waterfalls in the two streams. In the Pahali stream fish were found up to about 500 meters above the bridge.

Benthic macro invertebrates (BMI) were observed in these streams during the survey requiring minimum water flows for their sustenance.

C-6.2.1 Concern to Fish and BMI

The ADHEP once become operational will divert water from Allain and Duhangan stream and a combined flow will be discharged near Aleo downstream of Allain stream. The reduction of water flow may have adverse impacts on the fish and BMI.

The most effective mitigation measure for the impact on aquatic ecology is to ensure minimum ecological flows and adequately maintain water quality downstream of the diversion. This ecological flow may be designed based on the habitats of the most valued aquatic species in the river. Special care is required to ensure minimisation of losses of spawning grounds.

Since the Project involves water storage also, it is recommended that periodic water releases be optimised in a strategic way to maximise revenues and minimise environmental impact of the Project. Likewise attention should be paid to mandatory releases to the downstream river.

In order to sustain biological needs of fish and BMI and local needs for irrigation purposes, minimum flows are must to be maintained by the Project as per the following description:

C-6.3 MINIMUM FLOWS TO BE MAINTAINED

C-6.3.1 Allain Stream

A minimum of 15% of the available regular flow is to be discharged from the diversion structure. The minimum flow contributed by other channels post diversion structure on Allain has been found to be 0.226m^3/sec in the month of February during driest year of 1973-74. The lean season minimum flow along with flow available through other channels downstream the Allain would make the available total flow of 0.597 (0.231+0.226) m^3/sec i.e. 51,580 m^3/day, which is about 38% of the minimum flow ever observed on Allain at Aleo.

C-6.3.2 Duhangan Stream

A minimum of 15% of the available regular flow is to be discharged from the diversion structure. As per the findings of the Honourable High Court of India, the Project is required to discharge a total of 249.37litres per second (0.24937m^3/sec) and an additional 15% of minimum flow i.e. to a total discharge of 335.87litres per second as minimum flow to be maintained by the Project downstream the Duhangan weir. This flow will have to commensurate with increase of population of Jagatsukh village over the years. A minimum flow of 387.09litres per second is to be maintained by the Project till the Project life of 40 years and has to be re-assessed subsequently for any extended Project life.

C-6.4 FLOW MEASUREMENTS TO BE MONITORED

ADHPL is required to ensure recommended flows downstream the diversion structures. It is recommended that the Project install flow measuring electronic and manual measurement devices at:

- Downstream the Allain water diversion point (near Barrage site) as well downstream near Aleo;
- Downstream the Duhangan water diversion point (near Weir site) as well downstream before water diversion into kuhls (irrigation channels) near Jagatsukh; and
- Downstream near road bridge on Pahali stream. Although, the Project is not diverting water from Pahali stream, however, considering this stream falls within the catchment of Allain and Duhangan streams, there may be some adverse impact on flow of this stream, requiring monitoring of this stream also.

C-6.5 FISH & WATER QUALITY TO BE MONITORED

ADHPL will ensure six monthly monitoring of essential parameters of water for biological sustenance as well to conduct fish catch surveys downstream the Allain, Duhangan and Pahali streams.

Annex C7

Emergency Response Plan

C-7 EMERGENCY RESPONSE PLAN (ERP)

The project requires detailed Emergency Response Plan both for probable hazards likely to take place during construction and operation phases. During the construction phase, the ERP should address hazards associated with handling of heavy machinery and explosives required for excavation of about 14 km of total tunnels.

C.1 CONSTRUCTION PHASE ERP

Following natural/ accidental hazards may occur during construction phase of the project:

- slope failure at the project component locations including en-route proposed roads;
- accident due to explosives;
- accident due to heavy equipment/machinery;
- sabotage in case of magazine; and
- accidents due to fly excavations/drilling.

In order to take care of above hazards/disasters, the following control will be adopted:

- All safety precautions and provisions as suggested under approvals from Chief Controller of Explosives for handling and storage of Explosives;
- Checking and regular maintenance of steep slope areas;
- Provision of adequate culverts and cross drainages across access roads and slopes cordoned due to project activities;
- Entry of unauthorised persons shall be prohibited;
- Fire fighting and first aid provisions at the project sites and office;
- Provision of all the safety appliances such as safety boots, helmets, goggles etc. be made available to the construction labour and employees and regular check to ensure the use;
- Training and refresher courses for all the employees working in the confined/hazardous premises;
- Follow up of all regulatory provisions;

- Handling of explosives, charging and blasting shall be carried out by competent persons only;

- Provision of magazine at safe place with fencing and necessary security arrangement;

- Suppression of dust on the haulage roads;

- Awareness of safety and disaster through competitions, posters and other similar drives;

- Structure Designs must be established after considering safe margins for earthquakes etc.;

- Establishing detailed reporting procedures and communicating systems with elaborate tie up with local administration like hospital, police station, fire brigade, flood control department etc.

C.2 OPERATION PHASE ERP

Although the probability of natural or manmade threats to the proposed project during operation phase would be very low, however, ADHPL must prepare an elaborate and detailed emergency response plan to counter any event like earthquake, landslides, avalanche, forest or other fires and any accident related to the Project prior to Project commissioning. The Plan must be communicated to all persons responsible to perform management role during any emergency situation. The Plan must also be discussed with local administration, hospital and other responsible services for taking actions during any emergency situation. Elaborate procedures on do's and don'ts have to be worked out with reporting mechanism, emergency preparedness team and tie up with local administration.

Annex C8

Desiltation Management Plan

1 DE-SILTING MANAGEMENT PLAN

During operation phase there will be requirement of flushing of de-sanders for de-silting of settled silt in them. It is understood that there will be diversion of annual average water flow of 9.082 m^3/sec from Allain and 4.871 m^3/sec from Duhangan streams containing a maximum sand levels of 1.43 mg/l (>=0.2 mm size) and 1.21 mg/l (>=0.2 mm size) respectively as observed during non monsoon periods (refer to ***Section 4.4.11*** of this ESIA report). The proposed de-sanders (de-silting chambers) will be designed for removal of particles of 0.2mm and higher size only.

1.1 DE-SILTING FROM ALLAIN DIVERSION STRUCTURE

On Allain stream there will be four de-sanders (de-silting chambers) to be installed at its diversion structure. The settled silt from four de-sanders will be flushed only during monsoon season on rainy days through a total of 65 number of flushes per annum with a variable frequency of 10 (15%) flushes during June; 29 (45%) flushes during July, 20 (30%) flushes during August and 6 (10%) flushes during September using automatic de-silting mechanism. Provision for manual de-silting mechanism will also be available as a standby arrangement.

1.2 DE-SILTING FROM DUHANGAN DIVERSION STRUCTURE

On Duhangan stream there will be one de-sander (de-silting chamber) to be installed at its diversion structure. The settled silt from de-sander will be flushed only during monsoon season on rainy days through a total of 15 number of flushes per annum with a variable frequency of 2 (13%) flushes during June; 7 (47%) flushes during July, 4 (27%) flushes during August and 2 (13%) flushes during September using automatic de-silting mechanism. Provision for manual de-silting mechanism will also be available as a standby arrangement.

1.3 DISCHARGE MANAGEMENT

The discharges (flushes) from de-sanders both from Allain and Duhangan streams will be restricted to monsoon season on rainy days to get maximum dilution. The Project will ensure that the discharge will be of about 1200 m^3 per flushing through vertical lift slide type de-silting gates with a velocity of approximately 6.5 m/sec and discharge time of more than one hour to restrict incremental concentration of silt in the final water of Allain and Duhangan streams remain restricted to 100 to 500 mg/litre as per the description given in the following Table

Table.1 Incremental silt concentration from due to de-silting of de-sanders

S.N.	Description	Units	Allain stream	Duhangan stream
(1)	Available annual average flow at diversion site (per sec)	m3/sec	9.082	4.817
(2)	Available annual average flow at diversion site (per day) [(1)*3600*24]	m3/day	784684.8	417052.8
(3)	Silt content (0.2mm and above)	g/m3	1.43	1.21
(4)	Silt load accumulated in the de-sanders [(1)*(2) /10^6]	tons /day	1.122099	0.504634
(5)	Number of days considered in a year	Nos.	365	365
(6)	Total silt deposition (load) in De-sanders load [(3)*(4)]	tons /year	409.5662	184.1914
(7)	Flushes planned from De-sanders	Nos.	65	15
(8)	De-silting per flush from a De-sander [(6)/(7)]	tons per flush	6.301019	12.27942
(9)	Quantity of water per flush	m^3	1200	1200
(10)	Expected concentration in de-silted flush [(8)/(9)*10^6]	g/m^3	5250.849	10232.85
(11)	Average flow available during monsoon season	m^3/sec	14.668	8.245
(12)	Average flow per hour (considering a flush is completed in an hour)	m^3/hour	52804.8	29682.0
(13)	Expected incremental concentration [(8)/(12)*10^6]	g/m^3	119.3266	413.6994
(14)	Expected incremental concentration [(13)*1000/1000]	mg/litre	119.3266	413.6994

From the above, it is clear that during non monsoon period there will be no adverse impact due to deterioration of water quality as no de-silting will be taken up during non monsoon months. However, during monsoon months in the stretch between diversion structure and tailrace in Allain stream and up to Beas River in Duhangan stream, there will be incremental 100 to 500 mg/litre silt concentration.

The specific mitigation measures for de-silting will include the following:

- Flushes of de-sander(s) at Allain and Duhangan water diversion structures will be only during monsoon season;
- There will be approximately 65 flushes per annum for desilting on Allain and 15 flushes per annum on Duhangan stream;
- Flushing rate for 1200 m^3 flush per incidence will be for over an hour to minimise adverse impacts during monsoon months.