Environmental Impact Assessment

Project Number: 46919
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IND: 100 MW Tidong Hydroelectric Power Project

Prepared by AECOM India Private Limited for NSL Renewable Power Private Limited

Final Report

Environmental and Social Impact Assessment Report for 100 MW Tidong-I Hydro Electric Project in Kinnaur, Himachal Pradesh, India

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Submitted to:	Prepared by:
NSL Renewable Power Pvt. Ltd. 4th Floor, NSL ICON D.No. 8-2-648/2/A, Road No. 12 Banjara Hills, Hyderabad - 5000034	**AECOM India Pvt. Ltd.** 9th Floor, Infinity Tower-C, Cyber city, DLF Phase-II, Gurgaon -122002

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List of Abbreviation

ADM	Additional District Magistrate
ADB	Asian Development Bank
Bigha	0.0753 ha
BOD	Biochemical Oxygen Demand
CO	Carbon Monoxide
CAT	Catchment Area Treatment
CEA	Central Electricity Authority
CPCB	Central Pollution Control Board
CEO	Chief Executive Officer
CDM	Clean Development Mechanism
CLO	Community Liaison Person
CSR	Corporate Social Responsibility
DBH	Diameter at Breast Height
D/C	Double Circuit
DG Set	Diesel Generator Set
DEM	Digital Elevation Data
ECC	Emergency Control Centre
EMT	Emergency Management Team
ERT	Emergency Response Team
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
FCC	False Color Composite
FCA	Forest Conservation Act
FRL	Full Reservoir Level
GW	Gigawatt
GIIP	Good International Industry Practice
GHG	Green House Gas
GRC	Grievance Redress Cell

GRM	Grievance Redress Mechanism (GRM)
Ha	Hectares (1 ha = 10,000 m^2)
HRT	Head Race Tunnel
HFL	High Flood Level
HPPTCL	Himachal Pradesh Power Transmission Corporation Limited
HPSPCB	Himachal Pradesh State Pollution Control Board
HPPWD	HP Public Works Department
HPSEB	Himachal Pradesh State Electricity Board
IVI	Importance Value Index
ITI	Industrial Training Institute
INR	Indian Rupee
IFC	International Finance Corporation
KLD	Kilo Litre Per Day
kW	Kilowatt
Lday	Day time Noise Level
LAA	Land Acquisition Act, 1894
lpcd	Liters per capita per day
LADA	Local Area Development
LILO	Loop in Loop Out
MoEF	Ministry of Environment and Forests
Msl	Mean Sea Level
MS Tank	Masonry Storage Tank
NAAQS	National Ambient Air Quality Standards
NBWL	National Board for Wildlife
NEAA	National Environment Appellate Authority
NRRP	National Resettlement and Rehabilitation Policy, 2007
NPV	Net Present Value
Ldn	Night noise level
NOx	Nitrogen Oxide
NOC	No Objection Certificate
NTD	Noiseless Trunk Delay

NTFP	Non-timber Forest Produce
NRPPL	NSL Renewable Power Private Limited
NTPGPL	NSL Tidong Power Generation Pvt. Ltd
PESA	Panchayats Extension to Schedule Areas Act, 1996
PPE	Personal Protective Equipment
POL	Petroleum, Oil & Lubricant
PAFs	Project Affected Families
PCDP	Public Consultation and Disclosure Plan
PUC	Pollution Under Control Certificates
RCC	Reinforced Cement Concrete
RSPM	Respirable Suspended Particulate Matter
SPS	Safeguard Policy Statement
SC	Schedule Castes
ST	Schedule Tribes
SRTM	Shuttle Radar Topography Mission
SPCB	State Pollution Control Board
SO_2	Sulphur Dioxide
SPM	Suspended Particulate Matter
VP	Vice President

Executive Summary

Introduction

NSL Renewable Power Private Limited (NRPPL) is part of the NSL Energy Ventures Private Limited, Hyderabad established for implementation of Renewable Power Projects across the country. NRPPL is in the process of developing a 100MW Tidong-I Hydro Electric Project in the district of Kinnaur, Himachal Pradesh, India through a Special Purpose Vehicle (SPV) M/s NSL Tidong Power Generation Pvt. Ltd (NTPGPL).

The project has already obtained an environment clearance in the year 2007, from the Ministry of Environment and Forests (MoEF). The main construction work has started in year 2009 and the proponent approached International Finance Corporation (IFC) to seek partial funding for the project and hence the report was modified to include elements pertaining to IFC's Performance Standards (PS) on Social and Environmental Sustainability and Environment, Health and Safety (EHS) guidelines in 2011 by M/s AECOM. Now NRPPL has applied for a loan with Asian Development Bank (ADB) part of which would be used to finance Tidong-I HEP.

To fulfill ADB's requirements the existing report is being updated to incorporate the current status of the project which includes activities related to construction, modification of plans, organizational setup etc. which have already been implemented or proposed and were not considered in previous reports. The objective and scope of M/s AECOM consultancy for this report is to align the findings of the existing ESIA report and the supplementary studies undertaken in accordance with the requirements of ADB Safeguard Policy Statement, 2009.

Description on the project

The Tidong-1 Hydroelectric Project is situated in the Moorang Tehsil of Kinnaur District in the State of Himachal Pradesh. It is a run-of-the-river scheme proposed to harness the hydro potential of Tidong Khad, a tributary of river Sutlej. The barrage of the project is at Lambar village and Powerhouse at Rispa village.

The total land required for the project is 42.2557 ha which includes 39.0546 ha of forest land and 3.2011 ha of private land. The private land involved in the project, falls in three villages of three different Panchayats, i.e., Lambar in Thangi Panchayat; Lizang in Rispa Panchayat and Roowang in Moorang Panchayat.

The Project consists of a 10 m high concrete barrage at about 9.8 km upstream from the confluence of Tidong and Sutlej River, a surface desilting basin on the left bank of the river, a 8.46 km long head race tunnel and an underground surge shaft of 8.0m diameter (u/g) with inclined pressure shaft. The barrage will submerge an area of about 0.5 hectares. The power house is surface type on the left bank of Tidong Khad near the village Lambar. The power house shall house two units of 50 MW each to produce 100 MW of power.

The project will develop roads from the PWD road towards the head works, power house and surge shaft. The road will be 3 – 4 m wide with adequate width along the curves. The road towards the head works and adit 1 will be 2.5 km, while the road to the power house will be 2.46 km. The third road will be the longest and shall go up to the surge shaft, it will be 6.22km. There are three campsites proposed for the labor accommodation, one each at intake, power house and adit V to accommodate about 150 workers. The labor requirement will increase to 500 during the peak construction period which is foreseen during mid of 2013 and hence more labor camps are to be arranged.

There are five muck disposal areas identified for the project and out of these PA2 dump is abandoned and three are functional. The balance one will be made operational in future. The total muck generated will be 731859 m^3, out of this, 146370 m^3 of muck will be will be utilized for other protection works and in preparation of concrete. Thus, a total of 585489 m^3 will only be disposed off. The muck disposal sites are provided with retaining walls to protect the muck from flowing into the stream. Once the capacity for dumping is exhausted, trees will be planted to prevent erosion.

The original evacuation plan proposed for Tidong-1 was to evacuate by LILO of one circuit of 220 kV D/C Kshang-Bhaba line at Tidong-I HEP, however, after commissioning of the Jangi Pooling station, Tidong-I - Jangi line shall be constructed and also Kashang – Jangi 220 kV D/c line with single HTLS conductor shall be established. Earlier Himachal Pradesh Power Transmission Corporation Limited (HPPTCL) was to carry out this work with financial assistance from ADB, but now NTPGPL is desirous to take up this activity.

The construction activities have been going on for a period of last 3 years. The construction of access roads is near completion. The excavation works is also near completion for river diversion arrangement (98%), spillway (96%), storage reservoir (88%) and power house complex (95%). The excavation works of Head Race Tunnel and Penstock have also reached an appreciable stage with Head Race Tunnel at 21% and Penstock at 41% completion respectively. The concreting work for river diversion arrangement is 62% complete while the

concreting of power house complex is 8% complete. The project is expected to be completed by mid 2016.

Description of the Environment

The environmental and social baseline data was collected by RITES in 2005 for the EIA study which was later supplemented during the updation of report to ESIA in 2011 and 2012 by AECOM.

The total study area is about 73375.13 ha. In this zone, total vegetation (scrub/ alpine scrub, dense and open forests) predominantly covers the land with an area of 54.24%. About 22% of study area is either barren or rocky land. Soil samples were collected at 8 locations and the analysis revealed that soil is slightly alkaline and has a good sand content. The NPK values suggest good fertility but poor cation exchange capacity of soil.

Water environment covers both availability of water and its quality and suitability for human use. The data suggests that the winter months have lesser discharge and the monsoon months (July-Aug) have higher discharge. The minimum flow of 4.53 m^3 was observed in January 2005 and the maximum flow of 75.1 m^3 in July 2006. To assess the water quality of the region 10 surface and 1 ground water samples were collected. The results of water quality indicated that the water is rich in dissolve oxygen (7.4 to 8.2 mg/l) and all pollutants are well below the BIS (10500, 1991) and WHO Drinking Water Guidelines, 1993. On the basis of CPCB Water Quality criteria, it can be concluded that quality of all the samples fall under 'A' category of water with respect to pH, DO and BOD and total Coliform.

The ambient air quality monitoring within the study area was also carried out at five locations. The concentrations of pollutants were well below the older Indian standards.

Noise monitoring was also carried out at the same 5 locations and the average day and night noise level (Ldn) for the study area ranges from 49.11 to 70.10dB (A). A comparison of these results with the ambient noise standards show that both day and night time values are exceeding the prescribed standard of 55 dB (A) at all locations except at the Power house location near Rispa village. The main source of noise in the project area is the sound caused by the river flow.

The ecological assessment suggests that the major forest type of the project area is a temperate mixed evergreen forest. A total number of 94 plant species were recorded during the floristic survey in the project area. Plant diversity of the project area encompasses 20 species of trees, 30 species of shrubs and 30 species of herbs including 6 species of climbers

and 8 species of grasses. The most dominant tree species were *Cedrus deodara*, *Prunus armeniaca* and *Pinus gerardiana* whereas dominant shrub and herbs are represented by the species of *Artemisia* and *Anaphalis* respectively. The catchment area of Tidong Hydropower project is inhabited by more than 13 species of mammals which together constitute around 8 families (i.e., leopard, jackal, fox, Himalayan bear, Brown bear, Mongoose, Musk deer). A Himalayan pit viper (*Ancistrodon himalayanus*), a highly poisonous snake was spotted between the boulders during the site visit conducted in September 2005, other than that a common lizard (*Agama tuberculata)* has also been seen in the area. The study area harbours nearly 40 species of birds comprising of Kite, Vulture, Chukor partridge, Tragopan, Monal, Pigeons, Parakeet, Owl, Hoopoe, Woodpeckers, Martin, Swallow, Shrike, Magpie, cough, Crow, Bulbuls, Flycatcher, Redstart, Chat, Thrushes, Tits, Wagtails, Sparrows, Finches, Buntings etc.

To appreciate the aquatic ecological characteristics and the probability of fish occurrence in the Tidong stream and its tributaries (viz Shaktsanq, Ghat Leng, Dubaa Khad, Sankir khad) a fresh survey was undertaken by AECOM during Oct 2012. Among the biotic factors, phytoplankton contributed over 92% of total periphytic/plankton counts and was mainly represented by Bacillariophycea, Chlrophycea and Desmidacea. The major taxa encountered among the diatoms are Navicula, Gomphonema, Cyclotella, Amphora, Cymbella while the green algae were represented by Plurococcus and Closterium. The Zooplankton contribution ranged between 6-8% in all the samples and these were mainly represented by Difflugia and Centropyxis. The insect specimens encountered belonged to families Ephemeroptera, Trichoptera, Plecoptera Neuraptera and Diptera. No fish species was reported during the survey. The Tidong and its tributaries are classified as oligotrophic- meaning low temperature, poor primary and secondary productivity and impoverished benthic fauna.

Socio economic study in the project affected area was conducted in seven selected villages namely Rispa Khas, Lizang, Roowang, Lambar, Thangi Khas, Piwar and Charang Khas which are situated within the study area. Out of these, land for various project activities was only acquired from 3 villages, namely Lizang (Rispa Panchayat), Roowang (Moorang Panchayat) and Lambar (Thangi Panchayat). A total of 28 households and 1 *Mandir Devta Kuldev* (Temple of Local God) from Lizang, Roowang and Lambar village were affected due to losing part of their agricultural land for the execution of the project. The project, however, did not acquire any house/shop and none of them is physically displaced.

Out of 28 affected families 23 were contacted and data as per the structured questionnaire was collected. The analysis on land acquisition and change in land holdings of the affected families suggests that of the total 28 affected about 15 households lost less than 10% while

8 lost between 10 – 20 % of their total land. The rest 4 households had lost 20 -30 % of their total landholding and only 1 household has lost above 30% of land holding. Out of the total sample population of 113, the largest group is about 34% between the age group of 26-40 years, followed by 27% from 41-60 years and 22% in 16-25 years category. Out of the total population, 55% were married. Fraternal polyandry was observed to be prevalent in the affected villages; however, the patriarchal system of inheritance is being practiced. The Project Affected Families (PAFs) were dominated by nuclear families with separate kitchen, which contributes to almost 65% of the households surveyed. The size of the family varies between 1- 10 with an average of 5.2. It was observed that 38% of the PAFs are educated up to the primary level, while 7% and 15% of them have studied up to the intermediate and high school level respectively. The majority of the PAF households surveyed mentioned that they practice Hinduism as well as Buddhism. The primary occupation and source of income is reported to be agriculture and agriculture-allied activities. Girls are sent to pursue their primary and secondary education in schools situated in nearby villages and outside the district for higher education. The local women actively participate in family decision making of all matters of children education, household financial management, children marriage etc and also participate in community decision making under Gram Panchayats bodies.

Anticipated Environmental Impacts and Mitigation Measures

This project is identified as Category 'A' for environmental aspects and category 'B' for social attributes. Thus, all anticipated positive as well as negative concerns for environment and social conditions have been identified, quantified and discussed broadly into two categories, viz. impacts during project construction and operation on land, water, air, noise, ecology and socio-economic conditions. The mitigation measures have also been suggested, keeping in mind to eliminate, reduce or mitigate identified impacts (Table below).

S.N	Component	Impacts Identified	Suggested Mitigation Measures
	CONSTRUCTION PHASE		
1.	**Land use change and Soil pollution**	• Change in existing land use • Erosion of soil and increased slope instability due to removal of vegetation cover • Unchecked dumping of solid and hazardous waste may lead to soil pollution	• Afforestation of about 79.00 hectares of degraded forest land. • Restoration of vegetation in the areas which will have temporary land use changes, i.e., muck disposal area, batching plant, labor camp, quarry sites. • CAT plan has provisions to stabilize active landslides, treatment of nallas, bank stabilization and road side erosion and avalanche control. • Waste from labor camps is transported to an incinerator installed at Kalpa

S.N	Component	Impacts Identified	Suggested Mitigation Measures
			• All hazardous waste collected at site shall be disposed off within a period of ninety days • Storage of waste oil shall be in secured area with paved surface and restricted access • The waste oil is sold / given to authorized recyclers.
2.	**Water Environment**	• Improper disposal of muck can lead to increase in sediment in receiving water bodies downstream of the construction site. • Disposal of sewage from construction camps and contamination of surface and groundwater resource • Water quality may also be affected with unchecked waste dumping or spill into the river	• Out of total muck generation, about 32% will be reused within the project as backfilling material and construction material. • Muck will only be disposed in the identified four muck disposal sites, which has already been provided with boulder crates and retaining wall • All the muck disposal sites will be covered with vegetation after leveling and dressing the top surface once the dumping is completed • No sewage from labor camps shall be disposed off without treating it with the existing septic tank-soak pit arrangement • Once the septic tank is full, it should be cleaned and the collected sludge is to be disposed to the composting facility at Shimla. • Surface runoff from oil handling areas/devices should be treated for oil separation before being discharged into the river • Segregation of storm water shall be properly carried out to avoid its contamination from any waste, i.e., municipal or hazardous • Municipal and hazardous waste will be collected and disposed off as mentioned above
3.	**Ambient Air Quality**	• Emissions from onsite operation of diesel generators, construction equipments, vehicles	• Power supply for construction will be sourced from Himachal Pradesh Electricity Board • Use of DG set would be limited during power failure as a backup • For fugitive dust control, provisions will be made for sprinkling of water on the project roads and storage piles. • All stationary machines/ DG sets /

S.N	Component	Impacts Identified	Suggested Mitigation Measures
			construction equipment emitting the pollutants will be inspected weekly for maintenance and should be fitted with exhaust pollution control devices. • The wind barriers of 50% porosity will be installed on three sides of all storage piles • All the stone crushers for project activities will be installed with suitable pollution control arrangement • Concrete batching plant will be located at the closest possible location to the point of use so that the requirement of transit mixers/ delivery trucks is minimized • Effective traffic management needs to be undertaken to avoid significant delays in and around the project area
4.	**Ambient Noise Quality and Vibrations**	• Noise due to Construction activities (such as excavation, grading, erecting equipment, piling, etc) and movement of vehicles • Drill and blast method generates noise and vibration	• The construction works and vehicle movement will be carried out during the day time. • All stationary noise generating equipments such as air compressors and power generators should be used away from the residential area. • Provision of proper Personal Protective Equipment (PPEs), i.e., ear muffs and war plugs, will reduce noise impact on personnel. • A proper routine and preventive maintenance procedure shall be followed for all the equipments • Acoustic enclosures and noise barriers to be provided for all noise generating equipments • Controlled blasting techniques such as Noiseless Trunk Delay (NTD) technique etc. to be adopted to reduce vibrations. • The established time for blasting will be notified and displayed in the project area at strategic places such as main gate, project office, project roads, near blasting site etc.
5.	**Ecology**	• Loss of trees and ground vegetation • Destruction of forest due to fuel and fire wood	• Compensatory afforestation of over 79.00 hectares of degraded forest land • Provisions for room heating facility and common geysers are to be made in labor camps

S.N	Component	Impacts Identified	Suggested Mitigation Measures
		collection by labors • Habitat destruction for terrestrial and aquatic	• Diesel fired chullas must be mandatory for the kitchen • Contractor should acquire firewood from wood deports only and provide for the use in labor camps, if required. • Vigilance to be kept on the adjoining forest areas and forest entry points in the project area
6.	**Socio-Economic**	• Land Acquisition and loss of landholdings • Impact on livelihood of the villages • Loss of Common Property Resources • Increased employment opportunities • Contracting opportunities for locals	• The compensation amount was paid as decided by the Government. • The Project proponent has also paid the compensation for the diverted forest land which includes the net present value (NPV) and the monetary value of Non Timber Forest Products (NTFP) which in this case includes Chilgoza also. • A Rehabilitation and Resettlement (R&R) plan is under the draft stage to undertake activities for the well being of the affected families and panchayats. • Out of 28 affected families, 14 persons have been employed at the project and several locals have been provided with contract jobs.
7.	**Occupational Health and Safety**	• Injury due to improper handling, operation and execution • Trip and fall, inadequate fall safe arrangements • Exposure to hazardous substances	• Personal Protection Equipment (PPEs) to be provided to workers and their use to be mandated and supervised at work site. • Workers and contractors to be provided with health and safety training. • Safety harness to be ensured for workers while working at heights. • First aid and essential medical services to be provided at site. • Proper signage to be provided around the construction site.
	OPERATION PHASE		
8.	**Water Environment**	• Disposal of sewage from project colony and contamination of surface and groundwater resource • Water quality may also be affected	• Domestic wastewater from the residential staff colony will be treated through septic tanks and soak pits. • Properly treated water conforming to the desired standards will either be reused for greenery development or released into the natural water channels. • An incinerator must be installed to treat

S.N	Component	Impacts Identified	Suggested Mitigation Measures
		with unchecked waste dumping or spill into the river • Stagnant water provides favorable breeding place for vector life such as mosquito and snails	waste from the colony during the operation phase. However looking at the size of the colony and population, the solid waste generated will be very less. Therefore, the facility available at ReckongPeo will be utilized for disposal of solid waste. • The medical team in the project will be properly instructed to keep a watch and take care of any reported case.
9.	**Air Quality**	• Negligible increase in pollution level due to 4-5 vehicle movements	• Once the construction is over, all heavy machines and vehicles will be discontinued • Project roads will be paved and sprinkling of water shall be practiced in unpaved areas.
10.	**Ecology**	• Increased access to forest areas might increase the pressure on the forest • Water flow will decrease in the river	• HP Forest Department is required to tighten the forest access and improve the surveillance to control on illegal entrants into the forest areas adjoining the project. • The Project shall ensure a minimum flow of 15% of lean season discharge of the stream throughout the year • NTPGPL has deposited money to the Directorate of Fisheries, Government of Himachal Pradesh for Fisheries Development Plan.

Analyses of Alternatives

The analysis of the alternatives considered for the proposed project no project scenario; alternate methods of power generation and alternate location for the proposed project. NTPGL was awarded the project at the site chosen by the state government and therefore proponent did not have options for alternate sites. Two alternatives, along each bank of Tidong stream, were considered for the alignment of the head race tunnel. A comparative evaluation was carried out based on factors such as geological stability, shorter length number of streams to be negotiated and left bank was selected. As part of consultations with the Panchayats, the Rispa Panchayat raised concerns regarding the alignment of the road and the alternate option of constructing the road on the left bank of the Tidong stream i.e., passing through Moorang Panchayat. A 2.46 km long approach road along with a steel bridge on Tidong Khad to reach the Power House has been constructed.

Information Disclosure, Consultation and participation

NTPGPL has carried out several consultations with various stakeholders such as affected families, local administration and panchayats. The first consultation with affected panchayats and villagers was held during a Public Hearing undertaken as part of the EIA study conducted for the project at three locations, i.e., Moorang Tehsil near proposed diversion structure in Village Lumber, Panchayat Thangi and near proposed power house in Village and Panchayat Rispa. In an ongoing process, NTPGPL has carried out several consultations with the three panchayats between 2006 and 2012.

The Vice-President of the Project who is also the Project-in Charge has been appointed who has the overall responsibility of managing and implementing the stakeholder engagement plan with the support of Community Liaison Officer at Project Level and Manager-Social Manager at corporate office.

Grievance Redress Mechanism

The project has a Grievance Redress Mechanism already in place to receive and facilitate concerns and grievances of not only the local communities, Panchayats and other stakeholders but also of the workers employed for the project.

Environmental Management Plan

Based on the findings of the Environmental and Social Assessment and consultations with the communities, management plans have been prepared to implement the suggested measures, i.e., Pollution Abatement Plan, Solid Waste and Muck Management Plan, Biodiversity Conservation and Management Plan, Construction Labor Management Plan, Traffic Management Plan, Health and Safety Plan, Emergency Preparedness Plan Community Development and Social Development Activities and Resettlement Action Plan. In order to execute these plans, a budget of INR 479.10 million has been earmarked and out of this amount NTPGPL has already spent about INR 290.56 million.

For implementing the EMP appropriate institutional arrangements for implementation and monitoring at both project level and corporate level are in place. At the corporate level the environment and social management system includes CEO-NRPPL, Head-Hydro Projects, Head-EHS and Manager-Social who will guide the project level staff and monitor the EMP implementation process. They will also coordinate with the external agencies for compliance and reporting the progress achieved. At the site level the Vice-President of the Project who is also the Project-in Charge has overall responsibility for implementation and monitoring. He is supported by Community Liaison Officer and Manager- EHS for safety, safety supervisors , health team including Pharmacists and others. The site team reports to the corporate team on

a regular basis and maintains all the relevant records required during EMP implementation. They also will coordinate with all line departments and agencies for monitoring the progress of implementation of other mitigation plans such as CAT Plan, CA plan, Fishery Development plan etc.

Conclusions

Though the project has significant environmental impacts during the construction stage and limited impacts during operation phase, these can be mitigated through appropriate measures suggested above. Moreover, once the project is completed it has several benefits to the immediate affected community and society at large. As electricity is a key input for socioeconomic development process once the project is operational, it ensures efficient provision of electricity which not only contributes to poverty reduction indirectly through economic growth, but also central to the basic human needs of health and education.

The other direct positive economic and social benefits that result from the proposed project include generating local employment, provide good access roads and health facility at site during emergencies. In addition, the local community will be benefited from several grants being given to State Government, Panchayats under Local Area Development Fund (LADF) scheme and the Corporate Social Responsibility (CSR) initiatives by NTPGPL. The efforts proposed under the Rehabilitation and Resettlement (R&R) scheme for both direct affected families and to the local panchayats such as self-employment schemes, merit scholarship scheme, empowering women will substantially contribute to the overall development of the project area. The initiatives on afforestation, catchment area treatment, fisheries development etc in the project area will largely help in conserving the local ecology and benefit the local population.

1. INTRODUCTION

1.1 General

NSL Renewable Power Private Limited (NRPPL) is part of the NSL Energy Ventures Private Limited established for implementation of Renewable Power Projects across the country. NRPPL is in the process of developing a 100MW Tidong-I hydro electric project in district Kinnaur, Himachal Pradesh, India (hereinafter referred to as the Project). In order to ensure close monitoring and execution of the project, a Special Purpose Vehicle (SPV) has been created which is known as NSL Tidong Power Generation Pvt. Ltd (NTPGPL).

The project has already obtained an environment clearance in the year 2007. The first Environmental Impact Assessment (EIA) study for the purpose of environmental clearance from the Ministry of Environment and Forests (MoEF) was undertaken by M/s RITES Ltd. in November 2005.

Subsequently, the proponent, approached International Finance Corporation (IFC) to seek partial funding for the project and hence the report was modified to include elements pertaining to IFC's Environmental and Social requirements by M/s AECOM. AECOM revised the earlier EIA report as per the requirements of IFC Performance Standards (PS) on Social and Environmental Sustainability and Environment, Health and Safety (EHS) guidelines.

Now NRPPL is exploring the possibility of funding from Asian Development Bank (ADB) and this project is identified as Category 'A' for environmental aspects and category 'B' for social attributes. To fulfill ADB's requirements the existing report is being updated to incorporate the current status of the project which includes activities related to construction, modification of plans, organizational setup etc. which have already been implemented or proposed and were not considered in previous reports.

The mandate for the present study is to assess the impacts of the project based on current understanding and update the work according to the requirements of the ADB's Safeguard Policy Statement (SPS) of June 2009.

1.2 Project Background

Hydro-power potential of India has been estimated to be 148,700 MW in various basins (Table 1-1) as per the Central Electricity Authority (CEA) wherein a 60% Plant Load Factor (PLF) can produce 84,000 MW of power. Out of this, a little more than 34500 MW capacity has already been developed while another 12000 MW is under construction. The balance of 1, 00,000 MW is still yet to be harnessed.

Table 1-1: Basin wise hydropower potential in India (in MW)

Basin/Rivers	Potential	Developed	Under construction
Indus Basin	33,832	11080.3	4280
Ganga Basin	20,711	4987.2	1136
Central Indian River system	4,152	3147.5	400
Western Flowing Rivers of southern India	9,430	5660.7	100
Eastern Flowing Rivers of southern India	14,511	7783.2	470
Brahmaputra Basin	66,065	1847	5565
Total	**148,701**	34505.8	11951

Source: http://www.cea.nic.in/archives/hydro/status_hep/basin_wise/jul12.pdf

Recently, CEA (2012) assessed an addition to the hydro capacity by about 9200 MW between year 2012 -2017 from the under construction projects. The states of Arunachal Pradesh, Uttrakhand, Jammu and Kashmir, Himachal Pradesh and Sikkim are the fore-runners and contribute the most to hydro power generation.

1.2.1 Hydropower Potential in Himachal Pradesh

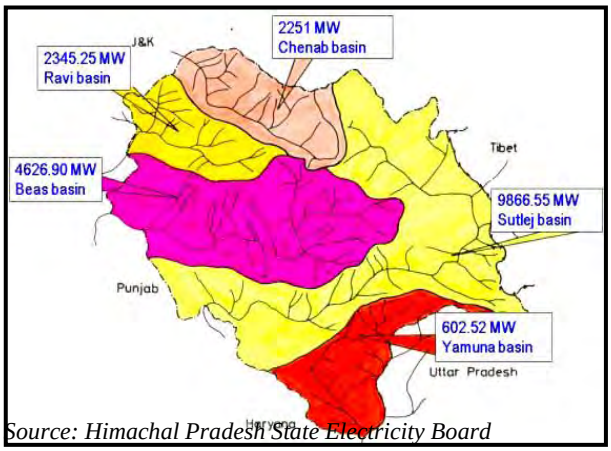
The hydroelectric potential of the state of Himachal Pradesh is 20,415 MW, out of which about 6300 MW of hydro power is being produced currently (Table 1-2). In a recent estimate, the total potential of the State of Himachal Pradesh is estimated as 20787.07 MW and contribution of Satluj basin is adjusted to 9450 MW (Table 1-3). It is evident that Satluj Basin has a share of nearly 50 % of the total endowments as well as installed capacity.

The proposed Tidong Hydropower project is located on the Tidong Khad, a tributary of river Satluj in Kinnaur district. It is a run-of-the-river scheme proposed to harness the hydropower potential of Tidong Khad in its lower reach between Lambar and Rispa villages on the right and left banks of Tidong stream respectively, near confluence with Satluj river. The project site is

situated 270 km from Shimla on National Highway-22 up to a place near Moorang and thereafter about 20 km on state road up to Lambar village.

Table 1-2: Basin wise hydropower potential of Himachal Pradesh

Basin	Hydropower MW
Beas Basin	4626.90
Ravi Basin	2345.25
Satluj Basin	9866.55
Yamuna Basin	602.52
Chenab Basin	2251.00
Mini Micro Projects	723.40
TOTAL	20415.62



Source: Himachal Pradesh State Electricity Board

Table 1-3: Status of hydropower potential of Satluj Basin in Himachal Pradesh

Project Status	Potential (MW)
Under Operation.	3150.25
Under execution in state/Pvt./Central Sector	1880.50
DPR Ready	862.00
Under Investigation	692.00
TOTAL POTENTIAL	**9450.25**

Source: http://www.infraline.com/power/State/Himachal/HPHydroPowerPotential.aspx#3

1.3 Objective and Scope of Work

The objective and scope for this report is to align the findings of the existing EIA report and the supplementary studies undertaken in accordance with requirements of ADB Safeguard Policy Statement. This report intends to assess the impacts based on the current operations and the status of the implementation of mitigation measures proposed in the earlier reports.

The existing capacity and procedures being followed will also be reviewed for its compliance and concurrence with the ADB's SPS. The report presents an environmental and social impacts arising from the project. The project is under construction and several activities are already been completed, the main aspect that are addressed as part of updations are:

- Review of Organization structure existing with respect to EHS function;

- Project schedule as on date;
- Campsite details based on existing facilities and pending activities;
- Status of transmission line and activities undertaken as on date;
- Assessment of Wild life habitat in and around the project site;
- Fish survey to verification of fish habitat and population in Tidong river;
- Status of Involuntary resettlement, compensation process and status
- Current status on stakeholder and grievance redress mechanism
- Implementation status of Environmental Management and Monitoring Plan (EMMP) and additional requirements
- Updation of EMMP as per ADB's SPS

1.4 Report Layout

The report has been structured as follows:

- **Executive Summary**
- **Chapter-1** of the report is on introduction. It gives an overview of the project rationale and sets context for the Tidong HEP.
- **Chapter-2** provides various policies, legal and administrative requirements with regard to the hydro-projects and also covers state guidelines for the current project.
- **Chapter-3** describes the proposed project components and activities including project features, construction schedule etc.
- **Chapter-4** summarizes environmental baseline on physical, biological and social parameters based on studies conducted during EIA stage and consequent site visits.
- **Chapter-5** highlights anticipated environmental and social impacts of the project. It also suggests mitigations measures.
- **Chapter-6** discusses various project alternatives.
- **Chapter-7** describes process of consultation and participation during project life and also explains mechanism of information disclosure.

- **Chapter-8** refers to grievance redress mechanism which shall be followed to seek coordination among various stakeholders.
- **Chapter-9** proposes EMP in which all sectoral plans are discussed separately along with their cost estimates wherever necessary. It also details monitoring requirements throughout the project life.
- **Chapter-10** provides a summary of the report in the form of conclusion and recommendations.

2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 General

In order to protect environment and social conditions, Government of India has formulated several policies and circulated a number of Acts, Rules and Notifications. These legislations ensure that the development process meets the overall objective of promoting sustainability in the long run.

The current project will also be guided by various National Acts, Rules and Policies and also IFC's and ADB's Policies and Performance Standards. This section discusses most of the significant legislations in brief which is essential to understand their bearing on the project to avoid any non-compliance.

2.2 Relevant Environmental, Health & Safety, Worker Welfare Legislations

2.2.1 The Environmental Impact Assessment (EIA) Notification, 2006 and its amendments

Hydroelectric Projects can cause broad range of impacts including alteration in the habitats and species, diversity of area, changes in land use pattern, aesthetics, natural and artificial resources and also affect upstream and downstream biology, hydrology and sociology. Although, water used in such projects may be free, inexhaustible and reusable natural resource but the same is not true for the environmental aspects. Environmental aspects need to be scrutinized for the sustainable development to mitigate the negative impact caused by hydroelectric projects. Hence, EIA Notification, 2006 requires preparation of an EIA Report and EC for hydroelectric power projects. Hydroelectric Power generation projects have been classified under Category 1 (c) "River Valley projects" of the EIA Notification, 2006.

Whenever a project is accorded an EC, a set of recommendations and conditions are stipulated by the Appraisal Committee for compliance by the investor while the project is under implementation and later under operation.

Also, Public Hearing is required for hydroelectric projects as a part of EC process. The applicant is required to make a request through a simple letter to the Member Secretary of the State Pollution Control Board (SPCB) or Union Territory Pollution Control Committee, in whose jurisdiction the project is located, to arrange the public hearing within the prescribed statutory period. In case the project site is covering more than one District or State or Union Territory, the public hearing is mandated in each District, State or Union Territory in which the project is located and the applicant shall make separate requests to each concerned SPCB or UTPCC for holding the public hearing as per this procedure.

The applicant has to enclose with the letter of request, at least 10 hard copies and an equivalent number of soft (electronic) copies of the draft EIA Report with the generic structure given in Appendix III including the Summary EIA report in English and in the official language of the state/local language, prepared strictly in accordance with the Terms of Reference communicated after Scoping (Stage-2). Simultaneously the applicant has to arrange to forward copies, one hard and one soft, of the above draft EIA Report along with the Summary EIA report to the following authorities or offices, within whose jurisdiction the project will be located:

a) District Magistrate/District collector/Deputy commissioner/s

b) Zila Parishad or Municipal Corporation or Panchayats Union

c) District Industries Office

d) Urban Local Bodies (ULBs) / PRIs Concerned/Development authorities

e) Concerned Regional Office of the Ministry of Environment and Forests

Following panel constitution, SPCB releases notice for the public hearing in one major National Daily and one Regional Vernacular Daily, inviting objections from the people likely to be affected by a project covered under the EIA notification. Its proceedings are then issued by SPCB to MoEF with a copy to the project proponent.

2.2.2 National Environment Appellate Authority Act, 1997

This Act was established to hear grievances arising out Environmental Clearance cases under the EPA, 86 by the establishment of a National Environment Appellate Authority (NEAA). A person aggrieved by an order granting environmental clearance in a given area for establishing an industry may, within 30 days from the date of such an order, appeal to the NEAA. The appellant can be a person, who owns or controls the project, an association of persons,

Central or State Government or any local authority. The Authority shall dispose of the appeal within 90days from the date of filing the appeal.

2.2.3 National Environment Tribunal Act, 1995

The National Environment Tribunal Act prescribes the procedure and substantive law relating to compensation for the death of, or injury to, a person and damage to property and environment, by any industry wherein a hazardous substance is used or is a byproduct. It also provides for the establishment of a National Environment Tribunal for effective and expeditious disposal of such. The tribunal would have jurisdiction over matters specified in the Public Liability Insurance Act. The tribunal would receive claims of compensation by the person who has sustained the injury or by his or her legal representative.

2.2.4 National Green Tribunal Act, 2010

This act provides for the establishment of National Green Tribunal for the effective and expeditious disposal of cases relating to environment protection and conservation of forests and other natural resources and giving relief and compensation for damages to persons and property. The tribunal has jurisdiction over all civil cases relating to environment. It would deal with all environmental laws on air and water pollution, the EPA, the FCA and the Biodiversity Act. Also the relief and compensation under this act is in severance to the relief paid under Public Liability Insurance Act, 1991.

2.2.5 The Forest (Conservation) Act, 1980 as amended in 1988

The Forest Conservation Act (FCA) was adopted in 1980 to protect and conserve forests. It strictly restricts and regulates the de-reservation of forests or use of forest land for non-forest purposes without the prior approval of Central Government. To this end the Act lays down the pre-requisites for the diversion of forest land for non-forest purposes. The FCA is relevant for the power sector for the citing guidelines for hydroelectric power plants, and for passage of transmission through forest areas, since it would involve use of forestland for "non-forest" purposes.

2.2.6 The Forest (Conservation) Rules 2003

The Forest (Conservation) Rules, 2003 empower the Central Government to constitute a seven -member committee to advise the Central Government on proposal made by a State Government for conversion of a forestland. The MoEF circulated guidelines for submission of

proposal for diversion of forest area to non-forest activity under the FCA, 1980 through letter no. 2-1/2003-FC dated October 20, 2003. The parameters for evaluation of loss of forests include loss of animal husbandry productivity, value of timber, fuel wood, forest produce, wages from the harvest, loss of public facilities and administrative infrastructure and Environmental loss.

The Indian Forest Act, 1927 consolidates the law relating to forests, the transit of forest-produce and the duty on timber and other forest-produce.

2.2.7 The Wild Life (Protection) Act, 1972, as amended in 1993 and Rules 1995

The Wildlife (Protection) Act, 1972 provides for protection to listed endangered species of flora and fauna and establishes a network of ecologically important protected areas. The objective is also to control poaching, smuggling and illegal trade in wildlife and its derivatives. The Act empowers the Central and State Governments to declare any area to be a Wildlife Sanctuary, National Park or a closed area. There is a blanket ban on carrying out any industrial process or activity inside any of these protected areas. In case forestland within the protected areas network is to be diverted for any non-wildlife use, a no objection has to be obtained from the Indian Board of Wildlife and the State Legislature, before the final consideration by MoEF. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent. The Ministry has proposed further amendments in the law by introducing more rigid measures to strengthen the Act.

In accordance with Wildlife (Protection) Amendment Act, 2002 “no alternation of boundaries /National Park/Sanctuary shall be made by the State Govt. except on recommendation of the National Board for Wildlife (NBWL)”. The study area does not involve any notified National Park or Wild life Sanctuary or biosphere reserve located within 10 Km radius; hence this Act is not applicable.

2.2.8 The Environment (Protection) Act, 1986, amended in 1991 and Rules 1986

This Act was introduced in 1986 as an umbrella legislation that provides a holistic framework for the protection and improvement to the environment. In terms of responsibilities, the Act and the associated Rules requires for obtaining environmental clearances for specific types of new/expansion projects (addressed under EIA Notification, 1994) and for submission of an environmental statement to the SPCB annually. It empowers the Central Government to establish authorities charged with the mandate of preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the

country. It also empowers Central government to take measures necessary to protect and improve the quality of the environment by setting standards for emissions and discharges; regulating the location of industries; management of hazardous wastes, and protection of public health and welfare. The Act was then amended in 1991. The EIA report has been prepared in accordance with the guidelines of this Act. The proposed project will fully abide to the Environment (Protection) Act.

2.2.9 Air (Prevention and Control of Pollution) Act, 1981, amended 1987 and Rules 1982, 1983

The Act prohibits the construction and operation of any industrial plant without the consent of SPCBs. The Act assigns powers and functions to the Central Pollution Control Board (CPCB) and the SPCBs for prevention and control of air pollution and all other related matters. For the prevention and control of air pollution, the State Government, in consultation with the SPCB has the powers to set standards for emissions from automobiles, impose restrictions on use of certain industrial plants and prohibit emissions of air pollutants in excess of the standards laid down by the SPCB. It can also make an application to the court for restraining persons from causing air pollution. In addition, it also has the power of entry and inspection, power to obtain information and power to take samples of air emissions and conduct the appropriate follow up. The Act also allows for appropriate penalties and procedures for non-compliance.

This Act empowers CPCB and SPCBs prosecuting offenders and issuing licenses for construction and operation of any facility. National ambient air quality standard for different regions e.g. industrial, residential and sensitive is notified under this Act. Air quality monitoring during construction and operation phases, particularly for obtaining consent for establishment and operation will be done under this Act.

To empower the central and state pollution boards to meet grave emergencies, the Air (Prevention and Control of Pollution) Amendment Act, 1987, was enacted. The boards were authorized to take immediate measures to tackle such emergencies and recover the expenses incurred from the offenders. The power to cancel consent for non-fulfillment of the conditions prescribed has also been emphasized in the Air Amendment Act.

The Air (Prevention and Control of Pollution) Rules formulated in 1982, defined the procedures for conducting meetings of the boards, the powers of the presiding officers, decision-making, the quorum; manner in which the records of the meeting were to be set etc.

They also prescribed the manner and the purpose of seeking assistance from specialists and the fee to be paid to them.

Complementing the above Acts is the Atomic Energy Act of 1982, which was introduced to deal with radioactive waste. In 1988, the Motor Vehicles Act was enacted to regulate vehicular traffic, besides ensuring proper packaging, labeling and transportation of the hazardous wastes. Mass emission standards were notified in 1990, which were made more stringent in 1996. In 2000 these standards were revised yet again and for the first time separate obligations for vehicle owners, manufacturers and enforcing agencies were stipulated.

2.2.10 Water (Prevention and Control of Pollution) Act, 1974 and Rules 1975 as amended up to 1988

This Act makes provision for the establishment of the CPCB and SPCBs, whose responsibility includes managing of water quality and effluent standards, as well as monitoring water quality, prosecuting offenders and issuing licenses for construction and operation of any facility. Subject to the provisions of the Act, the functions and powers of CPCB as well as the SPCBs have been delineated individually and with respect to each other.

2.2.11 Water (Prevention and Control of Pollution) Cess Act, 1977

This Act provides for a levy and collection of a cess on water consumed by industries and local authorities. It aims at augmenting the resources of the central and state boards for prevention and control of water pollution. Following this Act, the Water (Prevention and Control of Pollution) Cess Rules were formulated in 1978 for defining standards and indications for the kind of and location of meters that every consumer of water is required to install.

2.2.12 Legislations on Waste Management

Under the EPA 1986, the MoEF has issued several notifications to tackle the problem of hazardous waste management. These include:

- Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules 2008 including amendment Rules 2009, which brought out a guide for manufacturing, storage and import of hazardous chemicals and for management of hazardous wastes. The Rules require industries to classify wastes into categories and manage them as per the prescribed guidelines and obtain prior authorization for handling, treatment, storage and disposal of Hazardous Wastes. They also provide guidelines for the import and export of hazardous waste in the country.

- Para 25 of the Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules 2008 mentions about Liability of Occupier, Transporter, Operator of any waste facility and Importer. It suggests that the occupier and the operator of the facility shall be liable to pay financial penalties as levied for any violation of the provision under these rules by the SPCB with the prior approval of the SPCB.

- Biomedical Waste (Management and Handling) Rules, 1998 and amended in 2003, were formulated along parallel lines, for proper disposal, segregation, transport etc. of infectious wastes.

- Municipal Wastes (Management and Handling) Rules, 2000, whose aim was to enable municipalities to dispose municipal solid waste in a scientific manner.

2.2.13 The Land Acquisition Act, 1894

The Land Acquisition Act (LAA) of 1894 is summarized below:

- Land identified for the purpose of a project is placed under Section 4 of the LAA. This constitutes notification. Objections must be made within 50 days to the Collector (highest administrative officer) of the concerned District. The CBA requires 30 days for objections;

- The land is then placed under Section 6 of the LAA (or Section 7 of the CBA). This is a declaration that the Government intends to acquire the land. The Collector is directed to take steps for the acquisition, and the land is placed under Section 9. Interested parties are then invited to state their interest in the land and the price. Under Section 11, the Collector shall make an award within two years of the date of publication of the declarations. Otherwise, the acquisition proceedings shall lapse;

- In case of disagreement on the price awarded, within 6 weeks of the award the parties (under Section 18) can request the Collector to refer the matter to the Courts to make a final ruling on the amount of compensation;

- Once the land has been placed under Section 4, no further sales or transfers are allowed. However, since the time lag between Sections 4 and the others following it is about three years, land transfers are not uncommon;

- Compensation for land and improvements (such as houses, wells, trees, etc.) is paid in cash by the project authorities to the State government, which in turn compensates landowners. In the case of acquisition for coal projects, the coal companies make direct payments to landowners;

- The price to be paid for the acquisition of agricultural land is based on sale prices recorded in the District registrar's office averaged over the three years preceding notification under Section 4. The compensation is paid after the area is acquired, actual payment by the State taking about two or three years. An additional 30 percent is added to the award as well as an escalation of 12 percent per year from the date of notification to the final placement under Section 9. For delayed payments, after placement under Section 9, an additional 9 percent per annum is paid for the first year and 15 percent for subsequent years.

2.2.14 Panchayats Extension to Schedule Areas Act, (PESA) 1996

The PESA Act is one of the most potent legislative measures of the recent times, which recognizes the tribal people's mode of living, aspirations, their culture and traditions. The PESA Act provides special provision for function of Panchayats so as to protect and promote the tribal interests in accordance with the spirit of the scheduled areas as enshrined in the constitution. In addition, this State has also formulated The Himachal Pradesh Panchayati Raj (Extension to the Scheduled Areas) Rules, 2011 also.

As per PESA, the Gram Sabha will be involved in approval of development plans, and programmes, land availability and rehabilitation of affected persons, and has given control of land, forest and water in the hands of tribal through the Gram Sabha. The Act entrusts the Gram Sabha with the following responsibilities:

- Gram Sabha shall safeguard and preserve the traditions and customs of the people, their cultural identity, community resources and the customary mode of dispute resolution.
- Gram Sabha shall be responsible for approval of plans, programmes and projects for social and economic development.
- Responsible for the identification or selection of persons as beneficiaries under the development programmes.
- Consultation with Panchayat prior to land acquisition and Rehabilitation & Resettlement activities in the scheduled areas.
- Endows ownership of minor forest produce to Panchayats.
- Endows power to prevent alienation of land in Scheduled areas and to take appropriate action to restore any unlawfully alienated land of STs.

2.2.15 Rules for the regulation of Rights in the Demarcated and Un-demarcated Forest of the Sutlej Valley under the Schedule of Bashahr Lease, 1920

The rule prohibits certain activities in all the forests of the Bashahr State (now Kinnaur District), except with the permission of the Forest Officer or in the exercise of recorded rights. The prohibited activities include selling timber, shooting without license, removing dead leaves, setting trees or grass tracts on fire, breaking up of land for cultivation etc. However in case of demarcated forests, the proprietors of cultivated land and their agricultural tenants are allowed to exercise activities, like grazing of cattle; collection of dry and fallen wood for firewood; collection of fruits, edible seeds and other useful flowers, medicinal roots; collection of slates for sale or personal use from existing quarries; maintenance and repair of existing mills and water channels in demarcated forests; lopping of silver fur, kail, spruce and neoza (Chilgoza) for charcoal and for manufacturing of agricultural implements; cutting and collection for personal use and sale to agriculturalists within the state and extraction of resin from trees like deodar, blue pine, neoza trees etc, only when they have been specified in the record of rights. These activities may also be carried out without permission, provided the recognized customs and usages of the villages concerned are respected. As per the rules, the land in un-demarcated forest for new cultivation will be granted by the Forest Officer and the application for the same will have to be submitted through the Manager of the Bashahr State (now Kinnaur District) in accordance with such orders as may be prescribed by the Superintendent, Hill States, Shimla.

2.2.16 Himachal Pradesh Panchayati Raj Act, 1994

The aim of this act is to consolidate, amend and replace the law relating to Panchayats with a view to ensure effective involvement of the Panchayati Raj Institutions in the local administration and the developmental activities.

The act has specific provisions for the formulation, composition, specific functions and powers, various sub committees, election procedures, judicial functions, finance, taxation and accounts of the local bodies such as Gram Panchayat, Gram Sabha, Panchayat Samiti and Zila Parishad. It also specifies dispute solving mechanisms within these institutions.

2.2.17 Public Liability Insurance Act (PLIA), 1991, amended in 1992 and associated Rules

The Act covers accidents involving hazardous substances and insurance coverage for these. Where death or injury results from an accident, this Act makes the owner liable to provide

relief as is specified in the Schedule of the Act. The PLIA was amended in 1992, and the Central Government was authorized to establish the Environmental Relief Fund, for making relief payments.

2.2.18 Factories Act, 1948 and its Amendment in 1987

The Factories Act, 1948 was a post-independence statute that explicitly showed concern for the environment. The primary aim of the 1948 Act has been to ensure the welfare of workers not only in their working conditions in the factories but also their employment benefits. While ensuring the safety and health of the workers, the Act contributes to environmental protection. The Act contains a comprehensive list of 29 categories of industries involving hazardous processes, which are defined as a process or activity where unless special care is taken, raw materials used therein or the intermediate or the finished products, by-products, wastes or effluents would:

- Cause material impairment to health of the persons engaged
- Result in the pollution of the general environment

2.2.19 Child Labour (Prohibition and Regulation) Act, 2000

The Act addresses the issue of Child Labor which is social concern. This Act prohibits the engagement of children below the age of 14 years in certain employments and regulates the conditions of work of children in certain other employments. The Act prohibits employment of child in about 13 occupations and about 51 processes. The Act provides no child shall be permitted or required to work between 7p.m. and 8 a.m., for more than 3hrs before he has an interval for rest at least one hour. Every child employed in an establishment shall be allowed in each week a holiday for one whole day. The Act also levies the penalty on those who employs or permits any child to work in the occupations and processes in which employment of children is prohibited.

2.2.20 The Indian Fisheries Act, 1897

The Indian Fisheries Act, 1897 contains seven sections. Section 5 of the Act prohibits destruction of fish by poisoning waters.

2.2.21 Biological Diversity Act 2002 and Rules 2004

The MoEF has enacted the Biological Diversity Act, 2002 under the United Nations Convention on Biological Diversity signed at Rio de Janeiro on the 5th day of June, 1992 of which India is also a party. This Act is to "provide for the conservation of biological diversity, sustainable use of its components, and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto." As per the provision of act certain areas, which are rich in biodiversity and encompasses unique and representative ecosystems are identified and designated as biosphere reserve to facilitate its conservation. All restrictions applicable to protected areas like National Park & Sanctuaries are also applicable to these reserves.

2.2.22 Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996

This law was enacted in 1996 with an objective to provide a comprehensive Central Legislation for workers and laborers. It provides for regulation of employment and conditions of service of the building and other construction workers with respect to their safety, health and welfare measures in every establishment which employs 10 or more than 10 workers. The exception made is only in respect of residential houses for own purpose constructed with a cost not exceeding INR 1.0 Million and such other activities to which the provisions of Factories Act, 1948 and Mines Act, 1952 apply. The Act also has provision for immediate assistance in case of accidents, old age pension, loans for construction of house, premium for group insurance, financial assistance for education, to meet medical expenses, maternity benefits etc. The Act also requires constitution of Advisory Committee at the Central and the State levels and safety committees in every establishment employing 500 or more workers.

2.2.23 The Building and other Construction Workers' Welfare Cess Act, 1996

The aim of this Act is to provide for the levy and collection of a cess on the cost of construction incurred by employers with a view to augmenting the resources of the Building and Other Construction Workers' Welfare Boards constituted under the Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996. The Act provides for regulating the employment and conditions of service of building and other construction workers and also provides for their safety, health and welfare measures and other matters connected therewith or incidental thereto.

2.2.24 Employer's Liability Act, 1938 (as Amended)

The Act provides scenarios in which the employer may or may not have to take liability for certain accidents and damages faced by employees. It applies to a wide range of industries. Compensation benefits for injured party in case of liability taken up by employers have also been mentioned in the Act.

2.2.25 The Contract Labour (Regulation & Abolition) Act, 1970 and Rules

The Government of India has been deeply concerned about the exploitation of workers under the contract labor system. With a view to removing the difficulties of contract labor and bearing in mind the recommendations of various commissions and committees and the decisions of the Supreme Court, the Contract Labor (Regulation and Abolition) Act was enacted in 1970. This Act seeks to regulate the employment of contract labor in certain establishments and to provide for its abolition under certain circumstances.

2.2.26 Himachal Pradesh Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules, 2008

Himachal Pradesh Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules, 2008 apply to the building or other construction work relating to any establishment in relation to which appropriate Government in the State Government of Himachal Pradesh under the Act. These Rules suggests the responsibilities and duties of employers, architects, project engineers and designers, building workers, undertaking any of the operation or works. The Rules intend to ensure safety of workers, promote following of the accepted principles of standard safe operating practices connected with building and other related to or incidental to building or other construction, sanitation and hygiene of workers, timely payment of wages, testing, examination and inspection of machinery and equipment etc.

2.2.27 Payment of Wages Act, 1936 (Amended)

The Payment of Wages Act, 1936 is a central legislation which applies to the persons employed in the factories and to persons employed in industrial or other establishments specified in sub-clauses (a) to (g) of clause (ii) of section 2 of this Act. This Act does not apply to workers whose wages payable in respect of a wage period average INR 1,600/- a month or more. This Act has been enacted with the intention of ensuring timely payment of wages to the workers and for payment of wages without unauthorized deductions. The salary in

factories/establishments employing less than 1000 workers is required to be paid by 7th of every month and in other cases by 10th day of every month. A worker, who either has not been paid wages in time or an unauthorized deductions have been made from his/her wages, can file a Claim either directly or through a Trade Union or through an Inspector under this Act, before with the Authority appointed under the Payment of Wages Act. The power for hearing and deciding Claims under this Act has been vested at present with the Presiding Officer of a Labor Court.

2.2.28 Minimum Wages Act, 1948 (Amended)

The Minimum Wages Act, 1948 provides for fixing minimum rates of wages in scheduled industries. The Act purports to achieve to prevent exploitation of labor and the purpose that authorities under this Act have been empowered to take steps to prescribe minimum rates of wages in certain employments where labor is ignorant or less organized.

2.2.29 Workmen Compensation Act, 1923 as amended by Amendment Act No.6 of 1976

Workmen's Compensation Act 1923 is a central legislation which provides for payment of compensation for injuries suffered by a workman in the course of and arising out of his employment according to the nature of injuries suffered and disability incurred, where death results from the injury, the amount of compensation is payable to the dependants of the workmen. All the Deputy Labor Commissioner has been appointed as Commissioner under Workmen's Compensation Act. Where an employer is in default in paying the compensation due under this Act, within one month from the date it fell due, the Commissioner shall direct that the employer in addition to the amount of arrears, pay simple interest there on at the rate of 12% per annum or on such higher rates.

2.2.30 Maternity Benefit Act, 1961 (Amended)

This Act provides for maternity benefits and is applicable to factories covered under the Factories Act, 1948. It also applies to Shops and Establishments in which ten or more workers are employed or were employed on any day of the preceding twelve months. The provisions of this Act do not apply to any factory or establishment to which the provisions of Employee State Insurance Act, 1948 apply. The Rules have been framed under this Act, according to which Inspector of Factories is ex-officio Chief Inspector under this Act in respect of factories registered under the Factories Act, 1948.

2.2.31 The Industrial Employment (Standing Orders) Act, 1946 (Amended)

The act requires employers in industrial establishments to define with sufficient precision the conditions of employment under them and to make the said conditions known to workmen employed by them. It applies to every industrial establishment wherein one hundred or more workmen are employed, or were employed on any day of the preceding twelve months.

2.2.32 The Industrial Disputes Act, 1947 (Amended)

The Industrial Disputes Act came into existence in April 1947. It was enacted to make provisions for investigation and settlement of industrial disputes and for providing certain safeguards to the workers. The Act contains 40 sections divided into 7 chapters. The act contains description of various authorities such as Conciliation Officers, Labor Courts and Tribunals. The act also lays down the procedure, power and duties of the authorities constituted there under.

2.2.33 Payment of Bonus Act, 1965 and Amendment Act No.43 of 1977 and No.48 of 1978 and amendments

The Payment of Bonus Act imposes statutory liability upon the employers of every establishment covered under the Act to pay bonus to their employees. It further provides for payment of minimum and maximum bonus and linking the payment of bonus with the production and productivity. The Act applies to every factory where 10 or more workers are working and every other establishment in which 20 or more persons are employed, on any day during an accounting year. The Payment of Bonus Act, 1965, gives the employees a statutory right to a share in the profits of his employer. The Act enables the employees to get a minimum bonus equivalent to one month's salary or wages (8.33% of annual earnings) whether the employer makes any profit or not. But the Act also puts a ceiling on the bonus and the maximum bonus payable under the Act is equivalent to about 2.5 months' salary or wage (20% of annual earnings).

2.2.34 The Personal Injuries (Compensation Insurance) Act, 1963 (as amended)

This Act provides for imposing liability on employers to pay compensation to workmen sustaining personal injuries and to provide for the insurance of employers against such liability. The act defines the cases under which the employer is liable to pay compensation to the affected employee. It also guides the compensation policy to be followed in case of such events.

The Contractor will take into account all the above said financial liabilities in his quoted rates and nothing extra, whatsoever, will be payable to him on this account.

2.2.35 Employees Provident Fund Act

The Act is a piece of social security enactment designed to provide for a scheme to make provisions for the future of industrial workers and their dependents in case of their retirement and in the event of their premature death. The benefits are applicable to a wide range of employees working in factories, mines, plantations, construction industries, educational institutions and other classes of establishments in a short period.

The Contractor will provide and produce necessary proof and declaration to NTPGPL regarding compliance of all the provisions, making of timely deposits etc. otherwise a sum of 5% of the gross bill amount will be deducted against EPF deposit from the bill.

2.2.36 Ambient Air Quality Standards

Revised National Ambient Air Quality Standards (NAAQS) for major pollutants were notified by the CPCB in November 2009. The NAAQS prescribe specific standards for industrial, residential, rural and other ecologically sensitive areas. Table 2-1 presents the Revised National Ambient Air Quality Standards. Since Tidong-1 HEP is located in rural and residential area therefore levels prescribed for "Industrial, Residential, Rural and Other area" is applicable to this project.

Table 2-1: Revised national ambient air quality standards

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other area	Ecologically Sensitive Area (notified by Central Govt.)	Methods of Measurements
1	Sulphur Dioxide(SO_2) $\mu g/m^3$	Annual * 24 hours**	50 80	20 80	Improved West Geake Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_2) $\mu g/m^3$	Annual * 24 hours**	40 80	30 80	Modified Jacob & Hochheiser (Na- Arsenite) Chemiluminescence
3	Particulate Matter (size less than 10 µg)or PM 10 $\mu g/m^3$	Annual * 24 hours**	60 100	60 100	Gravimetric TOEM Beta attenuation

4	Particulate Matter (size less than 2.5 µg)or PM 2.5 µg/m^3	Annual * 24 hours**	40 40	40 60	Gravimetric TOEM Beta attenuation
5	Ozone(O3) µg/m^3	8 hours** 1 hours**	100 180	100 180	UV photometric Chemiluminescence Chemical method
6	Lead (Pb) µg/m^3	Annual * 24 hours**	0.50 1.00	0.50 1.00	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper ED-XRF using Teflon filter
7	Carbon Monoxide (CO) mg/m^3	8 hours** 1 hours**	02 04	02 04	Non Dispersive Infrared Spectroscopy
8	Ammonia (NH3) µg/m^3	Annual * 24 hours**	100 400	100 400	Chemiluminescence Indophenol blue method
9	Benzene(C_6H_6) µg/m^3	Annual*	05	05	Gas chromatography based continuous analyzer Adsorption followed by GC analysis
10	Benzo pyrene (BaP)- particulate phase only ng/m^3	Annual*	01	01	Solvent extraction followed by HPLC/GC analysis
11	Arsenic(As) ng/m^3	Annual*	06	06	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel(Ni) ng/m^3	Annual*	20	20	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

**Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals*

***24 hourly or 08 hourly monitored values as applicable shall be compiled with 98% of the time in a year. 2% of the time they may exceed the limits but not on two consecutive days of monitoring.*

Source: Ministry of Environment and Forests, GOI 2009

2.2.37 Ambient Noise Standards

Ambient noise level standards have been notified by the MoEF under Noise (Regulation & Control) Rules 2000 and also in the Schedule III of the Environmental (Protection) Rules 1986. Noise levels are measured in dB (A) Leq which denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing. These are presented in Table 2-2.

Table 2-2: Ambient noise level standards

Area Code	Category of Area / Zone	Limits in dB(A) Leq	
		Day Time*	Night Time*
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence Zone**	50	40

Source: Central Pollution Control Board
**Day time means from 6.00 a.m. to 10.00 p.m. Night time means from 10.00 p.m. to 6.00 a.m.*
***Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority*
Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

Noise standards in the work environment are specified by Occupational Safety and Health Administration (OSHA-USA) which in turn are being enforced by Government of India through model rules framed under the Factories Act. These are given in Table 2-3.

Table 2-3: Occupational Safety and Health Administration (OSHA) noise standards

Total Time of Exposure per Day in Hours (continuous or short term exposure)	Sound pressure level dB(A)
8	90
6	92
4	95
3	97
2	100
3/2	102
1	105
¾	107
½	110
¼	115
Never	>115
Note: No exposure in excess of 115 dB(A) is to be permitted	

2.2.38 Water Quality Standards

To ascertain and categorize the existing water quality, the results of the analysis of water quality will be compared with the water quality standards as prescribed by CPCB given in Table 2.4.

Table 2-4: Water quality criteria

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	– Total Coliforms Organism MPN/100ml shall be 50 or less – pH between 6.5 and 8.5 – Dissolved Oxygen 6mg/l or more – Biochemical Oxygen Demand (BOD) 5 days 20°C 2mg/l or less
Outdoor bathing (Organized)	B	– Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more – Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	– Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more – Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	– pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more – Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	– pH between 6.0 to 8.5 –Electrical Conductivity at 25°C micro mhos/cm Max.2250 – Sodium absorption Ratio Max. 26 – Boron Max. 2mg/l
	Below-E	– Not Meeting A, B, C, D & E Criteria

2.3 Relevant Policies of Government of India

2.3.1 Policy on Hydropower Development

Government of India formulated Hydropower Development Policy in August 1998. The objective of the Policy is to prevent a decline in hydro share and to undertake measures for maximizing vast hydroelectric potential in the country especially in the North and North-eastern Regions. Hydro stations presently account for only 25% of the total installed capacity as against the ideal hydro - thermal mix of 40:60. The total hydro potential assessed by CEA at 60% load factor is 84,044 MW. With the completion of the hydro projects under construction, the hydro potential utilized would increase to 22%. The objectives of the policy include the following:

- Ensuring targeted capacity addition during 9th Plan (and the subsequent plans – the 11th Plan aims capacity addition of 18,781 MW in the hydropower sector);
- Exploitation of vast hydroelectric potential at a faster pace;
- Promoting small and mini hydro projects;
- Strengthening the role of PSUs/SEBs for taking up new hydro projects;
- Increasing private investment in development of hydropower; and
- Supporting public sector by greater private investment through IPPs and joint ventures. Private sector participation is considered vital for large scale development of hydropower.

2.3.2 National Environmental Policy of India, 2006

Government of India released the National Environment Policy in 2006. The present national policies for environmental management are contained in the National Forest Policy, 1988, the National Conservation Strategy and Policy Statement on Environment and Development, 1992; and the Policy Statement on Abatement of Pollution, 1992. Some sector policies such as the National Agriculture Policy, 2000; National Population Policy, 2000; and National Water Policy, 2002; have also contributed towards environmental management. All of these policies have recognized the need for sustainable development in their specific contexts and formulated necessary strategies to give effect to such recognition.

The dominant theme of this policy is that while conservation of environmental resources is necessary to secure livelihoods and well-being of all, the most secure basis for conservation is to ensure that people dependent on particular resources obtain better livelihoods from the fact of conservation than from degradation of the resource.

2.3.3 Water Policy of India

National Water Policy of India with respect to hydropower generation states that “water resource development projects should to the extent possible, be planned and developed as multipurpose projects. Provision of drinking water should be a primary consideration. The projects should provide for irrigation, flood mitigation, hydroelectric power generation, navigation, pisciculture and recreation wherever possible”.

India has water treaties with neighboring countries like Pakistan, Nepal and Bangladesh. As an example, the present project is proposed on Tidong River, which is a tributary of River Sutlej.

The Sutlej is a tributary of River Indus, which flows into Pakistan along with some other rivers from India. India signed the Indus Water Treaty in 1960 with Pakistan under the aegis of International Bank for Reconstruction and Development (IBRD, part of the World Bank group). The Project will not alter the water flow downstream the Indus River, therefore, it does not attract the provisions of Indus Water Treaty with Pakistan. All projects undertaken by NSLRPL shall consider the National Water Policy if it attracts any of its provisions.

2.3.4 Indus Water Treaty

The Indus Waters Treaty is a water-sharing treaty between the Republic of India and Islamic Republic Of Pakistan, brokered by the World Bank (then the International Bank for Reconstruction and Development). The treaty was a result of Pakistani fear, that since, the sources of the Indus basin were in India, it could potentially create droughts and famines in Pakistan, especially at times of war.

The Indus System of Rivers comprises three Western Rivers the Indus, the Jhelum and Chenab and three Eastern Rivers - the Sutlej, the Beas and the Ravi; and with minor exceptions, the treaty gives India exclusive use of all of the waters of the Eastern Rivers and their tributaries before the point where the rivers enter Pakistan. Similarly, Pakistan has exclusive use of the Western Rivers. Pakistan also received one-time financial compensation for the loss of water from the Eastern Rivers.

The countries agree to exchange data and co-operate in matters related to the treaty. For this purpose, the treaty created the Permanent Indus Commission with a commissioner appointed by each country.

2.3.5 Wildlife Conservation Strategy 2002

Conservation of wildlife, involves the protection of entire ecosystems. No diversion of forest land for non-forest purposes from critical and ecologically fragile wildlife habitat shall be allowed. Lands falling within 10 km of the boundaries of National Parks and Sanctuaries are notified as eco-fragile zones under the Environment (Protection) Act.

2.3.6 National Forest policy 1988

The National Forest Policy 1988 emphasizes the role of forests in the national economy and in ecology. The basic objectives of National Forest Policy are given below:

- Maintenance of environmental stability through preservation and, where necessary, restoration of the ecological balance that has been adversely disturbed by serious depletion of the forests of the country;
- Conserving the natural heritage of the country by preserving the remaining natural forests with the vast variety of flora and fauna, which represent the remarkable biological diversity and genetic resources of the country;
- Checking soil erosion and denudation in the catchment areas of rivers, lakes, and reservoirs in the interest of soil and water conservation, for mitigating floods and droughts and for the retardation of siltation of reservoirs.
- Checking the extension of sand dunes in the desert areas of Rajasthan and along the coastal tracts;
- Increasing the sustainability of the forest/tree cover in the country through massive afforestation and social forestry programmes, especially on all denuded degraded and unproductive lands;
- Meeting the requirements of fuel wood, fodder, minor forest produce and small timber of the rural and tribal populations;
- Increasing the productivity of forests to meet essential national needs;
- Encouraging efficient utilization of forest produce and maximizing substitution of wood; and
- Creating a massive people's movement with the involvement of women for achieving these objectives and to minimize pressure on existing forests.

2.3.7 National Resettlement & Rehabilitation Policy (NRRP), 2007

The National Resettlement and Rehabilitation Policy (NRRP) 2007 aim at striking a balance between the need for land for developmental activities and protecting the interests of the land owners, and others, such as the tenants, the landless, the agricultural and non-agricultural laborers, artisans, and others whose livelihood depends on the land involved. This policy has been referred and relied upon while preparing the “Resettlement & Rehabilitation Entitlement Framework” for the project. The NRRP, 2007 also requires to carry out a Social Impact Assessment Study and an SIA Clearance for all new projects or expansion of existing projects involving involuntary displacement of 400 or more families en masse in plain areas, or

200 or more families en masse in tribal or hilly areas. Several section of the policy deals with the public hearing and information sharing with the affected stakeholders.

As the land acquisition for the proposed project involves only 28 families loosing partial agricultural land and none of them have become landless or displaced or adversely affected the above policy is not applicable for the project.

2.3.8 Himachal Pradesh Nautor Land Rules 1968

The Himachal Pradesh Nautor Land Rules provides for framing of special schemes for Resettlement and Rehabilitation of persons who are displace as a result of anything done for any public purpose. The rule requires the project to prepare an R & R plan and undertake compensatory measures under the rule 8A.

The project has prepared and R &R plan for the proposed which will be implemented through the district administration.

2.3.9 Himachal Pradesh Hydro Policy 2006

The key elements of HP hydro Policy are:

- The Agreement with government shall remain in force up to a period of 40 years from the Scheduled Commercial Operation Date of the Project, thereafter, the Project shall revert to the State Government free of cost and free from all encumbrances. The Project assets would be maintained by the successful developer in a condition that would ensure a residual life of the Project at the rated capacity for at least 30 years at any point of time.

- The Project proponents shall be required to obtain all the statutory/non statutory final clearances from the departments viz. Forest, I&PH, HPPWD, Fisheries, Pollution Control Board, Wild Life, Revenue etc, after paying the prescribed fee fixed by these departments, necessary for the implementation of the Project(s) and commence the construction work within the time frame specified in the Implementation Agreement i.e. within six months of signing of the same, failing which the agreement automatically shall stand cancelled.

- The Project proponents shall carry out the Environmental Impact Assessment (EIA) studies. The Developer shall be required to strictly adhere to the stipulations put forth by the authorities while issuing forest, wildlife, environmental and aquatic life clearances etc.

- The Company shall open a Police Station/Chowki and a Labour office in Projects above 50 MW at its cost. The Company shall also bear the cost of deployment of Police Personnel during the construction phase of the Project.

- The Company shall provide minimum 70% employment to the bonafide Himachalis whose names are registered on live register of any employment exchange located in the State of Himachal Pradesh, in respect of all the unskilled/skilled staff and other non-executives as may be required for execution, operation and maintenance of the Project through the local Employment Exchanges or from other than such live register from any where within the state or outside the state, who are bonafide Himachalis or through the Central Employment Cell at Shimla.

- The Company shall satisfy the Government that the contractors/sub-contractors engaged by them for the Project shall give employment to local people/ Himachalis for appointment as supervisors, workmen and labourers/workers in the Project.

- The Company, 'if ROR Project' shall ensure minimum flow of 15% water immediately downstream of the diversion structure of the Project all the times including lean seasons from November to March, keeping in mind the serious concerns of the State Govt, on account of its fragile ecology and environment and also to address issues concerning riparian rights, drinking water, health, aquatic life, wild life, fisheries , silt and even to honour the sensitive religious issues like cremation and other religious rites etc. on the river banks.

- The Company shall provide employment to one member of each of the displaced families or adversely affected as a result of the acquisition of land for the Project, during construction of the Project. During the operation and maintenance of the Project, the Company shall give preference to members of the displaced families for employment in the Project.

- The project shall give an undertaking to the Fisheries Department of the local area that wherever feasible, rearing of fish shall be promoted by the IPP in consultation with the Fisheries Department in the Project area at the time of final implementation of the Project.

- The Government shall constitute a Local Area Development Committee (LADC) for Project (s) being implemented in each river valley. The Deputy Commissioners shall be the Chairman of the LADC and other members shall be nominated by the Government, which will include the representatives of HEP's also. The activities of the

LADC during execution shall be financed by the Project itself and for this purpose the Developer shall make a provision of 1.5% of final cost of the Project.

- The Company shall be required to prepare Disaster Management Plan and its implementation taking into consideration the different flood eventualities, cloud bursts or any kind of natural calamity at various stages of construction and operation of the Project and their mitigation measures.

- The project shall give an undertaking to the Fisheries Department of the local area that wherever feasible, rearing of fish shall be promoted by the project proponent in consultation with the Fisheries Department in the Project area at the time of final implementation of the Project.

The project shall comply to all requirements of the Policy as per the agreement with the State government.

2.3.10 R&R Scheme for Tidong-I

As per the Implementation Agreement of the project to address the impact on loss of livelihood for the direct affected families and the affected panchayats the Deputy Commissioner, Kinnaur in consultation with the representatives of the affected panchayats and NTPGPL have developed a Resettlement and Rehabilitation Scheme for Tidong-I (100MW) Project. The revised scheme issued by Office of Deputy Commissioner, Kinnaur District at Reckong Peo vide Letter no. KNR –II-211(GB) / 2012 – 1031102 dated 30-Nov-2012 is forwarded to The Principal Secretary (Revenue), Government of Himachal Pradesh for approval and taking further necessary action. The approval of the scheme is awaited.

The above scheme is been developed to protect the interest of the Project Affected Families, in accordance with Rule 8-A of the H.P. Nautor Land Rules, 1968, which provides for framing of a special scheme for Resettlement and Rehabilitation of persons who are displaced as a result of anything done for any public purpose. The scheme is been developed by the government of Himachal Pradesh based on the previous existing R&R Scheme of similar projects such as Parbati Hydro Electric Project (PHEP) issued through Notification No Rev (PD) F(5)-1/1999 dated 27-04-2006 and R&R Scheme for Rampur Hydro Electric Project of Satluj Jal Vidyut Nigam limited.

The DC, Kinnaur initiated the formulation of the above R&R Scheme in 2006 and after due consultations with the affected families, affected panchayats and NTPGPL issued the first Draft

R&R Scheme in 2007. Subsequently based on the representation of the local people and others the Scheme is revised and sent for approval of the State Government.

The entire Scheme is divided into 3 parts where part 1 details on the coverage of the scheme where in it shall extend to the whole of area affected or likely to be affected as a result of construction of Tidong-I Hydro Electric Project (100MW), within Moorang Tehsil of Kinnaur District of Himachal Pradesh. The Deputy Commissioner, Kinnaur in whose jurisdiction the Project Affected Area falls, will be the Administrator for Resettlement and Rehabilitation. In same section it defines the project affected family, project affected area, project affected family rendered land less, project displaced family and project authority.

In part 2 of the scheme it details on the entitlements and sanction of the Rehabilitation grant amounts to the project affected families, employment provisions to the family rendered landless (as per definition of Scheme), the secondary employment opportunities available to the project affected families who are not covered under the landless or displaced category etc.

In final section under part 3 the R&R Scheme presents the commitments towards community development/social responsibility of the developer after start of generation of electricity. It suggests for a need assessment for the above and details the various infrastructural facility that can be upgraded in the affected area and annual financial commitments towards the above initiatives. Further as part of social responsibility it also details on other financial support to orphan girl child during their marriages and support in form of scholarships to boys and girls of the project affected family/area.

Traditionally it is seen that R&R Policies do not cover marginally impacted people. However the most important highlight of the proposed Scheme is in its coverage of all the affected family both directly affected land losers and indirectly affected local community irrespective of the severity of the impact for providing rehabilitation grants and other assistance measures. It ensures everybody is benefited by the Scheme.

2.4 Applicable International Conventions

Environmental problems which migrate beyond the jurisdiction (Trans-boundary) require power to control such issues through international co-operation by either becoming a Contracting Party (CP) i.e. ratifying treaties or as a Signatory by officially signing the treaties

and agreeing to carry out provisions of various treaties on environment and social safeguards. The relevant international conventions are as provided.

2.4.1 Montreal Protocol on Substances That Deplete the Ozone Layer (and subsequent Amendments)

India signed the Montreal Protocol along with its London Amendment on 17-9-1992 and also ratified the Copenhagen, Montreal and Beijing Amendments on 3rd March, 2003.

2.4.2 UN (Rio) Convention on Biological Diversity

India is a party since: 1994-02-18 by: Ratification; Protocol - Party since: 2003-09-11

2.4.3 The Convention on Wetlands of International Importance Especially as Waterfowl Habitat, 1971 (Ramsar Convention)

This convention was signed by India in 1981 and ratified in February 1982. The convention requires protection of identified wetlands of international importance as identified under Ramsar convention.

2.4.4 Conventions on the Conservation of Migratory species of wild animals and migratory species

India is contracting party to the convention on conservation of migratory species of wild animals and migratory species.

2.4.5 Kyoto Protocol

The Kyoto protocol was signed by India in August 2002 and ratified in February 2005. The convention pertains to the United Nations framework on Climate Change.
The 3rd Conference of the Parties to the Framework Convention on Climate Change (FCCC) in Kyoto in December 1997 introduced the Clean Development Mechanism (CDM) as a new concept for voluntary greenhouse-gas emission reduction agreements between industrialized and developing countries on the project level.

2.4.6 The Rotterdam Convention on the Prior Informed Consent (PIC) Procedure

The Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals & Pesticides in international Trade was adopted by India at the Conference of Plenipotentiaries at Rotterdam in 1998

2.4.7 International Labour Organization conventions

India has also ratified many of the International Labor Organization conventions that are relevant to the Project including:

- C1 Hours of Work (Industry) Convention, 1919 (14:07:1921, ratified);
- C5 Minimum Age (Industry) Convention, 1919 (09:09:1955, ratified):
- C11 Right of Association (Agriculture) Convention, 1921 (11:05:1923, ratified):
- C14 Weekly Rest (Industry) Convention, 1921 (11:05:1923, ratified);
- C29 Forced Labor Convention, 1930 (30:11:1954, ratified) & C105 Abolition of Forced Labor Convention, 1957 (18:05:2000, ratified);
- C100 Equal Remuneration Convention, 1951 (25:09:1958, ratified);
- C107 Indigenous and Tribal Populations Convention, 1957
- C111 discrimination (Employment and Occupation) Convention, 1958 (03:06:1960, ratified)

2.5 IFC's Guidelines

2.5.1 IFC's Performance Standards on Social and Environmental Sustainability

International Finance Corporation (IFC) applies the Performance Standards to manage social and environmental risks and impacts and to enhance development opportunities in its private sector financing in its member countries eligible for financing. Together, the eight Performance Standards establish standards that the client is required to meet throughout the life by IFC or other relevant financial institution.

PS 1 Social and Environmental Assessment and Management System- It establishes the importance of integrated assessment to identify the social and environmental impacts, risks, and opportunities in the project's area of influence. PS 1 requires Social and Environmental

Assessment and Management Systems for managing social and environmental performance throughout the life cycle of this Project and runs through all subsequent PSs. The main elements of PS.- 1 includes following elements: (i) Social and Environmental Assessment; (ii) Management program; (iii) organizational capacity; (iv)training; (v) community engagement; (vi) monitoring; and (vii) reporting.

PS 2 Labor and working conditions- requires that worker-management relationship is established and maintained, compliance with national labor and employment laws and safe and healthy working conditions are ensured for the workers.

PS 3 Pollution prevention and Abatement- outlines approach to pollution prevention and abatement in line with Internationally disseminated technologies and practices with objectives to a) avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from activities; and b) promote the reduction of emissions that contribute to climate change. It requires a project to avoid, minimize, or reduce adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.

PS 4 Community health, safety and security- concentrates on the responsibility that must be undertaken by the client to avoid or minimize the risks and impacts to the community's health, safety and security that may arise from project activities.

PS 5 Land Acquisition and Involuntary Resettlement- This standard requires that project does not result in involuntary resettlement or at least if unavoidable it is minimized by exploring alternative project designs. Also the project will ensure that social and economic impacts from land acquisition or restrictions on affected persons' use of land are mitigated.

PS 6 Biodiversity Conservation and Sustainable Natural Resource Management- aims at protecting and conserving biodiversity, the variety of life in all its forms, including genetic, species and ecosystem diversity and its ability to change and evolve, is fundamental to sustainable development. This PS addresses how clients can avoid or mitigate threats to biodiversity arising from their operations as well as incorporate sustainable management of renewable natural resources.

PS 7 Indigenous Peoples- acknowledges the possibility of vulnerability of indigenous people owing to their culture, beliefs, institutions and living standards and that it may further get compromised by one or other project activity throughout the life cycle of the project. The PS

underlines the requirement of minimizing adverse impacts an indigenous people in the project area, respecting the local culture and customs, fostering good relationship and ensuring that development benefits are provided to improve their standard of living and livelihoods.

PS 8 Cultural Heritage- aims to protect the irreplaceable cultural heritage and to guide clients on protecting cultural heritage in the course of their business operations.

The applicability of these Performance Standards is established during the Social and Environmental Impact Assessment process, while implementation of the actions is necessary to meet the requirements of IFC, the Performance Standards are managed through the owner's Social and Environmental Management System.

NRPPL will have to follow all the Performance Standards of IFC for this project and should also ensure that the contractors / subcontracts (subcontractors of the contracts) appointed by NSL all follow the IFC performance standards on Environmental and Social Sustainability.

2.5.2 Environmental, Health and Safety General Guidelines

The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account. The General EHS Guidelines consist of the following components:

Environmental: This guideline applies to facilities or projects that generate emissions to air at any stage of the project life-cycle. They also look into aspects of energy conservation, wastewater and ambient water quality, water conservation, hazardous materials management, waste management, noise and contaminated land.

Occupational Health and Safety: This section provides guidance and examples of reasonable precautions to implement in managing principal risks to occupational health and safety. Although the focus is placed on the operational phase of projects, much of the guidance also applies to construction and decommissioning activities. This incorporates general facility design and operation, communication and training, physical hazards, chemical hazards,

biological hazards, radioactive hazards, Personal Protective Equipment (PPE), special hazard environment and monitoring.

Community Health and Safety: This guidance complements the above two guidelines by specifically addressing aspects of project activities which fall outside the traditional project boundaries but which are related to the project operations as and when they occur.

Construction and Decommissioning: This section provides an additional and specific guidance to the prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle or due to expansion or modification of existing project facilities.

2.5.3 IFC's Environment, Health and Safety Guidelines for Electric Power Transmission and Distribution

The EHS Guidelines for Electric Power Transmission and Distribution include information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas. The various aspects comprising this guidance are industry specific impacts and management and performance indicators and monitoring.

2.6 ADB Guidelines

2.6.1 ADB's Safeguard Policy Statement 2009

Built upon the three previous safeguard policies on the Involuntary Resettlement Policy (1995), the Policy on Indigenous Peoples (1998) and the Environment Policy (2002), the Safeguard Policy Statement was approved in 2009. The safeguard policies are operational policies that seek to avoid, minimize or mitigate adverse environmental and social impacts including protecting the rights of those likely to be affected or marginalized by the developmental process. ADB's safeguard policy framework consists of three operational policies on the environment, indigenous peoples and involuntary resettlement. A brief detail of all three operational policies have been mentioned below:

Environmental Safeguard: This safeguard is meant to ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision making process.

Involuntary Resettlement Safeguard: This safeguard has been placed in order to avoid involuntary resettlement whenever possible; to minimize involuntary resettlement by exploring project and design alternatives; to enhance, or at least restore, the livelihoods of all displaced persons in real terms relative to pre- project levels; and to improve the standards of living of the displaced poor and other vulnerable groups.

Indigenous Peoples Safeguard: This safeguard looks at designing and implementing projects in a way that fosters full respect for Indigenous Peoples' identity, dignity, human rights, livelihood systems and cultural uniqueness as defined by the Indigenous Peoples themselves so that they receive culturally appropriate social and economic benefits; do not suffer adverse impacts as a result of projects; and participate actively in projects that affect them.

Information, Consultation and Disclosure: Consultation and participation are essential in achieving the safeguard policy objectives. This implies that there is a need for prior and informed consultation with affected persons and communities in the context of safeguard planning and for continued consultation during project implementation to identify and help address safeguard issues that may arise. The consultation process begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle. It provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people and is undertaken in an atmosphere free of intimidation or coercion. In addition, it is gender inclusive and responsive and tailored to the needs of disadvantaged and vulnerable groups and enables the incorporation of all relevant views of affected people and other stakeholders into decision making. ADB requires the borrowers/clients to engage with communities, groups or people affected by proposed projects and with civil society through information disclosure, consultation and informed participation in a manner commensurate with the risks to and impacts on affected communities. For projects with significant adverse environmental, involuntary resettlement or Indigenous Peoples impacts, ADB project teams will participate in consultation activities to understand the concerns of affected people and ensure that such concerns are addressed in project design and safeguard plans.

2.6.2 Social Protection Requirements

ADB's Social Protection Strategy (2001 SPS) requires the Borrower to comply with applicable labor laws in relation to the Project, and take the following measures to comply with the core labor standards1 for the ADB financed portion of the Project:

a. carry out its activities consistent with the intent of ensuring legally permissible equal opportunity, fair treatment and non discrimination in relation to recruitment and hiring, compensation, working conditions and terms of employment for its workers (including prohibiting any form of discrimination against women during hiring and providing equal work for equal pay for men and women engaged by the Borrower);

b. not restrict its workers from developing a legally permissible means of expressing their grievances and protecting their rights regarding working conditions and terms of employment;

c. engage contractors and other providers of goods and services:

   (i) who do not employ child labor2 or forced labor;3

   (ii) who have appropriate management systems that will allow them to operate in a manner which is consistent with the intent of (A) ensuring legally permissible equal opportunity and fair treatment and non discrimination for their workers, and (B) not restricting their workers from developing a legally permissible means of expressing their grievances and protecting their rights regarding working conditions and terms of employment; and

   (iii) whose subcontracts contain provisions which are consistent with paragraphs (i) and (ii) above.

2.6.3 Public Communications Policy 2011

The Public Communications Policy (PCP) of ADB, originally formulated in 2005 and revised in 2011, is aimed at promoting improved access to information about ADB's operations related

1 the core labor standards are the elimination of all forms of forced or compulsory labor; the abolition of child labor; elimination of discrimination in respect of employment and occupation; and freedom of association and the effective recognition of the right to collective bargaining, as per the relevant conventions of the International Labor Organization;

[2] child labour means the employment of children whose age is below the statutory minimum age of employment in the relevant country, or employment of children in contravention of International Labour Organization Convention No. 138 'Minimum Age Convention" (www.ioo.org)

[3] forced labour means all work or services not voluntarily performed, that is, extracted from individuals under threat of force or penalty

to funded projects. It endorses greater transparency and accountability to stakeholders involved in a project. The PCP establishes the disclosure requirements for documents and information related to projects. It mandates project-related documents normally produced during the project cycle to be posted on the web.

2.6.4 Gender and Development Policy 1998

ADB's Gender and Development Policy (1998) adopts gender mainstreaming as a key strategy for promoting gender equity, and for ensuring that women participate in and that their needs are explicitly addressed in the decision-making process for development activities. The key elements of ADBs gender policy are:

(i) Gender sensitivity, to observe how the project affects women and men differently and to take account of their different needs and perspectives in resettlement planning;
(ii) Gender analysis, which refers to the systematic assessment of the project impact on men and women and on the economic and social relationships between them;
(iii) Gender planning, which refers to the formulation of specific strategies to bring about equal opportunities to men and women; and
(iv) Mainstreaming, to consider gender issues in all aspects of ADB operations, accompanied by efforts to encourage women's participation in the decision-making process in development activities.

The SPS and safeguards requirements also reiterate the importance of including gender issues in the preparation of safeguards documents at all stages to ensure that gender concerns are incorporated, including gender-specific consultation and information disclosure. This includes special attention to guarantee women's assets, property, and land-use rights and restoration/improvement of their living standards; and to ensure that women will receive project benefits.

2.7 Environmental Permits Required for the Project

As per the policies and legal framework, the following approvals/clearances are required for a hydroelectric project (Table 2-5):

Table 2-5: Clearances required and their status for Tidong I HEP

Clearance Required	Status
Implementation Agreement	Executed on 28-Jul-06 between Government of Himachal Pradesh and Nuziveedu Seeds Limited
Techno-economic Clearance of Detailed Project Report from HP State Electricity Board	HPSEB (Sectt) 401-TEC/Tidong-I/50-42034-47 dated 23-Jul-07
Environmental Public Hearing by Himachal Pradesh State Pollution Control Board (HPSPCB)	Conducted on 21-Jul-06 in Villages Lambar and Village Rispa, Tehsil Moorang
No Objection Certificate/Consent to Establish by the HPSPCB	Received vide letter no. HPSPCB/Tidong HEP-Kinnaur/ 10140-47 dated 8-Aug-2008.
Environmental Clearance by the MoEF, as per EIA notification, 2006 under Environment (Protection) Act, 1986;	Received vide letter no. J-12011/35/2007-IA-I dated 7-Sep-2007.
Forest Clearance for diversion forest land by the MoEF.	Received vide letter dated 18-Jun-2008 diverting 39.0546 ha. of forest land and 1261 trees standing on that land in favour of project.
Private Land acquisition - 3.2011 ha under Land Acquisition Act, 1894	Awarded vide letter number SDP -III - 71(Peshi)2009-3631 dated 31-Jul-09
Clearance form Standing Committee of National Board for Wild Life (NBWL) under Wildlife Protection Act, in case, any part of National Park / Wildlife Sanctuary is within 10 km radius of the project	Not applicable, as no protected area is falling under the study area of the project.
No Objection from Irrigation and Public Health Department (IPH), Government of Himachal Pradesh.	Received vide letter dated 8-Feb-2006
No Objection from Department of Fisheries, Government of Himachal Pradesh.	Received vide letter no. FSH-F(2)39/2010-ARC-5996 dated 10-Jun-2010 after receiving an amount of INR 11.1 Millions towards their proposal on “Fisheries Development Plan” sent to NSL vide their letter dated 11-Apr-2007.
No Objection from Public Works Department, Government of Himachal Pradesh	Received vide letter number PW.KNR – WA – N.O.C./2005 -6406 dated 06-Dec-05

Labour License	Received vide letter number LO(KIN)PE/REC/2008 7 Dated 04-Dec-08
Registration under Building and Other Construction workers Act, 1996	Registered wide letter no: LO/KNR/BOCW/-46/2011 Dated 20-04-2011.

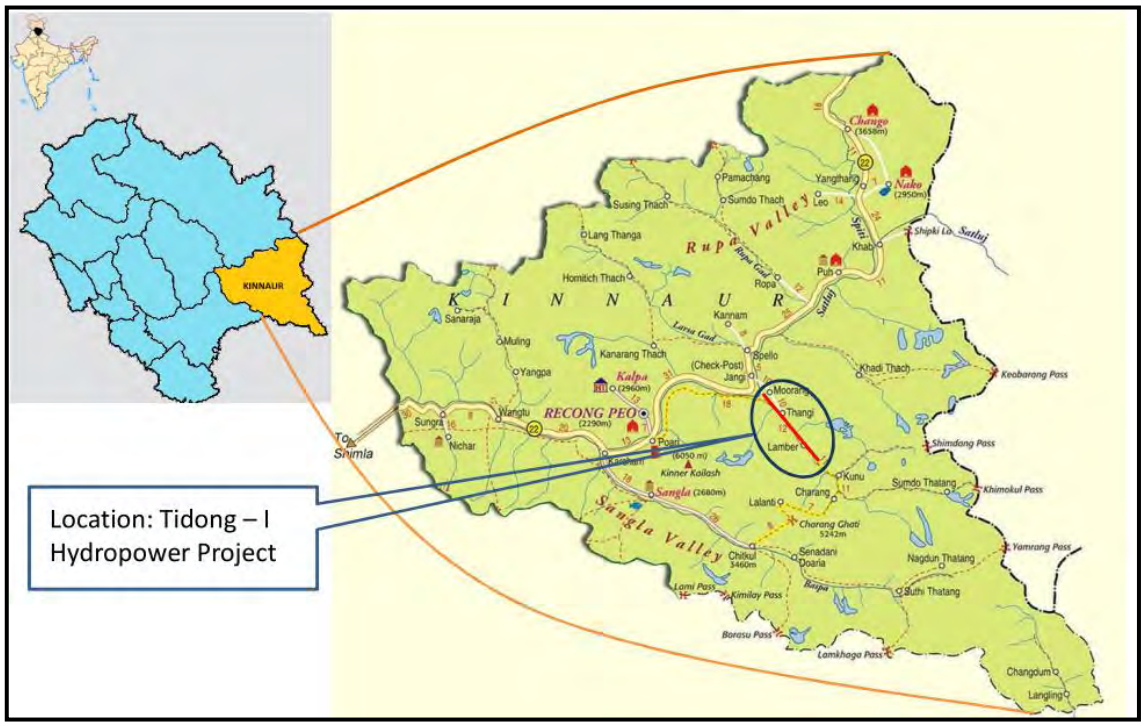
3. DESCRIPTION OF THE PROJECT

3.1 Location of the Project

The Tidong-1 Hydroelectric Project is situated in the Moorang Tehsil of the Kinnaur District in the State of Himachal Pradesh (HP) (Figure 3-1). The administrative headquarter of Kinnaur District is at Reckong Peo, whereas the Tehsil headquarter is at Moorang. The project site area is about 278 km from Shimla (the State capital), 250 km on National Highway-22 up to Moorang and 13km on the state road up to village Thangi. There onwards it is another 16km to the diversion site.

The project is proposed on the Tidong Khad, a tributary of river Sutlej. It is a run-of-the-river scheme proposed to harness the hydro potential of Tidong Khad. The barrage of the project is at Lambar village and Powerhouse at Rispa village. The location map of the project is given below in Figure 3.1.

Figure 3-1: Location map of 100 MW Tidong hydro-electric project



Tidong Khad originates in the North Western slopes of Himalayan ranges at an altitude of 6740m. It mostly flows in south-easterly to north-westerly direction. A number of nallas (rivulets) join Tidong Khad up to its confluence with Sutlej River, just upstream of Moorang village in District Kinnaur of Himachal Pradesh.

The Catchment of Tidong Khad lies between Latitude 31°20'30"N to 31°33'30"N and Longitude 78°22'10"E to 78°47'50"E. The altitude of Tidong Khad ranges from 2200 meters at its confluence with Sutlej River to 6740 meters in the glacier zone.

The catchment area above the dam site comprises of steep mountains, a portion of it is covered with forest and the major part is under permanent snow. Total catchment area up to the dam site is 497.86 Km^2 while the catchment area above permanent snow line (i.e., El 4200m) is 418.36 Km^2. The permanent snow line is considered to be variable as it is considered to be near 3048m during severe intensity storms and winter months, however, it is considerably higher in summer months and during low intensity storms.

3.2 Land Required for Project

The total land required for the project is 42.2557 ha which includes 39.0546 ha of forest land and 3.2011 ha of private land. The private land, involved in the project, falls in three villages of three different Panchayats as mentioned in Table 3-1.

Table 3-1: Details of private land acquired

S. No.	Project Component	Village	Panchayat	Families affected by Land acquisition	Private Land acquired (Ha.)
1	Upstream structures and part of access road to Adit-1	Lambar	Thangi	5	0.8156
2	Power House area	Lizang	Rispa	2	0.1353
3	Staff Colony and part of access road to Power house	Roowang	Moorang	21	2.2502
			TOTAL	**28**	**3.2011**

**1 land parcel belongs to Mandir Devta Kuldev (Temple of Local Deity) from Lizang village*

The entire private land has been acquired by the project under LAA, 1894 through Land Acquisition Collector-Cum-Additional District Magistrate (ADM), Pooh, District Kinnaur, HP vide their office letter no. SDP-III-71(Peshi)/2009-1163 dated 14-Jul-2009. The nature of private land acquired comprises of agricultural land both irrigated/orchard and un-irrigated/un-cultivable waste land. A total of 28 families are affected by losing part of their agricultural land and none of them is rendered landless or physically displaced. One land parcel falling in Lizang village under Rispa Panchayat belongs to Mandir Devta Kuldev (Temple of local Deity). In addition to the agricultural land 4 kutcha/temporary dilapidated structures and 173 fruit bearing trees are also affected due to the land acquisition.

Based on the compensation awarded by the Land Acquisition Collector a total amount of INR 25.82 million (including land, trees and structures) was deposited by NTPGPL vide letter dated 16-Jul-09. Subsequently the compensation is disbursed among the land owners. After the disbursement of the compensation the Land Acquisition Collector has given the possession of the private land for construction activity.

The forest land (including 1261 numbers of trees) required for the project was diverted in favor of NTPGPL by Regional Office of Ministry of Environment and Forests, Government of India vide their letter no. 9-HPC602/2007-CHA/5228 dated 18-Jun-2008 after receiving the required amount towards Compensatory Afforestation and Net Present Value from the project proponent.

3.3 Main Components of the Project

Tidong–I Hydroelectric Project (100 MW) is a run off the river scheme in District Kinnaur of Himachal Pradesh. The Project consists of a 10 m high concrete barrage at about 9.8 km upstream from the confluence of Tidong and Sutlej River, a surface desilting basin on the left bank of the river, a 8.46 km long head race tunnel and an underground surge shaft of 8.0m diameter (u/g) with inclined pressure shaft. The power house is surface type on the left bank of Tidong Khad near the village Lambar. The power house shall house two units of 50 MW each to produce 100 MW of power.

The barrage will submerge an area of about 0.5 hectares and divert the water into a 4 hours peaking reservoir of 237000m^3 storage capacity. The Project layout provided as Figure 3-2 shows location of various project component and details for the same is discussed in the following sub-sections.

3.3.1 Diversion Dam

It is proposed to construct a 10 m high (from river bed) concrete gravity dam across Tidong River. The submergence area will be 0.4844 ha diverted forest land with no habitations or standing trees. The design discharge is of 19.2 cumecs.

3.3.2 Desilting Arrangement

A conventional type surface desilting arrangement has been proposed to exclude the sand particles larger than 0.2 mm. The arrangement comprises two parallel compartments each consisting of two troughs, 80m long, 8.50m high and 8.50m wide. A design discharge of 25 cumecs will be maintained in the desilting basin with a flow through velocity of 0.2m/s and a flushing velocity of 6.0m/s. The sediments from the collection trench will flow down to the flushing conduit and ultimately it will be flushed out to the river. The conduit will be provided with two vertical lift gates.

3.3.3 Head Race Tunnel

The Head Race Tunnel (HRT) diverts the water from the desilting basin to the main surge shaft. It will be 8.461 km long with a finished diameter of 3.5m with concrete lined D-shaped section. The tunnel diameter is based on techno-economic studies for a discharge of 19.2cumecs at a flow velocity of 1.75m/sec. The slope head race tunnel is of 1 in 160. The head race tunnel will be concrete lined with sections supported with steel ribs, besides necessary rock bolting as required by geological considerations.

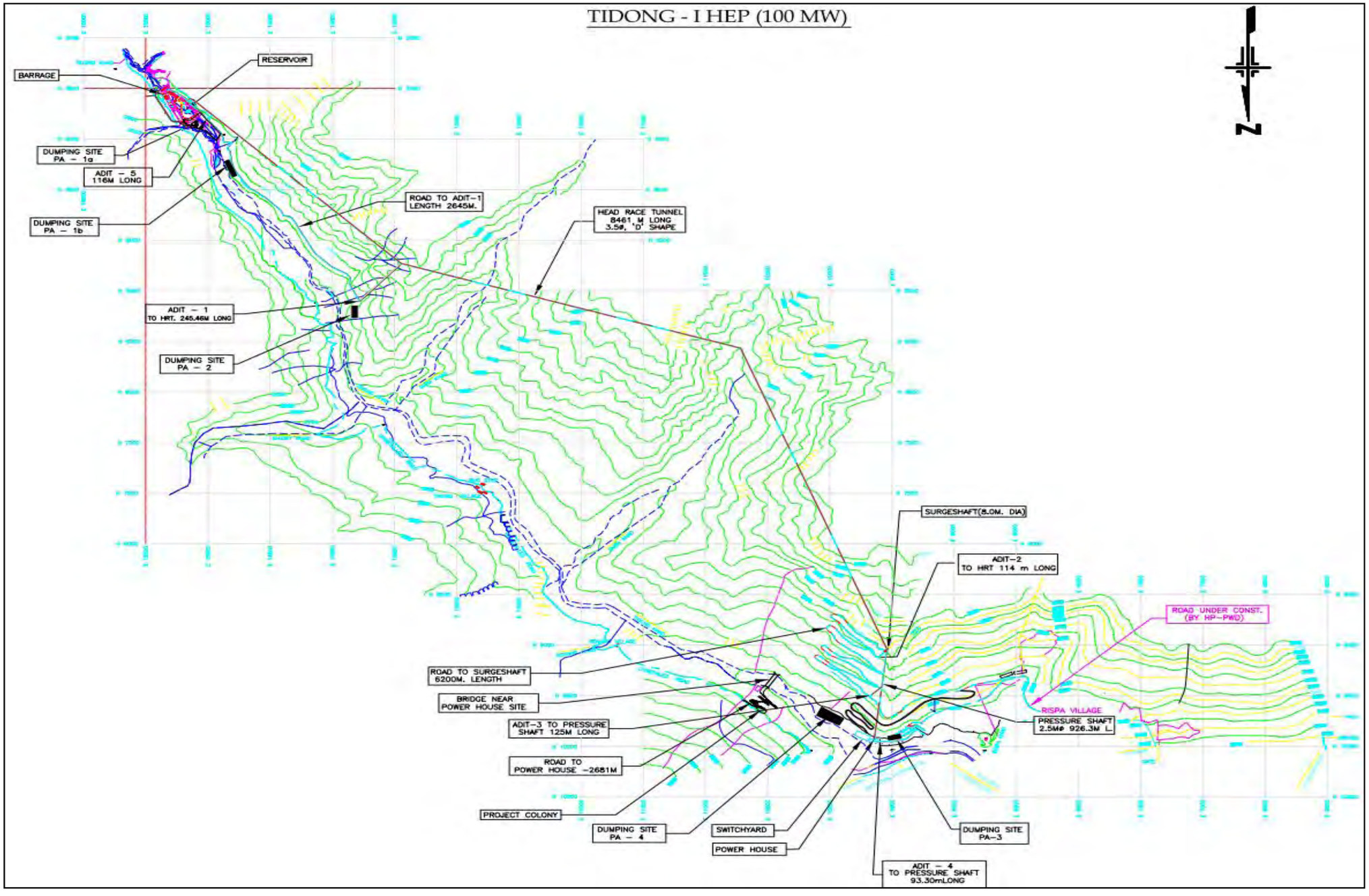
3.3.4 Adits

There are five adits proposed for the construction of the Head Race Tunnel. All adits will have a D- shaped section with 3.5m finished diameter. The details of adits have been provided in Table 3-2.

Table 3-2: Details of the Adits

ADITS	
To HRT (RD-2404)	Adit-1: 247 m long
To HRT (RD-195)	Adit-5: 116 m Long
To HRT, Surge Shaft and Valve house	Adit-2: 114 m long
To Pressure Shaft (Intermediate Adit at El 2531)	Adit-3: 124 m long
To Pressure shaft (At 'Y' junction of pressure shaft	Adit-4: 93 m long

Figure 3-2: Layout map of Tidong hydro-electric project



3.3.5 Surge Shaft

An underground surge shaft is proposed for the project. The surge shaft will be 8.0 m in diameter and 120 m high with a restricted orifice. Adit 2 will facilitate the construction of surge shaft. The surge will be lined with concrete up to the top level of 2900m.

The rope way is proposed to reach top of the surge shaft from pressure shaft instead of road of 1.2 km to conserve the environment. The decision of rope way is taken in view of preventing the tree felling.

3.3.6 Pressure Shaft Tunnels

A pressure shaft of 1200 m length and 2.5m diameter would take off from the surge shaft. This would be lined with high tensile steel corresponding to ASTM-A-516 Grade 70 (12mm to 66mm thick). The pressure shaft will be bifurcated near the power house (15m long and 1.75m in diameter), and each branch shall feed one of the two generating units (turbines). A spherical valve will be provided in each branch to enable its closing whenever required.

3.3.7 Power House

A surface type power house of 63.0m x 25.0m has been proposed for the project. The power house will have two vertical shaft pelton turbines, each of 50 MW capacity. The turbines will receive water from the pressure shaft and use the flow to generate power. The rated net head of the power house is 595m. The rated discharge for the turbines is 9.60 cumecs.

3.3.8 Tail Race Channel

An open channel type surface tail race is proposed for the project. The tail race will commence from the power house and return the water back to the river close to its confluence with Sutlej. The Tail race channel will be 4m wide and 50m long with a velocity of 1.90m/s.

3.4 Associated Facilities

3.4.1 Roads

The access to the various Project components is through HP Public Works Department (PWD) road from Moorang (Power house site) to Lambar (Barrage site) on the right bank of the Tidong Stream.

The project has developed roads from the PWD road towards the Head works, Power house and surge shaft. The road will be 3 – 4 m wide with adequate width along the curves. The road towards headwork and adit 1 is 2.5 km, while the road to the power house is 2.46 km. The third road will be the longest and shall go up to the surge shaft, it will be 6.22km.

The roads will be compacted and rolled to ensure a firm surface; black topping of the road will be undertaken towards the culmination of the construction work and to avoid frequent damage from construction activities. Adequate concreting, crating and support wall will be provided to ensure the strength of the roads.

3.4.2 Labour Camps

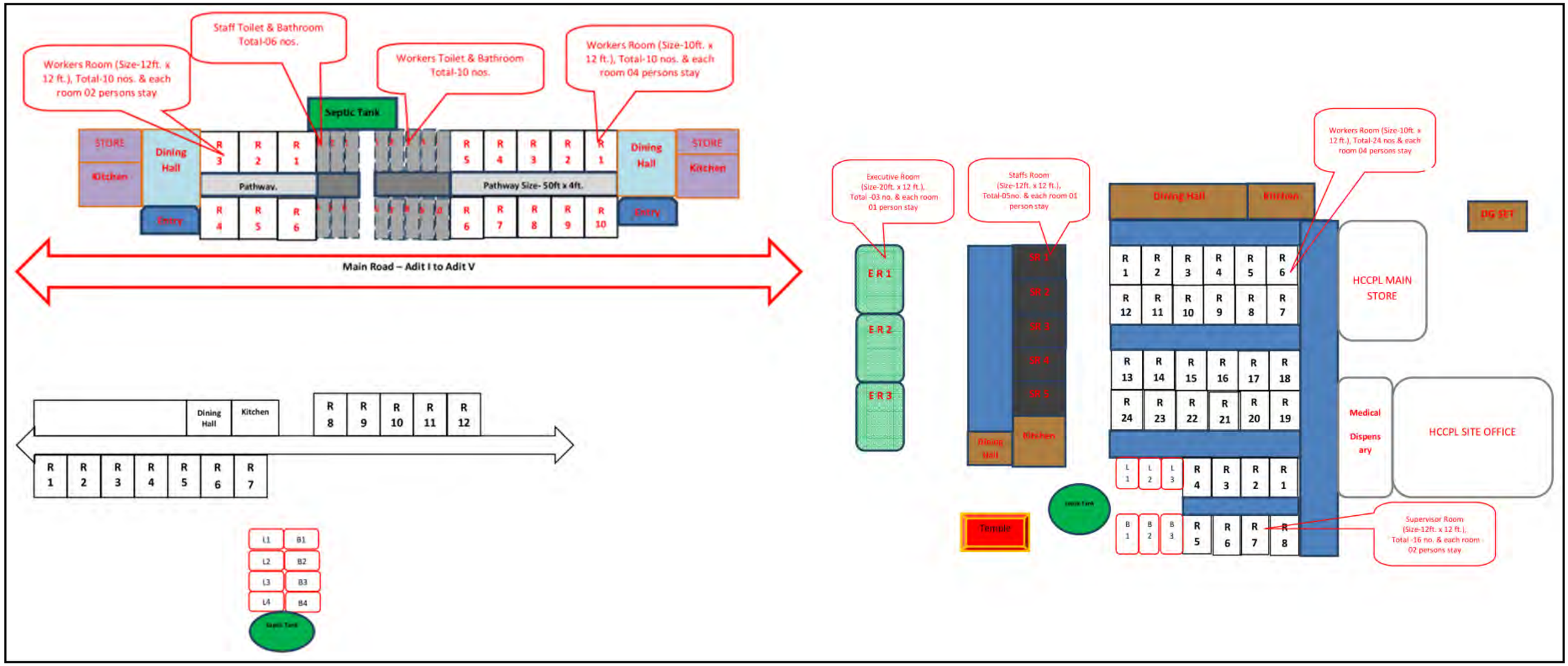
The project would require an average of 120 – 150 laborers at the site working on various components (Table 3-3). There are three campsites proposed for the labor accommodation, one each at intake, power house and Adit V. The accommodation capacities of each labor camp are as provided in Table 3-4 and Figure 3-3.

Table 3-3: Details of labor camps

Campsite	Accommodation
Intake Site	52 persons (40 Workers and 12 Staff)
Near Adit V	40 persons (Workers)
Power House	80 persons (Workers)

The labor campsites have been provided with adequate toilet facilities with one toilet per 10 workers. There are sixteen toilets with attached bathroom at the intake site, four units at adit V and twenty units at the power house. All toilets are provided with septic tank-soak pit arrangement to ensure proper disposal of sewage generated. The water supply for the labor camps and administrative blocks is maintained through bore wells, which is filtered and supplied. Water required for construction and other purposes is drawn from the Tidong River.

Figure 3-3: Layout for campsites



The campsites ensure a minimum area of 4 m^2 per occupant with single and bunk type rooms with thermal insulation. The project has room heaters and hot water supply for the laborers and the fuel wood is also sourced from the authorized fuel wood depot. The LPG fuel is used for cooking in canteen. The cylinders are stored in an isolated place in the kitchen. The project ensures provisions of 24 hours power backup through DG sets, Fire Extinguishers, Television and First Aid Kits at the campsite.

The labor requirement will increase up to 500 during peak construction period which is foreseen during mid of 2014 and to accommodate this additional workforce camps will be provided at Power house and Intake site having facilities as per desired guidelines.

The solid waste generated in the camp site and site offices is segregated as biodegradable and non-biodegradable prior to disposal in pits. The burnt out lubricant oil from construction equipment and Diesel Generator (DG) set called waste oil has been categorized as hazardous waste. About 5 l/d of waste oil is generated, which is stored in barrels till it is sold / given to authorized recyclers, i.e., M/s. Shivalik Solid Waste Management Ltd. The project has obtained No Objection Certificate (NOC) from Himachal Pradesh State Pollution Control Board (HPSPCB) for storage and handling of the waste oil.

The project has two dispensary (one each at intake and powerhouse sites) and ambulance facility to deal with work site health and safety issues. The waste generated at bio-medical waste at dispensaries is sent to Government Hospital at Reckong Peo for disposal.

3.4.3 Muck Disposal

The total muck generated will be 731859 m^3, out of this 146370 m^3 will be utilized in concrete work and balance 585489 m^3 will be disposed off in the 5 earmarked dumps (Table 3-4). The total capacity available for dumping is 842232 m^3. Among these dump PA2 dump has been abandoned to prevent damage to the trees. Excluding PA2 dump the total capacity available is 710432 m^3, which will be sufficient to dispose off the muck. At present, the muck is disposed in PA1-B and PA4. The PA 1A and PA3 will be developed in future.

The identified muck disposal areas are shown in Figure 3-4. The muck disposal sites are provided with retaining walls to protect the muck from flowing into the stream.

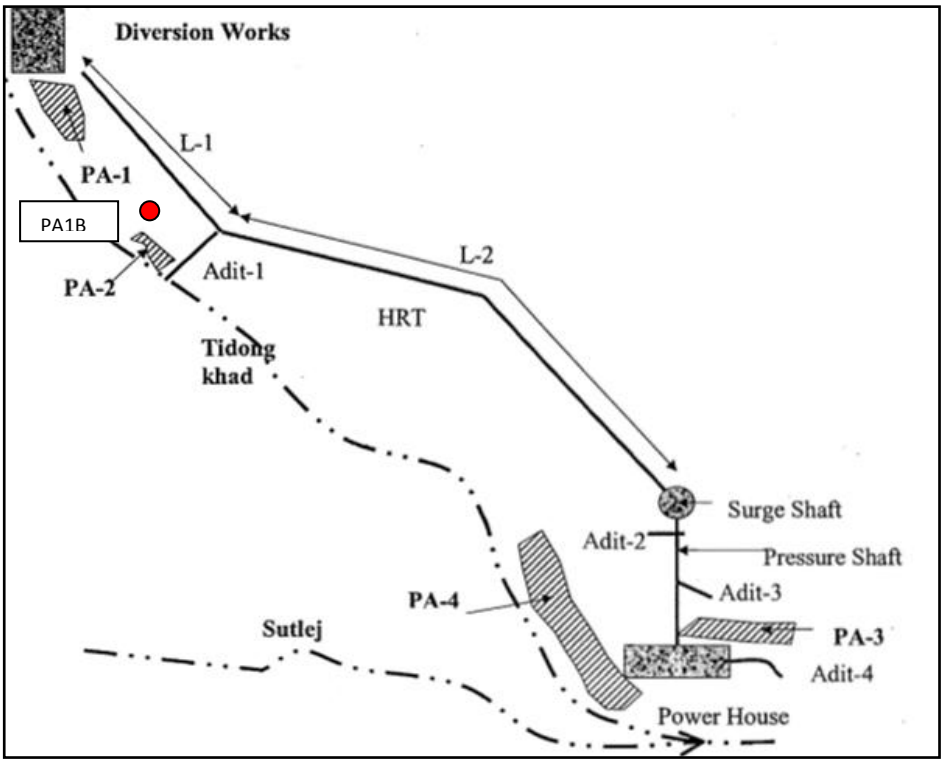
Once the capacity for dumping is exhausted, trees will be planted to prevent erosion. The monthly statement giving the details of quantity of muck generated, utilized and disposed in muck dump is prepared and submitted to HPSPCB.

Table 3-4: Details of muck disposal sites

Dumping area Location	Muck generated from	Actual Dump Capacity (m^3)	Muck to be dumped (m^3)	Muck Dumped as on December 2012 (m^3)	Remark
PA 1: A -Near Diversion Point	Barrage, under sluice, desilting basin reservoir, tunnel intake and HRT till audit 1	131800	103000	Nil	Not yet developed
PA 1: B- Near Crushing Plant		276200	200900	252000	Active
PA 2**- Near Audit 1		107652	106000	8000	Abandoned
PA 3- Near Power House towards Audit 3	Surge shaft, valve house, Audit 2,3,4, road	77180	76000	Nil	Not yet developed
PA 4- Near Power House	Pressure shaft, power house, switchyard, tailrace, road	249400	245959	124393	Active
Total		**842342***	**731859**	**384393**	

Note- ** The total capacity of 842342 m^3 is available but only 731859 m^3 will be utilized.*
***The total dump capacity available after abandoning PA2 dump is sufficient to dispose off 585489 m^3 (Total Generation* 731859 m^3- Utilized 146370 m^3*) of muck generated.*
 # 51,000 m^3 of muck is used near the dump for reclamation of crusher site.

Figure 3-4: Location of the muck disposal site (PA 1-4)



3.4.4 Transmission Lines

The original evacuation plan proposed for Tidong-1 was to evacuate by LILO of one circuit of 220 kV D/C Kshang-Bhaba line at Tidong-I HEP, however, after commissioning of the Jangi Pooling station, Tidong-I - Jangi line shall be constructed and also Kashang – Jangi 220 kV D/c line with single HTLS conductor shall be established.

The alignment and conceptual design of the transmission lines have not been carried out. While NTPGL is interested to carry out this activity as part of the whole project, no decision has been made. NTPGL will coordinate with the government to provide it with the environmental and social assessment, including social plans if required, prepared following the ADB agreed NRPPL SEHSMS. The ESIA and relevant social plans will be submitted to ADB prior to any ground clearance related to the establishment of the transmission line. NTPGL will inform the government that the transmission line design, implementation and operation will conform to ADB's SPS 2009 and the IFC guidelines of the World Bank group.

3.5 Construction Schedule and Current Status of the Project

The project was scheduled to be completed in 5 ½ years, commencing from mid 2008 and completing towards the end of 2013. The construction activities are in full swing at the moment although it has been observed to be behind schedule (Figure 3-5) and a revised schedule is proposed for the completion of each component.

Figure 3-5: Photographs from site

The construction activities have been going on for a period of last 2 years and two contractors have been appointed for civil works. The initial part of the construction was undertaken by Srinivas Construction Limited (SCL) while Himalaya Construction Company Private Limited (HCCPL) was engaged subsequently to undertake major construction activity. Another sub contractor ALSTOM has been appointed for electro-mechanical works while for hydro-mechanical works the process for identification of contractor needs to be initiated. The construction of access roads is near

completion. The excavation works is also near completion for river diversion arrangement (98%), spillway (96%), storage reservoir (88%) and power house complex (95%).

The excavation works of HRT and Penstock have also reached an appreciable stage with Head Race Tunnel at 21% and Penstock at 41% completion respectively. The concreting works in process for river diversion arrangement is 62% complete and concreting of power house complex is 8% complete. As per the revised schedule, the construction will be completed by mid of 2016. The revised completion schedule is presented in bar chart which is enclosed as **Annexure-1.1**.

3.6 Activities proposed during Operation Phase

The plant will be designed to be operated as an attended type. A unit control will be provided locally while central control will be from various control panels located in the control and relay room of the power house. Control equipment will include metering and control panels, protections for supervision and operation of the generator turbine, 11 kV switch gear, auxiliary power system, transformers and 220 kV switch gear.

An employee colony will be constructed to accommodate about 50 families. The accommodation will be permanent type with adequate facilities. Water requirement for the colony will be met from bore well. The septic tanks will be provided for the treatment of wastewater since the population during operation phase will be very small. The domestic solid waste will be disposed off in the incinerator available at Reckong Peo which is the district head quarters.

4. DESCRIPTION OF ENVIRONMENT

4.1 General

This chapter deals with the description of baseline environmental settings of the project area. The identification of physical, biological and social characteristics of the region and assessing their existing conditions is central to predict the possible environmental impacts of the proposed hydropower project.

The baseline environmental data presented in this chapter comprises of information collected by RITES for the first EIA study conducted in 2005, the information was later supplemented during the updation of report in 2011. The information has been further been updated in this report.

The baseline information of the proposed project and surrounding area presented in this chapter has been mainly compiled from:

- Air, Water, Noise and Ecology survey – RITES, 2005
- Satellite image analyses to study land environment – AECOM, 2011
- Ecological Survey – AECOM/CISHME, 2011
- Socio-economic Survey – AECOM, 2011 and October, 2012
- Fishery Survey – AECOM, October, 2012

The study area considered for this project includes 10 km radius around the dam site, HRT and power house site. The study area covers all the village settlement and other eco-sensitive areas where the project is likely to be impacted due to the construction and operation of the project.

4.2 Land Environment

Land environment includes assessment of the geography, hydrology, land use and soil of the area. The different physiographic features of the project were analyzed using satellite imagery IRS-P6 LISS-III of October, 2008 (Table 4-1) and Shuttle Radar Topography Mission (SRTM) data. Digital image processing of the satellite data and the analysis of interpreted maps were carried out using ERDAS Imagine and ArcGIS software which was substantiated through information derived from the Survey of India toposheets on the 1:50,000 scale.

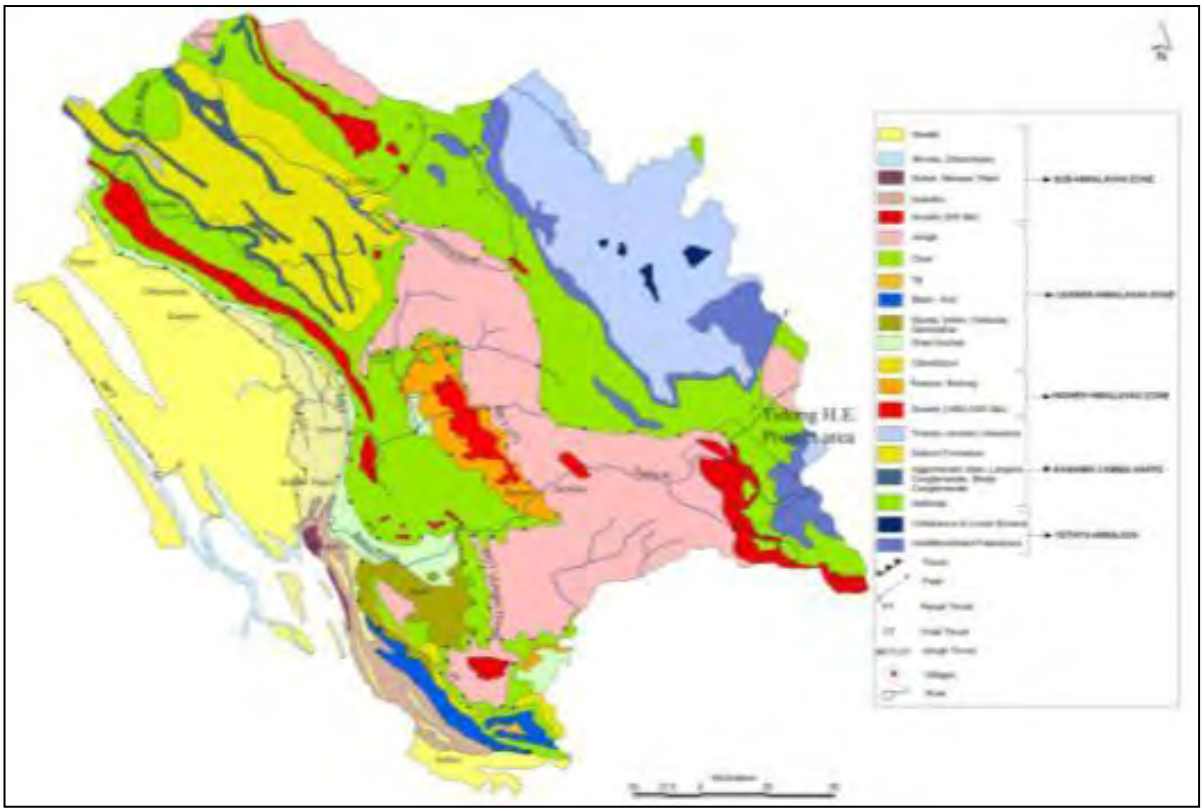
Table 4-1: Details of the satellite imagery

Satellite	Sensor	Path/Row	Date	Data type & Bands
IRS-P6	LISS-III	96/48	05-10-2008	Digital (1,2,3,4)
IRS-P6	LISS-III	96/49	05-10-2008	Digital (1,2,3,4)

4.2.1 Geology and Seismicity

The regional geology of the Sutlej valley in Himachal Pradesh has been shown in Figure 4-1. The regional stratographic framework for the Lesser Himalaya has been established from various published works (Srikantia and Bhargava, 1998; Srikantia and Sharma, 1976; Sharma, 1977, Kumar, 1999). The rocks exposed along the Lesser Himalaya region of the Sutlej basin are of Archaean, Proterozoic, Palaecene, Pleistocene and Holocene age. The dominant rock types include granite gneisses, quartzites, schists, mafic volcanics, limestones, dolomites, shales, laterites and older and newer alluvium.

Figure 4-1: Geology of Himachal Pradesh



The project area lies in Mehbar and Maldi gneisses comprised of kyanite and psamatic gneisses with bands of schist and quartzite. These are intruded by basic and acidic rocks. Some of the rocks are well foliated. The general trends are North-South with moderate dips towards East. These are transacted by a number of joints of which the foliation and strike joints are the most predominant

followed in frequency by steeply dipping transverse joints. The rock formations within the project area goes upstream from the tailrace consist of Wangtoo, Rampur and Jutogh gneisses and granites. The Wangtoo rocks are overlaid by Rampur followed by Jutogh, the three series having thrusted contacts.

The Figure 4-2 shows the seismicity of India. The project area lies in an active seismic region, zone IV of the Seismic Zoning Map of India. Available data on seismicity within a radius of 150km of the project shows that earthquakes having a magnitude greater than 5 on the Richter scale occur at frequent intervals. Important seismic events which have taken place in the past 150 years and caused significant damage include the 1905 Kangra quake (magnitude 8+), the 1908 Kullu quake (magnitude 6.0), the 1945 and 1947 Chamba quakes (magnitude 6.5 & 6.6), the 1975 Kinnaur quake (magnitude 6.8) and the 1991 Uttarkashi quake (magnitude 6.6).

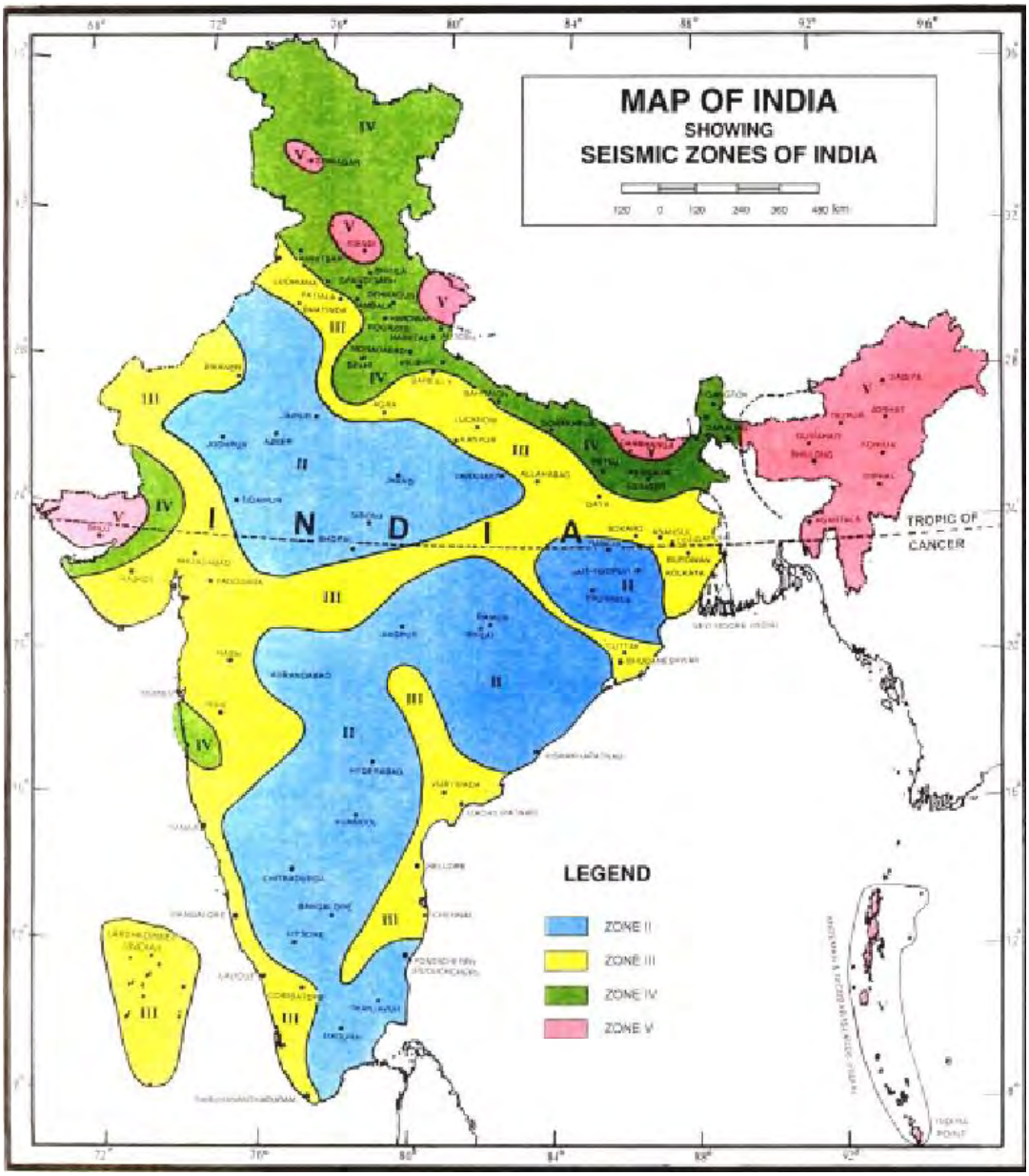
4.2.2 Drainage

The catchment area above diversion dam site comprises of steep mountains, a portion of it is covered with forest and a major part is under permanent snow. Total catchment area up to weir site is 497.86 square kilometers. The average slope of khad just upstream of diversion site is 1:50, and thereafter it has a steep descent (slope 1:10), making it most lucrative scheme for hydroelectric potential exploitation.

The catchment of the Tidong basin has many snow fed and rain fed streams with dendrite drainage pattern. The Tidong Khad originates at an elevation of more than 6000 m and traverses about 36 km from east to northwest up to the proposed weir site. Thereafter, many snow fed tributaries join the Tidong khad on both of its banks (Figure 4-3).

1. Lambar Khad : Snow fed tributary joins the Tidong stream after about 260 meters
2. Shankvi Khad: Shankvi Khad is a perennial tributary which joins Tidong after 3640 meters at its right bank near Thangi village after travelling 7.74 km from its origin.
3. Gara Khad: It is a snow fed perennial tributary of Tidong and originates from Gara glacier. Gara Khad travels about 7.25 km from its origin before joining Tidong after 3875 meters near Thangi village.
4. Duba Khad: It is also a snow fed perennial tributary and joins Tidong after 6505 meters after traversing 8.7 km from its origin. It is also fed by many small nallas.
5. Roowang Khad: Roowang Khad is a perennial tributary joins Tidong after 7395 meters at its right bank near Roowang Dogri village at an elevation of about 2400 m.

Figure 4-2: Seismic Zone Map of India



4.2.3 Elevation Bands (Relief)

The relief in the catchment area and study area of Tidong hydropower project varies from 2000 m to 6400 m. This elevation range was divided into 12 elevation bands with 400 m interval (Figure 4-4).

The area of catchment area and study area (in terms of hectares and percentage) is given in Table 4-2. It is noticed that most of the catchment area of proposed project (approximately 74.1%) has an elevation in the range of 4400-5600m. The proposed location of power house and dam site has an elevation of about 2000-2400m and 3200-3600m respectively.

Figure 4-3: Drainage map of study area of the proposed Tidong HEP

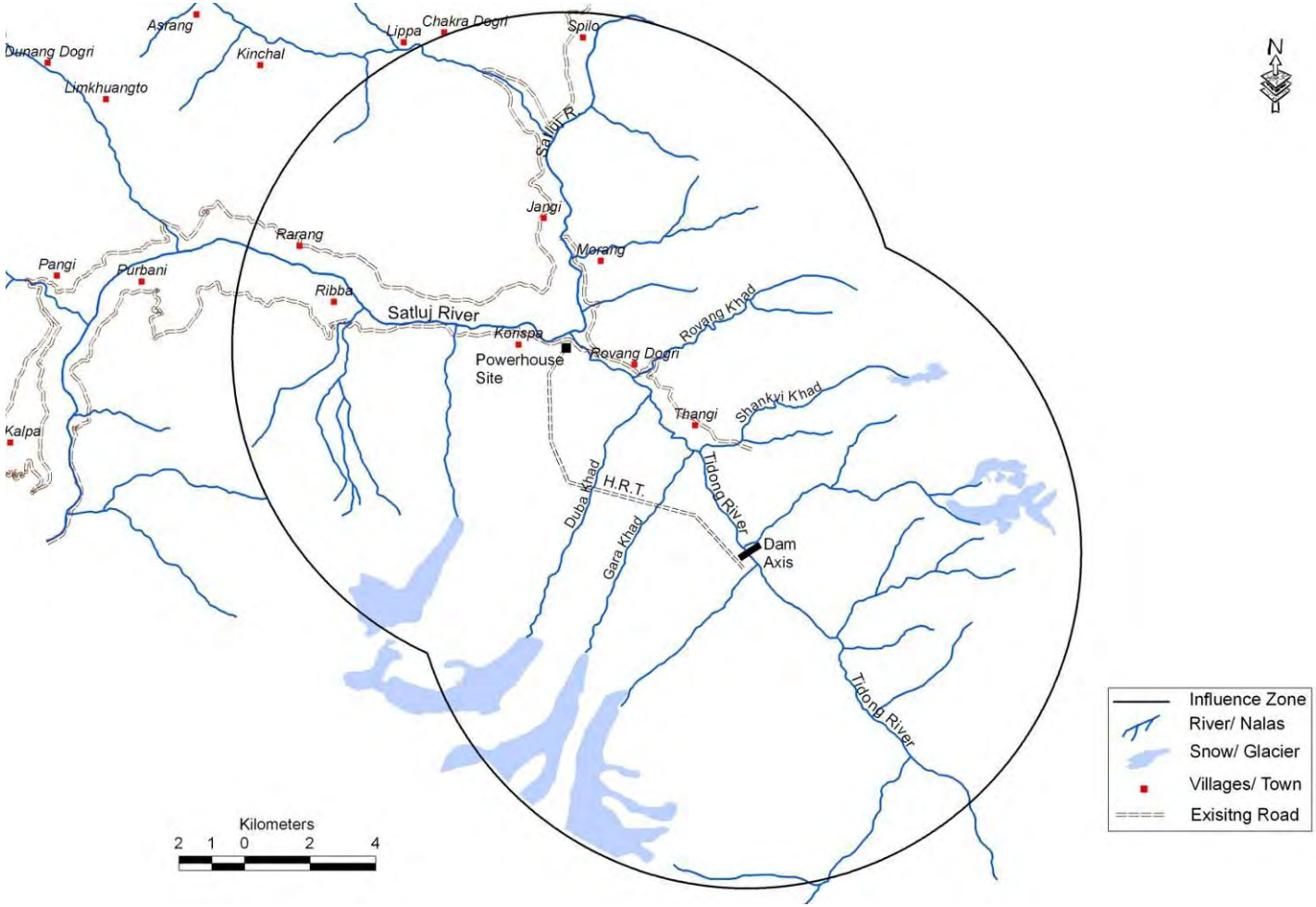


Figure 4-4: Elevation band map of catchment area and study area of proposed project

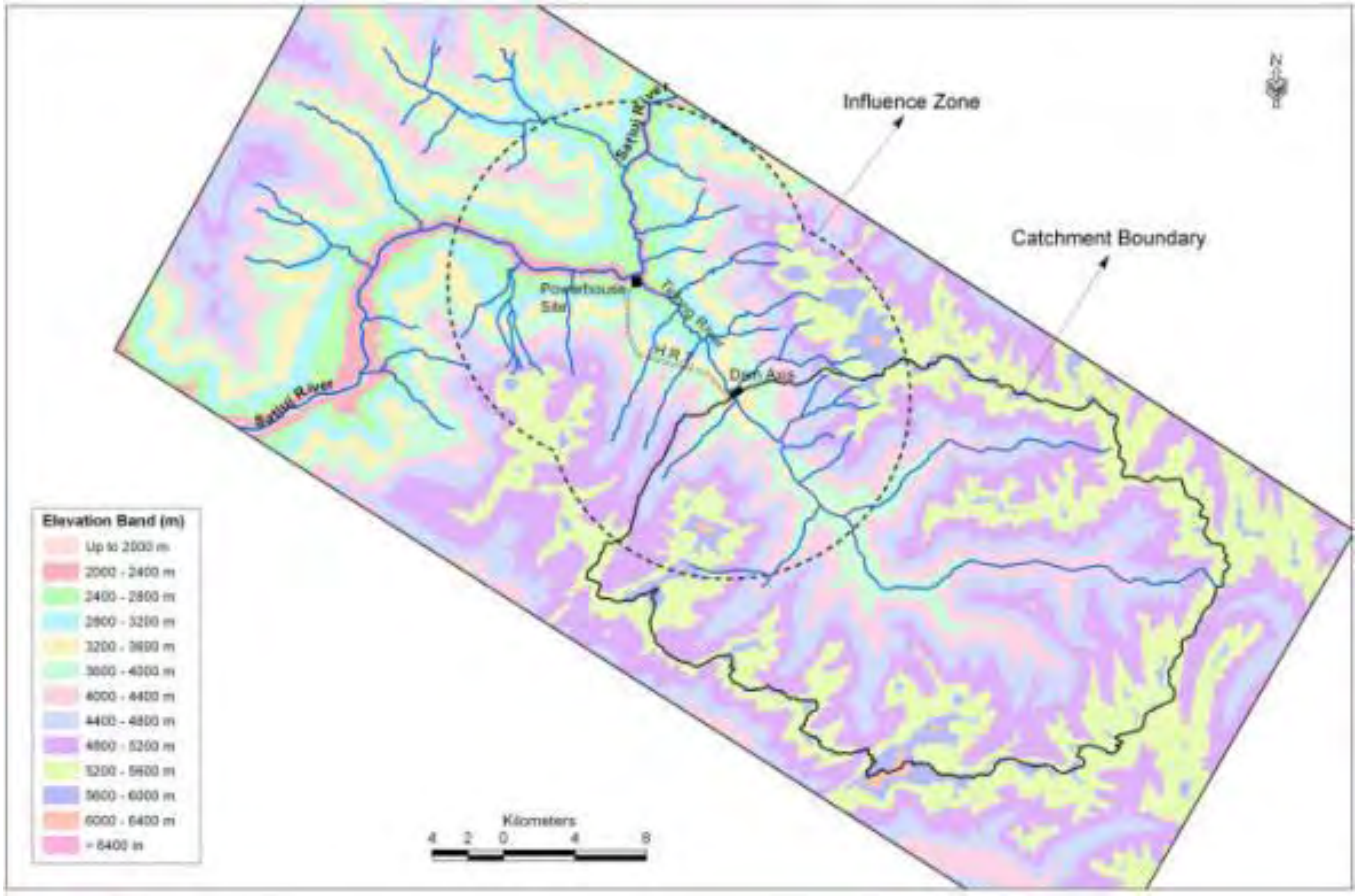


Table 4-2: Area (ha) of different elevation bands of catchment area and study area

Elevation Bands	Catchment Area		Study Area	
	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)
Up to 2000	-	-	171.77	0.23
2000-2400	-	-	2939.43	4.01
2400-2800	-	-	6245.37	8.51
2800-3200	-	-	7910.18	10.78
3200-3600	931.29	1.63	10353.73	14.11
3600-4000	4021.62	7.03	11400.26	15.54
4000-4400	7751.47	13.56	9388.25	12.78
4400-4800	12153.77	21.26	7730.71	10.54
4800-5200	16638.14	29.1	8733.35	11.9
5200-5600	13573.55	23.74	6856.97	9.35
5600-6000	1965.11	3.44	1549.38	2.11
6000-6400	142.91	0.25	95.7	0.13

4.2.4 Slope

The slope map of the catchment and study area for the proposed Tidong hydropower project was generated from Digital Elevation Data (DEM) prepared from SRTM data.

The slope of mountains in the Tidong basin has been categorized into seven slope categories and break up for each type of slope category is given in Table 4-3. Most of the catchment area is either strongly sloping or moderately steep (Figure 4-5). The area of the catchment with very steep slope and escarpment is significantly less i.e. 0.30% and 0.10% respectively. In the study area, strongly and moderately steep category of slope together cover more than 71% area while moderately slope covers about 17.5% around Tidong and Sutlej rivers (Figure 4-5).

Table 4-3: Area (in ha) under different slope categories for the catchment area and study area

S. No.	Slope categories	Catchment Area		Study Area	
		Area (ha)	Percentage (%)	Area (ha)	Percentage (%)
1	Gently sloping (0-2%)	2813.23	4.92	2833.32	3.86
2	Moderately sloping (2-8%)	8227.37	14.39	12855.79	17.52
3	Strongly sloping (8-15%)	24411.97	42.69	26897.42	36.66
4	Moderately steep (15-30%)	18633.62	32.59	25593.69	34.88
5	Steep (30-50%)	2864.11	5.01	4984.01	6.79
6	Very steep (50-70%)	172.50	0.30	155.82	0.21
7	Escarpments (above 70%)	55.08	0.10	55.08	0.08

Figure 4-5: Slope profile for catchment area of Tidong

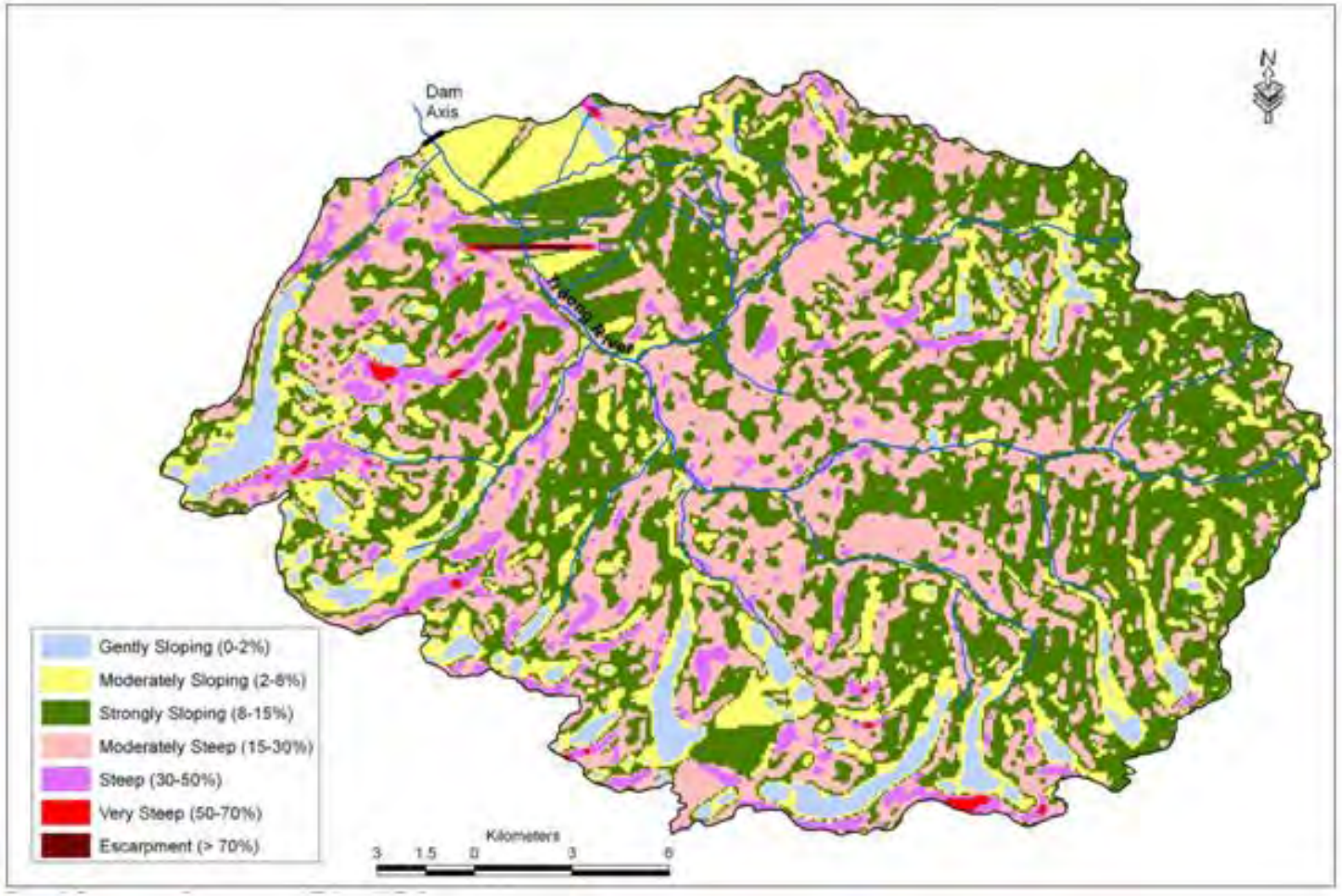
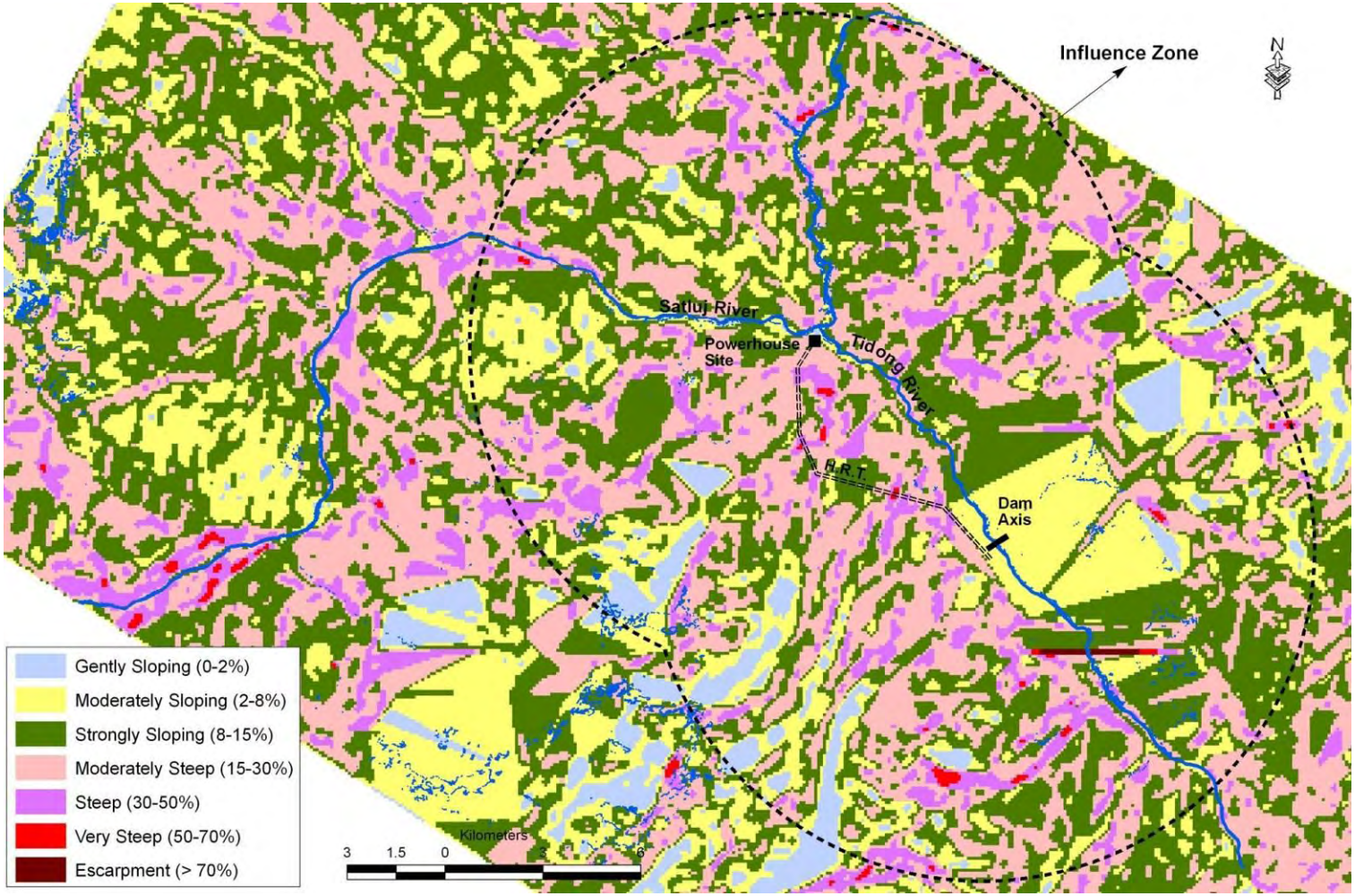


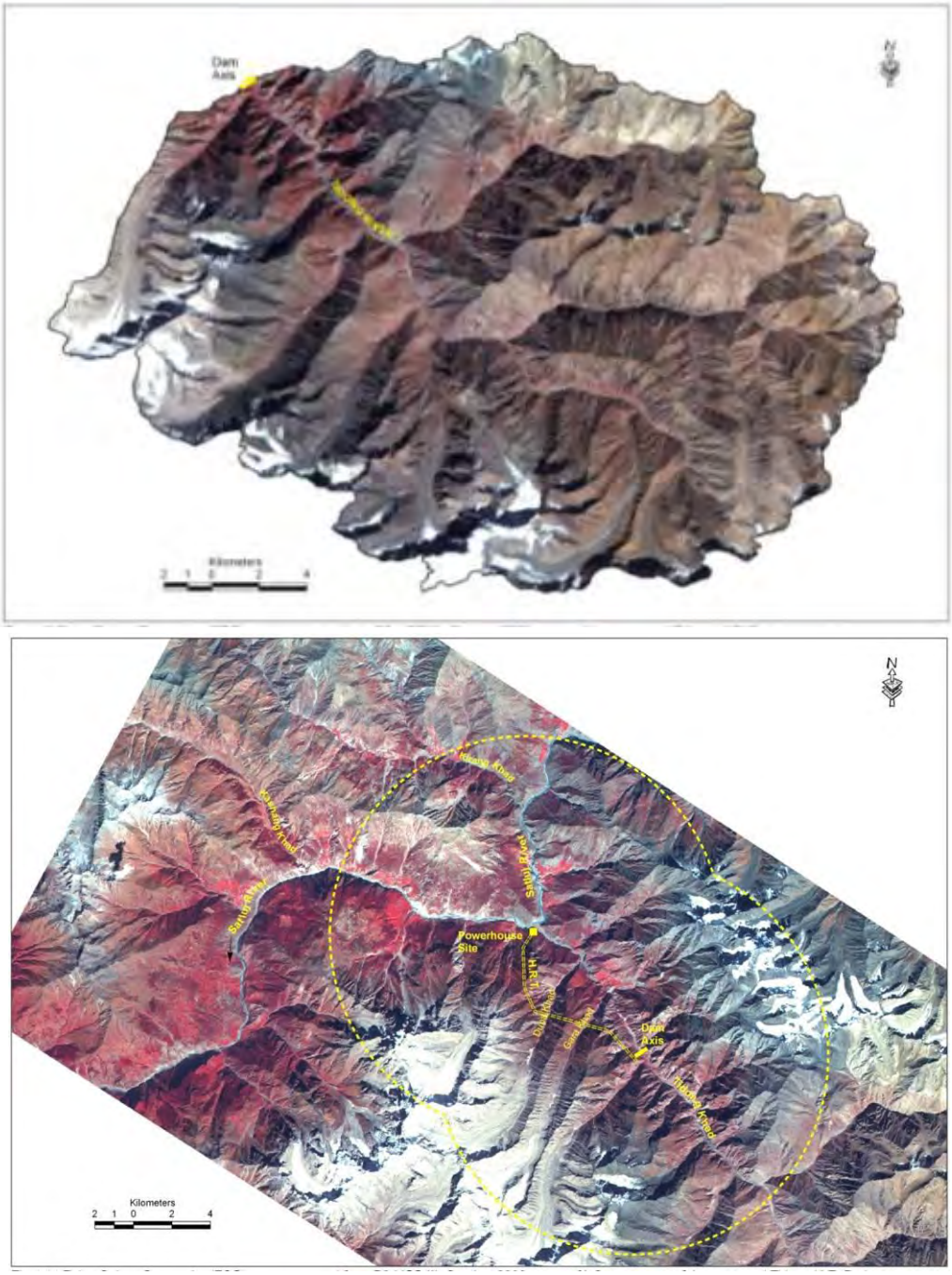
Figure 4-6: Slope profile for project study area



4.2.5 Land Use and Land Cover

The False Color Composite (FCC) of the extracted satellite imagery of catchment area and study area as shown in Figure 4-7 was used as a source to prepare Land use and land cover maps of the catchment area and study area of the Tidong river basin.

Figure 4-7: An FCC map of catchment area and study area generated from P6 LISS-III



For the preparation of land use and land cover mapping, density classification was done by supervised, unsupervised and Normalized Difference Vegetation Index techniques. The land use of catchment area and study area is categorized into the following categories:

- Dense forest - forest with canopy density more than 70%
- Moderately dense forest - forest with canopy density in the range of 40-70%
- Open forest - forest with canopy density between 10-40%
- Crop land
- Other non-forest land cover in the form of barren/ rocks, snow/ glaciers, lakes, etc.

Land use maps for the catchment and study area are provided in Figure 4-8 and 4-9 and statistics are presented in Table 4-4.

Catchment Area

Tidong catchment area up to the proposed weir site of Tidong hydroelectric project is approximately 57177.87 ha. Most of the catchment is characterized by barren land and rocks which amounts to more than 59% of total area. On the higher ridges of the catchment, about 12.88% of area is covered with snow and glaciers. The vegetation including dense and open forests together constitutes an area of 5.30% (2.69% and 2.61% respectively) while moraines at higher elevations are spread over the catchment with area coverage of 21.13%.

Study Area

The total area of study area is about 73375.13 ha. In this zone, total vegetation (Scrub/ Alpine scrub, dense and open forests) predominantly covers the land with an area of 54.24%. About 22% of study area is either barren or rocky land.

Table 4-4: Area of study area and catchment area under different land use categories

Land Use/ land cover categories	Catchment Area		Study Area	
	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)
Dense Forest	1537.77	2.69	17568.41	23.94
Open Forest	1493.64	2.61	14255.14	19.43
Scrub/ Alpine scrub	437.98	0.77	6510.42	8.87
Settlement & Cultivable area	162.95	0.28	2038.17	2.78
Barren/ Rocks	34032.49	59.52	16340.18	22.27
Moraines	12083.18	21.13	8612.24	11.74
River/ Water bodies	65.16	0.11	603	0.82
Snow/ Glaciers	7364.7	12.88	7447.57	10.15
Total	**57177.87**	**100**	**73375.13**	**100**

Figure 4-8: Land use of catchment area of proposed project

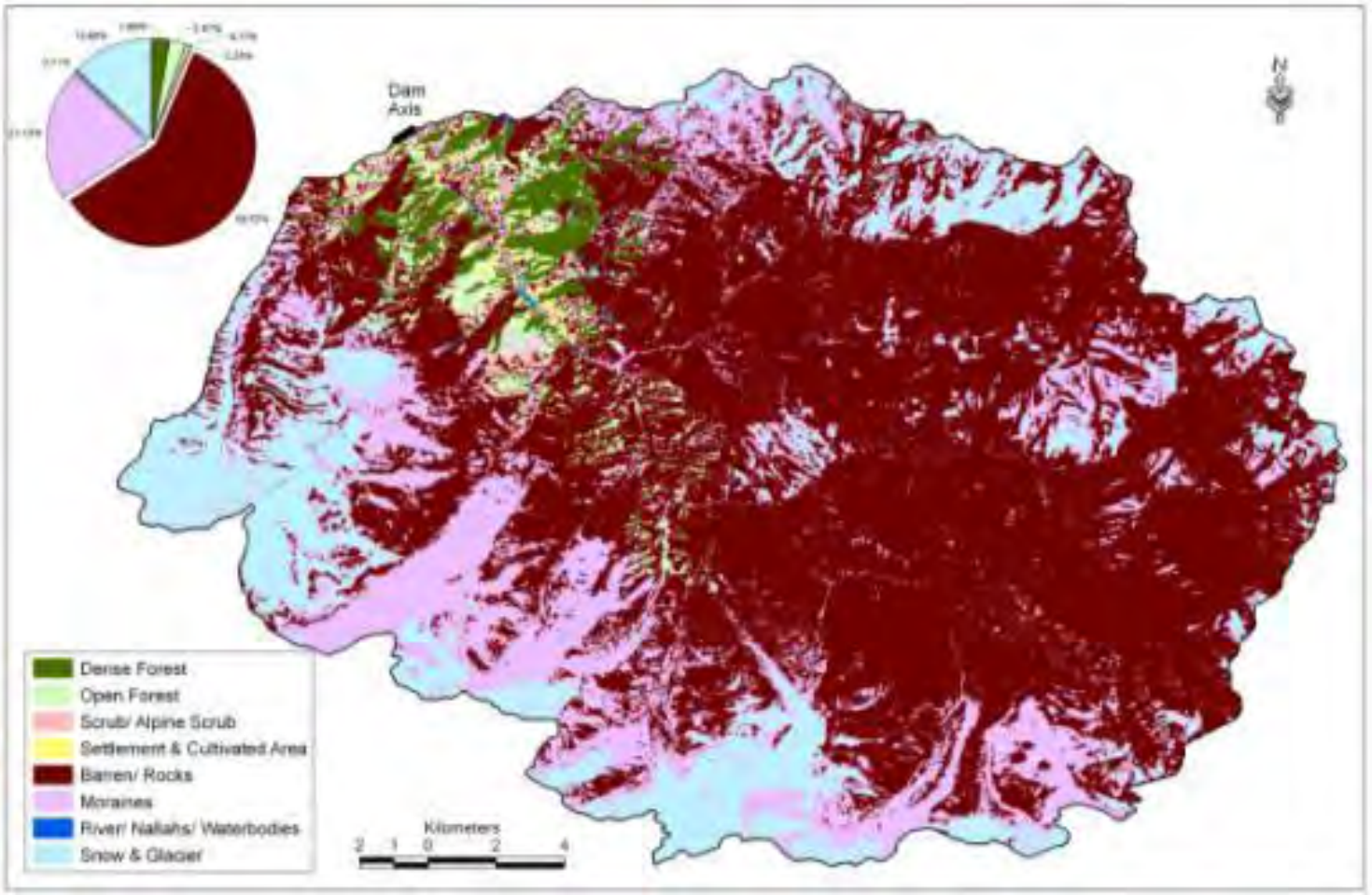
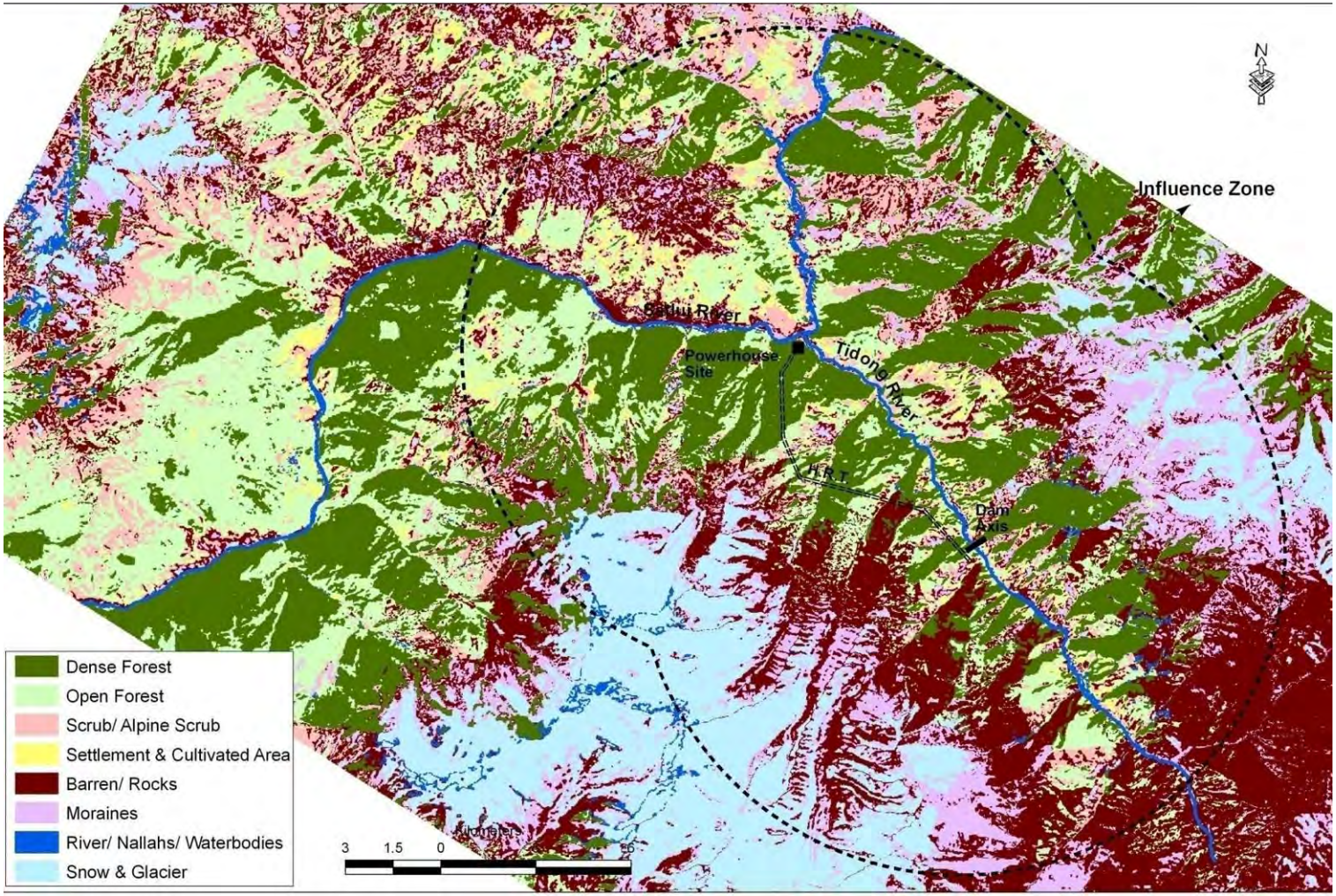


Figure 4-9: Land use of study area of proposed project



4.2.6 Soil

Soil mapping of the proposed area for Tidong hydropower project was prepared from the National Bureau of Soil Survey and Land Use Planning, 2000. The soil map for the catchment area and study area of proposed project has been shown in Figure 4.10 and legend to this soil map is given in Table 4-5.

Figure 4-10: Soil map of catchment area and study area of proposed project

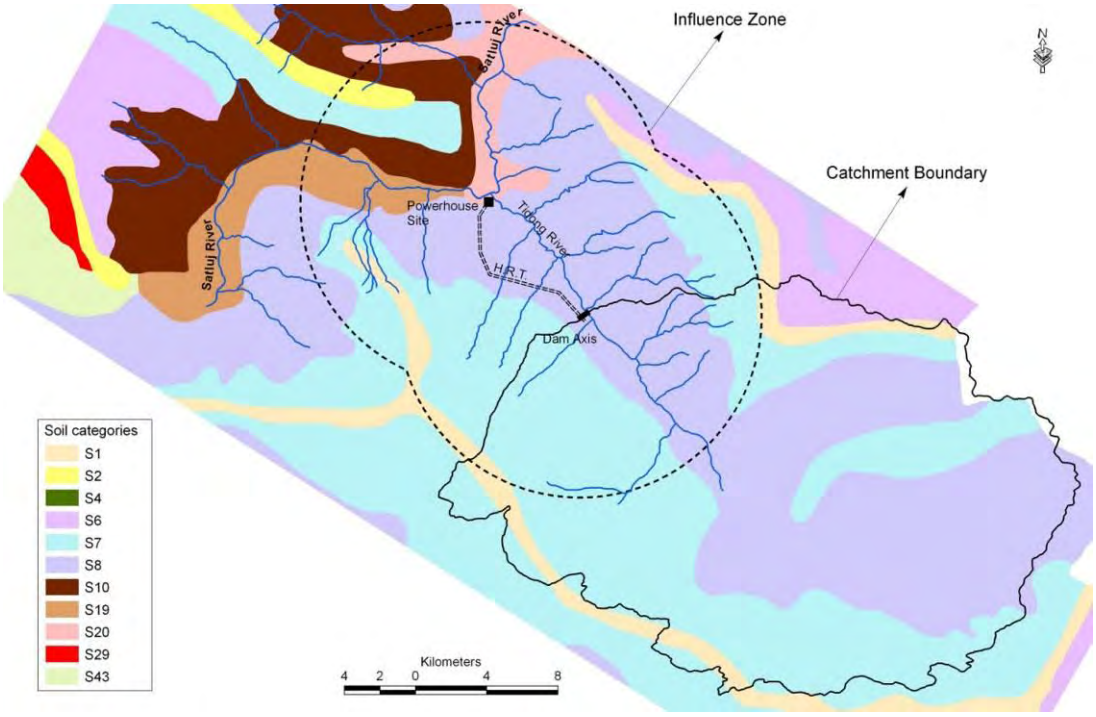


Table 4-5: Soil series and its description in the project area

Soil Unit	Soil Taxonomy	Description
S1	Lithic Cryorthents	Rocky outcrops covered with glaciers; Associated with: Shallow, excessively drained, sandy skeletal soil with sandy surface, severe erosion and strong stoniness.
S2	Lithic Cryorthents	Rocky outcrops. associated with: Shallow, excessively drained, sandy skeletal soil on very steep slopes with sandy surface, severe erosion and moderate stoniness;
S4	Lithic Cryorthents	Rocky outcrops covered with glaciers; associated with : Shallow, excessively drained, sandy skeletal soil

Soil Unit	Soil Taxonomy	Description
		on very steep slopes with sandy surface, severe erosion and moderate stoniness
S6	Typic Cryorthents	Rocky outcrops; associated with: Medium deep, excessively drained, loamy skeletal calcareous soils on steep slopes with loamy surface, severe erosion and moderate stoniness
S7	Typic Cryorthents	Rocky outcrops; associated with: Shallow, excessively drained, loamy-skeletal soils on very steep slopes with loamy surface, severe erosion and moderate stoniness.
S8	Typic Cryorthents	Rocky outcrops; associated with: Medium deep, excessively drained, loamy skeletal calcareous soils on steep slopes with loamy surface, severe erosion and strong stoniness.
S10	Lithic Cryorthents	Rocky outcrops; associated with: Shallow, somewhat excessively drained, coarse-loamy, calcareous soils on steep slopes with loamy surface, severe erosion and strong stoniness.
S19	Dystric Eutrochrepts	Deep, well drained, mesic, fine-loamy soils on moderately steep slopes with loamy surface, moderate erosion and slight stoniness; associated with : Medium deep, somewhat excessively drained, sandy soils with loamy surface, severe erosion and moderate stoniness
S20	Typic Cryorthents	Rocky outcrops; associated with: Medium deep, somewhat excessively drained, loamy skeletal on moderately steep slopes with loamy surface, severe erosion and moderate stoniness.
S29	Typic Udorthents	Rocky outcrops; associated with: Medium deep, excessively drained, mesic, loamy-skeletal soils on very steep slopes with loamy surface, severe erosion and moderate stoniness.
S43	Typic Udorthents	Shallow, well drained, thermic, loamy-skeletal soils on moderate slopes with loamy surface, moderate erosion and moderate stoniness; associated with: Shallow, somewhat excessively drained, coarse-loamy soils with loamy surface, severe erosion and slight stoniness.

The catchment area and study area of the proposed Tidong hydropower project mainly comprises of four soil families Lithic Cryorthents, Typic Cryorthents, Typic Udorthents and Dystric Eutrochrepts having 8 soils units. The catchment area of Tidong has a rocky outcrop with soil which is primarily shallow or moderately deep with loamy skeletal calcareous soils (S7 and S8). It is also characterized by severe erosion, stoniness and loamy surface. The detail of the area under different soil unit categories of catchment area and study area of the project has been presented in Table 4-6.

Table 4-6: Area (ha) of different soil unit categories of catchment area and Study area

Soil Units	Catchment Area		Study Area	
	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)
S1	2400.38	4.23	2971.85	4.05
S2	-	-	1565.28	2.13
S6	988.98	1.74	2214.59	3.02
S7	26777.37	47.16	23320.5	31.78
S8	26617.68	46.87	25758.18	35.1
S10	-	-	10741.13	14.64
S19	-	-	4484.15	6.11
S20	-	-	2319.44	3.16

4.3 Climate and Meteorology

The project area falls in temperate climate zone with winters from November to April and summers from May to October. The winter season is a little extended by virtue of elevation of the area. The summer season in itself includes the rainy season from July to September. The transition period from April to May and from September to October correspond to the spring and autumn seasons of the area. Broadly there are three seasons viz. winter, summer and rainy are discernible.

Winter Season: The duration of winter season depends on altitude and it generally lasts from November to April in most parts of the district. It is characterized by heavy snow at higher elevations towards the end of November or early in December. It does not contribute directly to the stream discharge significantly and mostly feeds the snow/glacier bound area of the catchment. The snow comes down to 1300 m elevation but it seldom lies long below 2000 m. Snow generally disappears before the middle of May, all the areas are clear of snow areas above 4500 m.

Summer Season: This is characterized by frequent showers in the moist or wet zone while in the dry zone. Snowfall as late as May has taken place at Kalpa in 1957. This can be termed as spring. At this time of the year the lower valleys are hot. Hot winds blowing up the Sutlej and hot sun in arid and semi-arid parts allow only a short spring.

Rainy Season: It starts with the advent of monsoons either towards the end of June or early in July and lasts till the end of September. The bulk of rainfall is received during this period in the wet zone. In the inner valley beyond Wangtu, the rainfall shows a progressive decline followed by an enhanced snowfall so much so that at Pooh, there is higher snowfall and absolutely no rains. The distribution of rainfall is, however, not regular. Sometimes it rains exceptionally heavy for a few days and rest of the rainy season may go dry.

After the rainy season, the sky becomes clear and there is very little rain, if any, during October to November. In these months the diurnal range of temperature is quite marked. The soil loses moisture very rapidly. There is thus, another dry period during the months of October and November.

4.3.1 Rainfall

The climate of the Sutlej Valley shows a gradual alteration from the heavy monsoon of the outer Himalayas to the arid Tibetan type with a winter snowfall. The monsoon clouds advancing from the plains of India provide plenty of rainfall to the outer ranges of the hills in the state but the inner valleys does not receive precipitation. The rainfall recorded at Moorang Tehsil (2001-2004) is presented in Table 4-7. In all these years, maximum annual rainfall in Moorang was about 550 mm.

Table 4-7: Rainfall in project area (RITES, 2005)

Months	Rainfall in mm				
	Moorang				Kalpa
	2001	2002	2003	2004	2004
January	3.6	35.2	33.3	149.7	117.5
February	34.1	149.1	209.9	16.3	53.9
March	69.4	22.6	38.2	0	5.7
April	7.1	108.6	126.7	46.9	46
May	10.1	24.34	33.7	18.3	40.1
June	12.5	0	13.7	1.4	4.8
July	6.5	0	25.3	14.2	25.9
August	33.5	23.6	11.2	28.4	53
September	2.4	34.4	0	0	5.9
October	0	2.4	0	32.3	185.5
November	8.8	0	0	0	0
December	34.6	0	60.1	7.8	31.8
TOTAL	**222.6**	**400.24**	**552.1**	**315.3**	**570.1**

The monthly rainfall and snowfall data of Kalpa (2003) was also collected and given in Table 4-8, which can be considered to be representative of the project area.

Table 4-8: Snowfall trends in project area (Kalpa) in 2003 and 2008

Month	Rainfall, mm		Snowfall, cm	
	2003	2008	2003	2008
January	0	0	45.5	100
February	0	1	139.9	68
March	23.9	20	85.6	201
April	83.5	61	16	8
May	59.6	41	0	0
June	28.2	41	0	0
July	78.2	31	0	0
August	32.5	53	0	0
September	26.8	36	0	0
October	4.9	32	0	0
November	0	2	6.4	17
December	0	2	75.1	43
Total	**337.6**	**320**	**368.5**	**437**

4.3.2 Wind Speed and Wind Direction

Data for wind speed and direction were collected to prepare wind rose diagram of winter, summer and monsoon season (Figure 4-11 to 4-13). Annual wind rose diagram is also provided to get the annual average result of wind speed and wind direction (Figure 4-14. It was observed that most prevalent wind direction during morning (8:30 hr) and evening hours (17:30 hr) are Northeast and Southwest, respectively.

Figure 4-11: Wind rose: Winter - 8.30 hrs and 17:30 hrs (RITES, 2005)

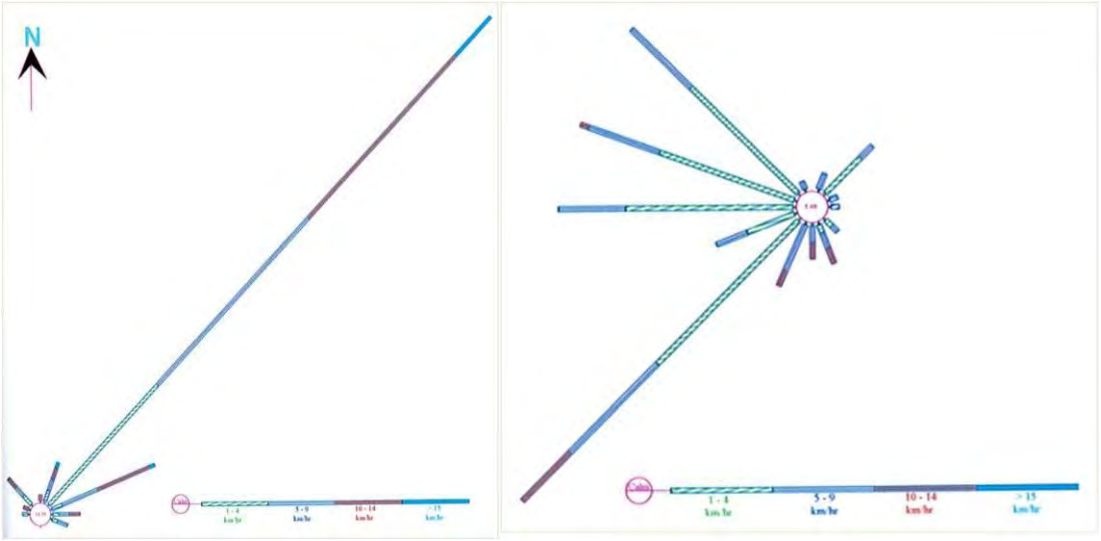


Figure 4-12: Wind rose: Summer - 8.30 hrs and 17:30 hr (RITES, 2005)

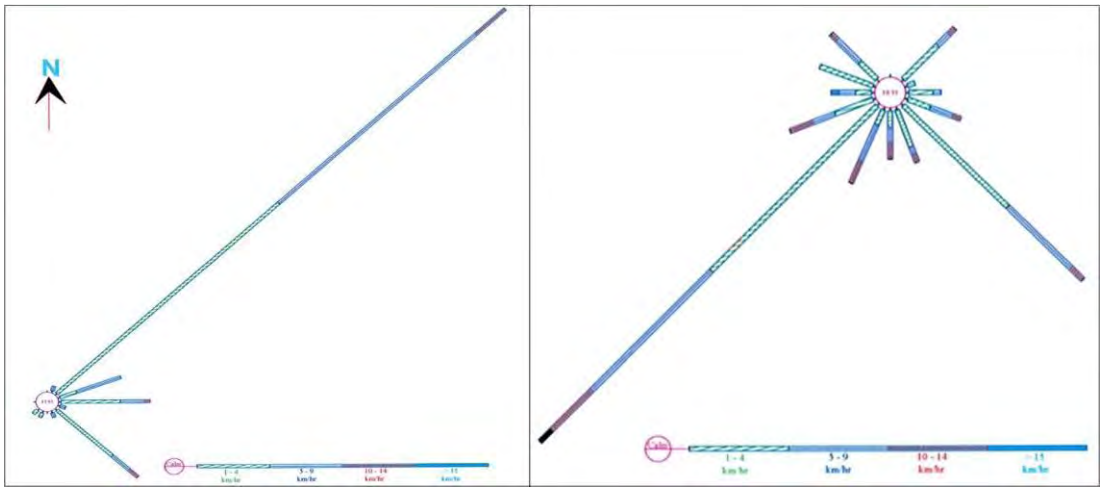
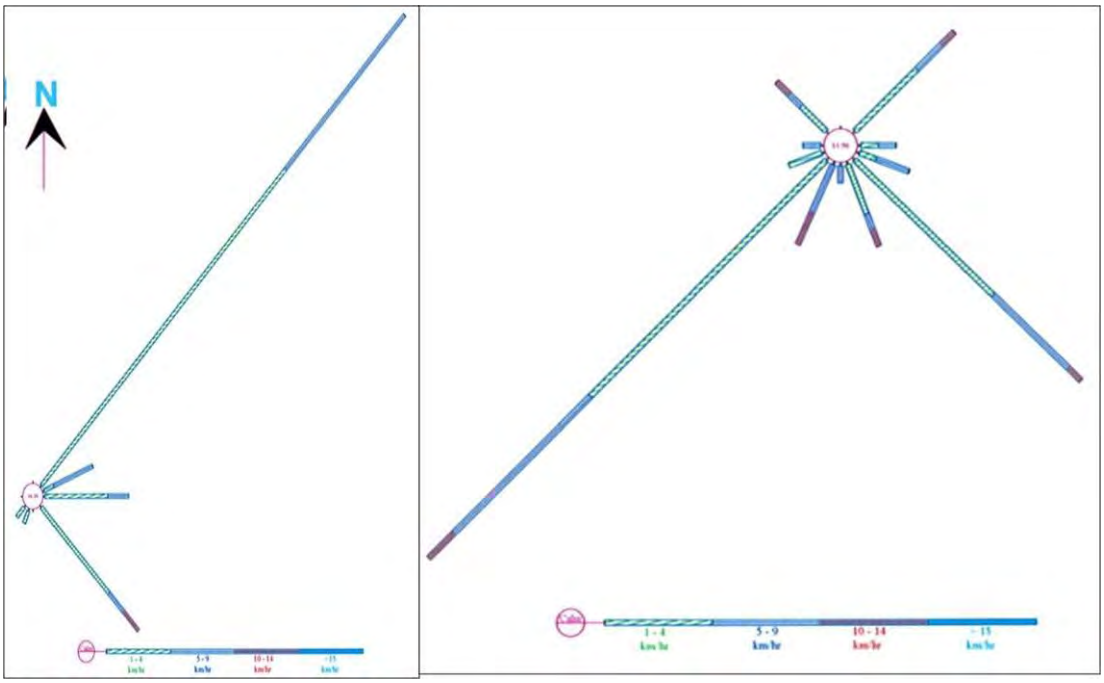


Figure 4-13: Wind rose: Monsoon– 8:30 hr and 17.30 hrs (RITES, 2005)



4.3.3 Temperature and Humidity

To observe the monthly variation, mean temperature (maximum and minimum) and relative humidity (08:30 and 17:30 hours) were collected for Kalpa from Regional Meteorological Centre, New Delhi (Table 4-9).

The monthly mean of maximum and minimum daily air temperatures varies from 6.1 to 24.5 °C and from -2.9 to 12.1 °C respectively. The relative humidity was found to be higher in the month of July and August.

Figure 4-14: Wind rose: Annual – 8:30 hr and 17.30 hrs (RITES, 2005)

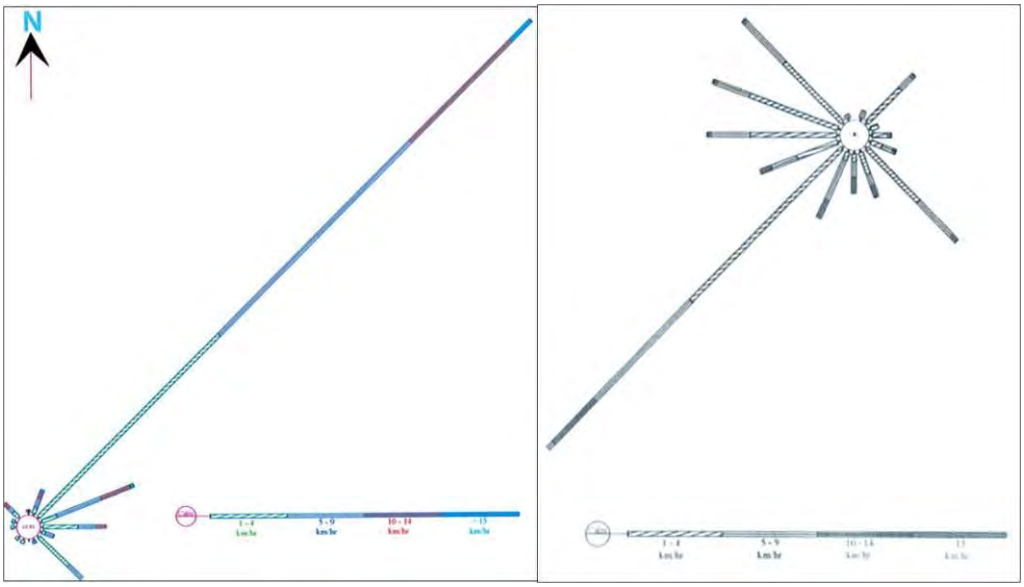


Table 4-9: Temperature and relative humidity for Kalpa

Months	Monthly Mean Temperature °C		Monthly Mean Relative Humidity %	
	Maximum	Minimum	08:30 hrs	17:30 hrs
January	6.1	-2.9	61	56
February	9.2	-1.6	50	44
March	17.5	3.5	32	23
April	19.6	5.3	47	40
May	21.4	7.2	45	38
June	22.7	9.2	61	50
July	24.5	12.1	72	52
August	22	11.8	85	75
September	22.9	9.6	69	55
October	16.3	2.9	59	56
November	15.2	0.7	38	41
December	11.5	-0.7	44	31

Source: Regional Meteorological Centre, New Delhi

Temperature begins to rise rapidly from the end of February till June, which is the warmest month. The temperature remains high during July and August. With the onset of southwest monsoon by the end of June, the temperature begins to decrease gradually; however, the drop is rapid only after October. January is the coolest month. In association with the passage of western disturbances in the cold season, the tract experiences spells of cold weather when temperature often goes down several degrees below the freezing point. Snowfall occurs from October to May.

To assess local conditions, temperature and humidity were monitored from 27th April to 1st May, 2005 between 06:00 hours to 22:00 hours at five locations in the project area (Figure 4-15 and Table 4-10). The minimum temperatures occur during early morning and maximum is noticed at noon at all sites.

Figure 4-15: Meteorology and air sampling locations

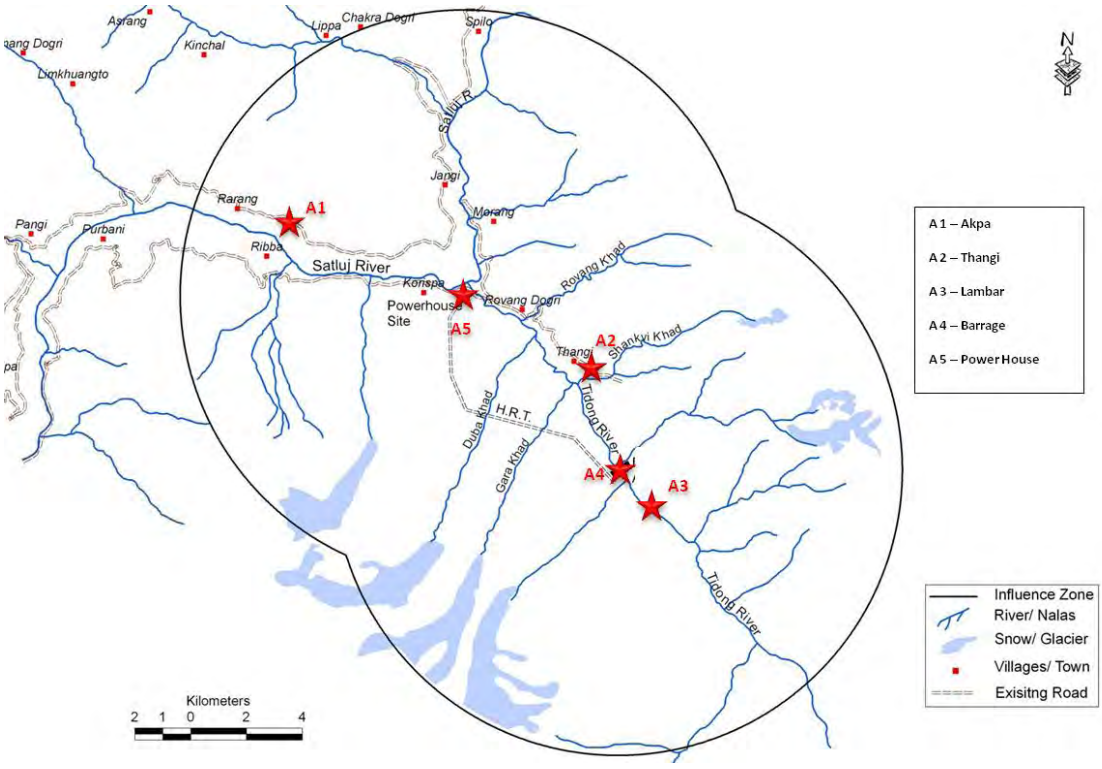


Table 4-10: Temperature and humidity observations (April/May 2005)

TIME	Akpa, A1		Thangi, A2		Lambar, A3		Barrage site, A4		Powerhouse, A4	
	Temp	Hum	Temp	Hum	Temp	Hum	Temp	Hum	Temp	Hum
hrs	°C	%	°C	%	°C	%	°C	%	°C	%
6:00	10	62	10	74	9	73	5	84	12	54
8:00	15	48	15	68	12	65	6	70	14	47
10:00	20	36	12	54	16	50	15	48	16	43
12:00	22	33	11	52	17	34	18	21	20	32
14:00	23	28	13	55	18	36	16	24	21	27
16:00	21	20	12	76	13	35	13	25	13	25
18:00	18	32	10	74	11	41	11	38	12	35
20:00	15	39	9	73	9	48	10	50	10	54
22:00	12	54	8	72	8	59	10	54	8	79

Source: *Field Study by RITES for EIA-2005*

4.4 Soil Environment

During September 2005, soil samples were collected from 8 locations as shown in Figure 4-16. The Soil Texture Classification of all the samples is represented in Figure 4-17. Test results of these samples are given in Table 4-11.

Figure 4-16: Soil sampling locations

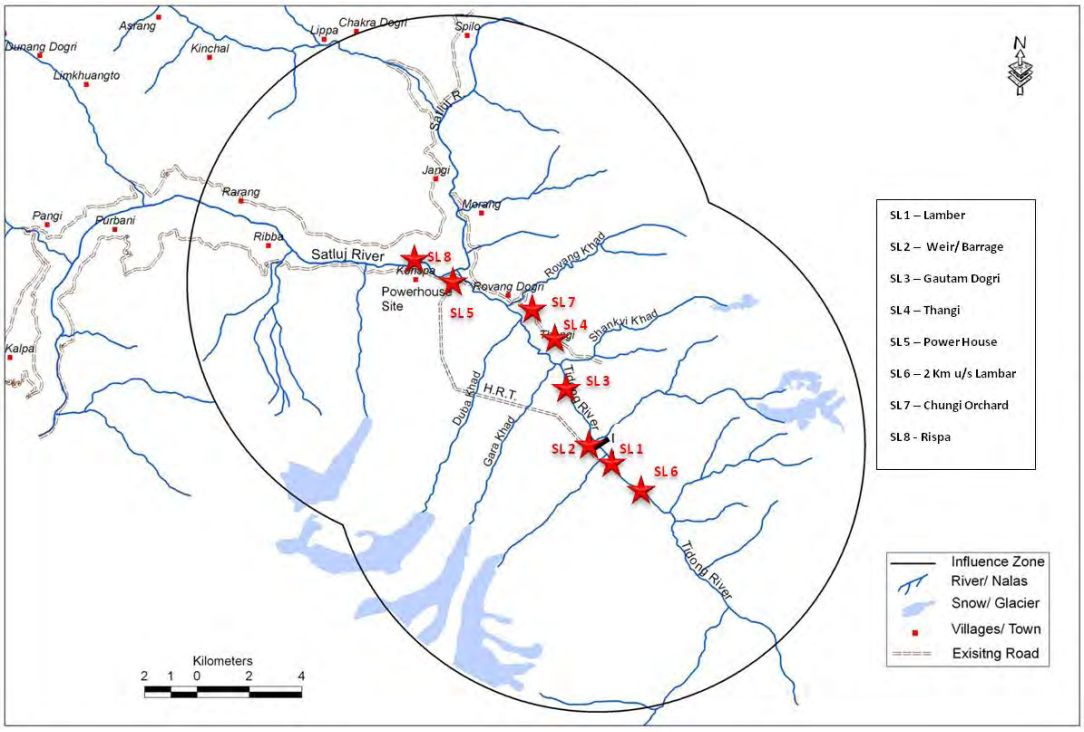
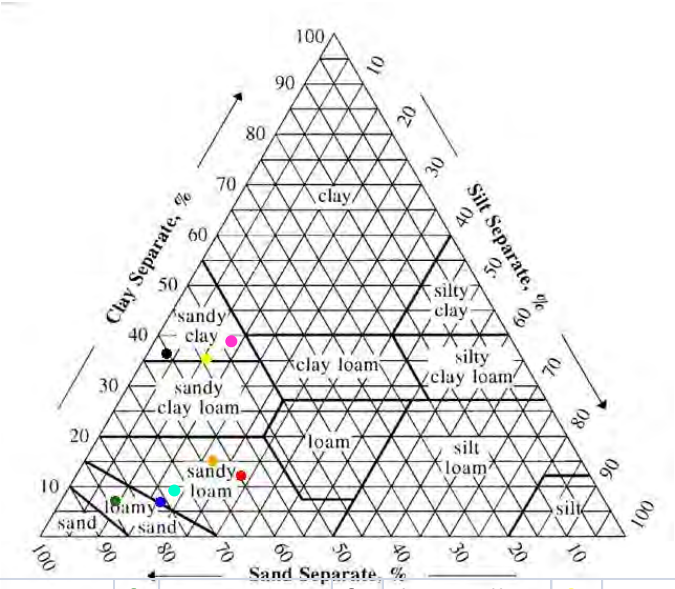


Figure 4-17: Soil texture classification



●	Lumber village	●	Weir site	●	Gautam Dogri	●	Thangi village	●	Powerhouse site
●	Two km upstream of Lumber village	●	Chungi Orchard	●	Rispa village				

Table 4-11: Physio-chemical characteristics of soil samples

S. No.	Location*/ Parameter	Unit	S1	S2	S3	S4	S5	S6	S7	S8
1	Texture									
i.	Clay Content	%	12.37	7.17	7.43	36.84	35.77	15.34	9.35	38.84
ii.	Sand Content	%	59.81	76.26	83.78	60.46	54.03	63.2	72.26	48.35
iii.	Silt Content	%	27.82	16.57	8.79	3.2	10.2	21.46	18.29	12.81
2	Bicarbonate (HCO3)	mg/kg	214.0	268.26	376.94	276.18	302.11	162	76	94
3	Calcium Content	meq/100 gm	11.37	16.26	24.33	8.72	3.39	85	165	255
4	Chloride Content	mg/kg	203.52	99.35	128.79	236.27	78.77	14	36	12
5	Conductance (1:2)	millimho/cm	0.21	0.38	0.263	0.122	0.13	0.19	0.51	0.22
6	Magnesium Content	meq/100gm	3.03	5.23	3.84	4.21	3.23	117	18.3	161
7	Moisture Content	%	18.45	31.61	18.75	13.56	0.27	13.95	10	10.82
8	Available Nitrogen content	kg/ hectare	6648.81	9394.08	11816	2905.42	813.94	5601.9	2913	3137
9	Total Organic Carbon	%	2.62	7.19	9.75	1.41	0.15	3.2	1.2	1.5
10	pH Value at 250C(1:2)	-	7.37	6.98	7.15	7.54	7.95	7.2	5.2	7.9
11	Ortho Phosphate content (P205)	kg/ hectare	1997.11	1125.04	2810.88	1768	2167.44	873.6	851.49	1254.8
12	Total Phosphorous (P205)	kg/ hectare	4600	4377.32	4304.67	4398.82	4596.41	291.3	291.3	403.3
13	Potassium Content	meq/100gm	0.98	22.88	0.57	0.57	0.64	5.6	6.7	4.6
14	Sodium Content	meq/100gm	0.61	6.91	0.89	0.78	0.87	7.4	5.7	7

*Location Code: 1 Lambar village; 2 Weir site; 3 Gautam Dogri; 4 Thangi village; 5 Powerhouse site; 6 Two km upstream of Lambar village; 7Chungi Orchard; 8 Rispa village

The soil sample analysis reveals that:

1. pH value of seven samples except the sample collected from Chungi Orchard varies from 6.98 to 7.95, which shows that the soil is slightly alkaline.
2. Sand content of the samples varies between 48% and 84% indicating that the soil in predominantly sandy.
3. NPK (Nitrogen, Phosphorus, and Potassium) contents of the samples indicate good fertility of soil;
4. Conductivity of soil is less than 2, which indicates poor salinity;
5. Calcium and Magnesium content of the samples is very less indicating the poor cation exchange capacity of soil.

4.5 Water Environment

Water environment covers both availability of water and its quality and suitability for human use. Both ground and surface water resources are examined in the region to give a holistic picture.

4.5.1 Water Availability

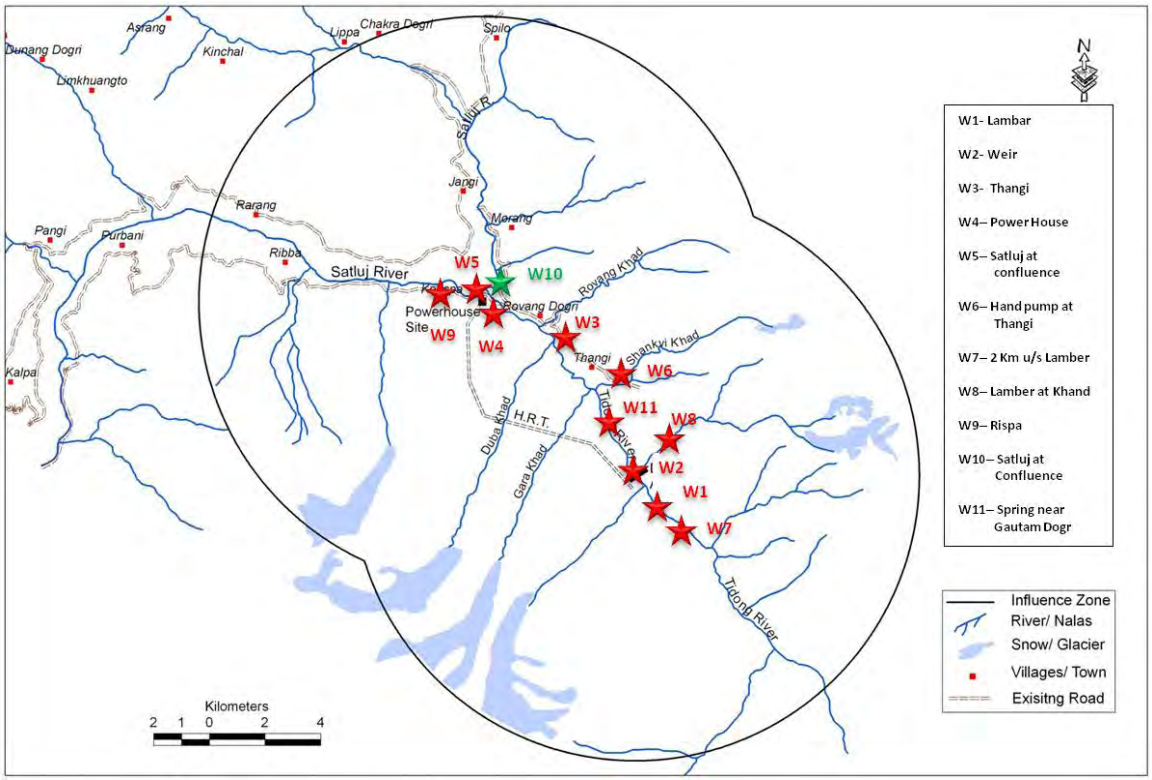
Himachal Pradesh State Electricity Board (HPSEB) has recorded the water flow in the Tidong Khad from the year 1995 to 2004 for designing of the project. The detailed Hydrology report is provided in the Annexure 4.1. The recorded data is given in the Annex-6.2 of the Hydrology report indicates that indicates the minimum discharge of 2.03 cumec in March 1997. The 15% of this works out to be 0.30 cumec. However, it is decided that minimum 0.50 cumec will be discharged which is more than the mandatory 15% of minimum flow.

4.5.2 Water Quality

In order to generate baseline data for existing quality of water in the project area and also to evaluate its suitability for drinking and other purposes, RITES collected water samples (composite) at eleven locations during 2005 (Figure 4-18) and analyzed it. Representative samples from river Sutlej were also taken at its confluence with Tidong at upstream and downstream points, considering its importance during project activities.

To establish the ground water quality, one sample each from Hand pump at Thangi village and a natural spring near Gautam Dogri was also collected. The results of the analysis carried out for the sampling are summarized in Table 4-12.

Figure 4-18: Water sampling locations



The results of water quality indicate that:

1. The water is almost neutral with pH varying from 7.0 to 7.4.
2. DO ranges from 7.4 to 8.2 mg/l indicating it to be rich in dissolved oxygen.
3. On the basis of CPCB Water Quality Criteria, it can be concluded that quality of all the samples fall under 'A' category of water with respect to pH, DO and BOD and total Coliform.

The analysis shows that the concentration of Chloride (Cl) in water taken from all the eleven locations ranged from 4 to 20 mg/l. The maximum concentration of Chloride was recorded near Weir. Similarly the concentration of Sulphate (SO_4) in the water varies from 18 to 100 mg/l with maximum value found in the sample taken from Sutlej at the downstream of confluence with Tidong.

4.5.3 Source of Pollution

No significant source of pollution (industrial), other than the domestic exists in the project area. The sewage from domestic sources is let out either on land or to nearby water bodies without any treatment. Since, the population density is low, the quantity of wastewater generated from domestic sources is less, and hence, no significant adverse impact on water quality is envisaged.

Table 4-12: Water analysis results

S.No.	Parameter	Unit	Results										Desirable Limit BIS 10500-1991	WHO Drinking Water Guidelines, 1993
			W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	
1	pH		7.0	7.2	7.0	7.0	7.0	7.0	7.3	7.2	7.4	7.2	7.1	6.5-8.5	-
2	Colour	Hazen Unit	<5	<5	<5	<5	<5	<5s	<5	<5	<5	<5	<5	5	-
3	Odour		Odourless	Odourless	Odourless	Odourless	Odourless	Odourless	Odourless	Odourless	Odourless	Odourless	Odourless	Unobjectionable	Unobjectionable
4	Dissolved Oxygen	mg/l	7.5	7.5	7.8	7.8	8.2	8.2	7.4	7.6	7.6	7.9	8	-	-
5	Total Harness as CaCO3	mg/l	144	296	320	280	400	272	197	163	111	146	128	300	-
6	Calcium Hardness	mg/l	88	192	192	208	208	192	68	67	48	83	98	75	-
7	Magnesium Hardness	mg/l	56	104	128	72	192	80	129	96	63	63	29	30	-
8	Chloride as Cl	mg/l	10	20	8	10	12	12	4	10	14	8	10	250	250
9	Fluoride as F	mg/l	0.5	0.5	0.75	0.75	1	0.75	0.75	0.75	0.75	1	0.75	1	1.5
10	Nitrate as NO3	mg/l	10	10	10	10	10	10	ND	0.1	1	3	1.9	45	50
11	Phosphate as PO4	mg/l	0.15	0.15	0.15	0.15	0.15	0.15	0.08	0.04	0.06	0.07	0.06	-	-
12	Arsenic (as As)	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01
13	BOD (5 days at 200C)	mg/l	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-
14	Cadmium (ad Cd)	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.003
15	Chromium (as Cr)	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.05
16	COD	mg/l	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	-	-
17	Coliforms	MPN/100ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	-
18	Copper (as Cu)	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	2
19	Cyanide (as Cn)	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.07
20	Lead (as Pb)	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.01
21	Manganese (as Mn)	mg/l	0.004	0.03	0.046	0.048	0.043	0.014	0.01	0.03	0.041	0.028	0.014	0.10	0.5
22	Mercury (as Hg)	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.001	0.001
23	Selenium (as Se)	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01
24	Sulphates (as SO4)	mg/l	21.32	62.47	60.97	63.67	100	56.76	68	49	18	18	82	200	500
25	Total Dissolved Solids	mg/l	89.19	210.57	219.42	208.36	317.1	205	212	192	154	224	232	500	-
26	Total Iron (as Fe)	mg/l	0.223	0.327	0.203	0.215	0.286	0.225	0.45	0.13	ND	ND	ND	0.3	-
27	Total Suspended Solids	mg/l	0.5	3.7	2.6	3.8	93.5	0.29	1.5	5.2	3.5	56.5	1.3	-	-
28	Zinc (as Zn)	mg/l	0.036	0.098	0.115	0.102	0.106	0.085	0.036	0.045	0.102	0.102	0.085	5	3

*Location Code: 1 Lambar village; 2 Weir site; 3 Thangi village; 4 Powerhouse site; 5 Satluj at Confluence d/s; 6 Hand pump at Thangi; 7 Two km u/s Lambar; 8 Lambar khad; 9 Rispa Village; 10 Satluj at Confluence u/s; 11 Spring near Gautam Dogri; Source: Field Study by RITES for EIA-2005

4.6 Air Quality

The existing ambient air quality of the study area serves as an index for assessing the pollution load and the assimilative capacity of any region and forms an important tool for planning further development in the area. The baseline serves to assess the conformity of existing air quality to standards and also to predict change that may occur during construction and operation of the project.

The ambient air quality monitoring within the study area was also carried out at five locations shown in Figure 4-15 (from 27th April to 1st May, 2005 between 06:00 hours to 22:00 hours) for five parameters namely, Suspended Particulate Matter (SPM), Respirable Suspended Particulate Matter (RSPM), Sulphur Dioxide (SO2), Nitrogen Oxide (NOx) and Carbon Monoxide (CO) in two shifts of 8 hourly monitoring (06-1400 hrs and 1400-2200 hrs). The average results of the air quality monitoring are given in Table 4-13.

Table 4-13: Air quality monitoring results

Location	Code	Shift	Average concentration in µg/m^3				
			SPM	RSPM	SO_2	NO_X	CO*
Akpa	A1	1	95.81	37.66	7.78	12.39	1.7
		2	47.2	12.07	<5	5.78	1
Thangi	A2	1	58.6	21.8	6.67	14.3	1
		2	24.1	10.1	<5	7.16	0.7
Lambar	A3	1	47.7	27.8	8.89	11.56	1.3
		2	30.4	16.9	<5	6.06	1
Barrage	A4	1	72.7	31.9	<5	4.95	0.33
		2	41.7	12.8	<5	3.3	ND
Power House	A5	1	87.1	37.9	10	24.2	0.7
		2	67	27.2	8.89	23.67	0.7

Source: Field Study by RITES for EIA-2005

** indicates concentration in ppm; Results in Italics red are min-max for the parameter*

SPM: The concentration of SPM in the ambient air recorded at the five locations ranged from 24.1 to 95.81 µg/m^3. The maximum concentration was found at Akpa.

RSPM: The concentration of RPM ranged from 10.1 to 37.9 µg/m^3 at the all locations. The maximum concentration of RPM was recorded at Power house site.

SO_2: The SO_2 concentration ranged from 8.89 to less than 5 µg/m^3 and Power house and Lambar village sites had maximum concentration.

NOx: *The NOx concentration ranged from 3.3 to 24.2 µg/m^3.*

CO: The concentration of CO recorded in the ambient air ranged from 0.33 to 1.7 ppm. However, the CO concentration could not be detected at Barrage site during second shift, indicating its values to be less than 0.1 ppm.

The results of ambient air quality monitoring which was undertaken in the previous EIA (by RITES) cannot be compared with the new National Ambient Air Quality Standards, 2009. Sampling period of 8 hours is not acceptable as per these guidelines. Hence, fresh monitoring data needs to be generated for ambient air quality. The details of suggested monitoring plan are given in Section 7.11 of this report.

4.7 Noise Environment

The ambient noise monitoring was conducted in the study area to assess the background noise levels at five locations where air monitoring was carried out (Figure 4-15) during daytime (08-10 hrs, 12-14 hrs and 16-18 hrs) and night time (20-22 hrs). The results of monitoring have been presented in terms of Leq, L90, L50, L10, Lmax, Lmin, Lday, Lnight and Ldn (Table 4-14).

Table 4-14: Noise measurements in project area in dB (A)

Time Period	Noise Level In dB (A)							
	Leq	L90	L50	L10	Lmax	Lmin	Lday/ Lnight	Ldn
Akpa								
8-10	62.79	61.81	62.7	63.56	63.67	61.5	63.87	65.1
12-14	63.88	62.95	63.63	64.73	65.03	62.7		
16-18	64.96	64.28	64.93	65.55	65.8	64		
20-22	58.79	57.89	58.63	59.57	59.87	57.73	58.79	
Thangi								
8-10	69.38	61.33	61.6	68.01	72.03	61.23	63.57	64.78
12-14	61.67	61.53	61.67	61.81	61.87	61.5		
16-18	59.66	59.05	59.67	60.16	60.33	58.77		
20-22	58.42	57.74	58.4	58.97	59.07	57.5	58.42	
Lambar								
8-10	61.17	60.65	61.27	61.53	61.6	60.37		

Time Period	Noise Level In dB (A)							
	Leq	L90	L50	L10	Lmax	Lmin	Lday/ Lnight	Ldn
12-14	61.36	61.04	61.33	61.65	61.73	60.93	61.29	63.12
16-18	61.34	60.77	61.4	61.76	61.8	60.57		
20-22	58.63	57.76	58.43	59.45	59.83	57.6	58.63	
Barrage								
8-10	67.78	67.41	67.67	68.19	68.5	67.37	67.78	70.1
12-14	67.54	67.31	67.57	67.73	67.77	67.2		
16-18	68.02	67.62	68.03	68.38	68.43	67.57		
20-22	67.07	66.71	67	67.45	67.6	66.67	67.07	
Power House (Rispa)								
8-10	48	42.53	44.93	50.18	52.7	42.1	48.51	49.11
12-14	51.76	46.75	49.1	54.09	55.07	46.23		
16-18	45.77	42.83	45.93	47.43	48.2	42.47		
20-22	40.92	38.69	40.37	42.41	43.2	38.1	40.92	

Source: Field Study by RITES for EIA-2005

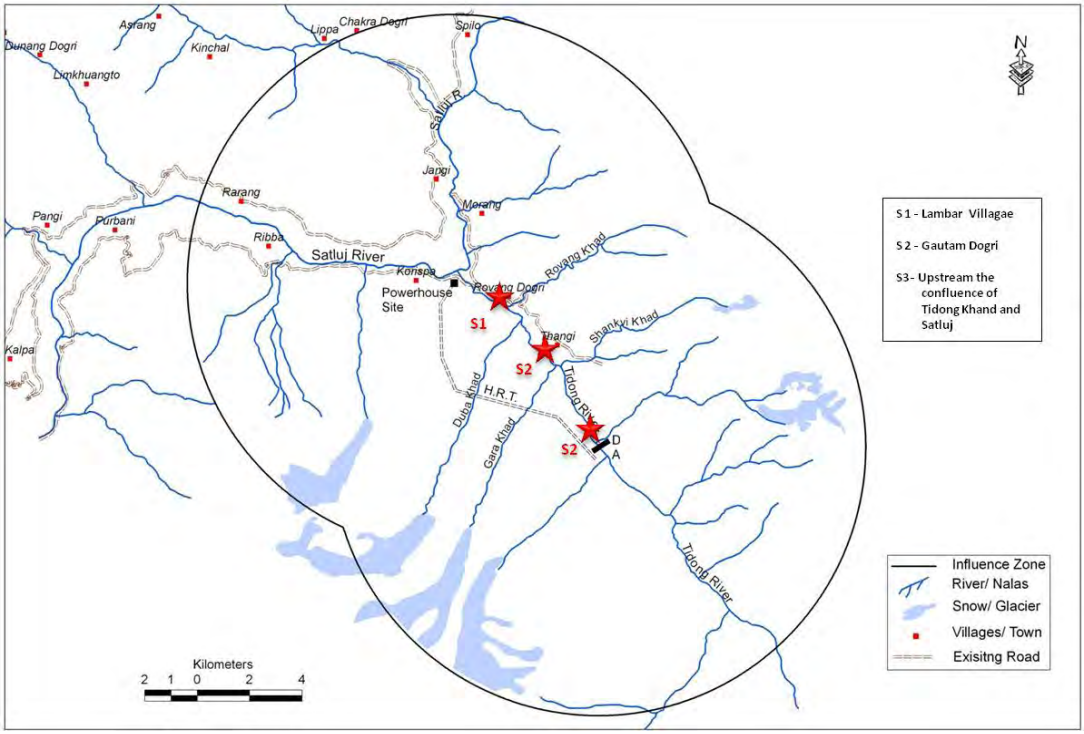
The average day and night noise level (Ldn) for the study area ranges from 49.11 to 70.10dB (A). The day time (Lday) noise levels ranged from 48.51 to 67.78 dB (A) and night time (Lnight) noise levels ranged from 40.92 to 67.07 dB (A). The comparison of these results with the ambient noise standards shows that both day and night time values are exceeding prescribed standard of 55 dB (A) at all locations except at Powerhouse location near Rispa village. The main source of noise in the project area is the sound caused by river flow. Occasionally, there are vehicular movements at Akpa, Thangi and Powerhouse site, which could also contribute to the noise levels.

4.8 Ecological Environment

An ecological study is essential to understand the impact on the existing flora and fauna of the area due to project development activities. Thus, a detailed study was taken up during 2005, where three sampling sites i.e. S_1, S_2 and S_3 (Figure 4-19) were identified to provide reasonable spatial coverage of the project affected area.

Later, in order to update the data on ecological status, AECOM undertook fresh survey during March, 2005. Additional survey on aquatic ecology was also carried out very recently (October, 2012) by AECOM to assess current situation with respect to the availability of fish species in the area. This section thus includes observation from all three surveys carried out during 2005, 2011 and 2012.

Figure 4-19: Ecological sampling locations



The sampling site S_1 was identified near Lambar village on Tidong Khad (2,860 m above mean Sea Level, msl. just above the barrage site in the submergence area, while the S_2 site was identified near Gautam Dogri (2,600 m above msl), 2 km downstream of S_1. The sampling site S_3 was identified near Rispa village, 200 m upstream of confluence of Tidong Khad and Satluj (2,260 m above msl), which is also close to the powerhouse and dumping grounds of the excavated material.

4.8.1 Terrestrial Ecology

Floral Biodiversity

The state of Himachal Pradesh has about 66% of its geographical area under forests, out of which 26.35 is under tree cover. Total forest area in Kinnaur district is close to 80% but tree cover is limited to a little more than 9 % (Table 4-15), as most of the area in Kinnaur is inaccessible and above tree limit.

However, the project site lies in the altitude range of 2,260 m and 2,860 m above msl and shows good floral biodiversity. Hence a detailed terrestrial ecosystem study was carried out.

Table 4-15: Classified description of forest cover in Himachal Pradesh and Kinnaur (in sq km)

District	Geographical Area	Forest Area	Tree covered area				% of Geog. Area
			Very dense forest	Moderate dense forest	Open forest	Total forest cover	
Himachal Pradesh	55,673	37,033	3,224	6,383	5,061	14,668	26.35
Kinnaur	6401	5093	82	263	257	602	9.40

Source: Forest Department, Himachal Pradesh; As per Forest Survey of India Report - 2009

For the purposes of sampling to assess ecological status of the project area, the quadrant method was used for sampling of the vegetation. A total of twenty five (25) random quadrants of 10m x 10m size were laid to study the trees and shrubs, and twenty five (25) random quadrants of 1m x 1m size were marked to study the herbaceous component at each sampling site.

During the survey, number of plants of different species in each quadrant were counted and identified. Based on the quadrate data, frequency, density and cover (basal area) of each species were calculated. The importance value index (IVI) for different species of trees, herbs and shrubs were determined based on the relative density, relative frequency and relative cover value.

Species diversity indices (Shannon Weiner Index) of general diversity ($\overline{H}$) was computed using the following Shannor Weiner Diversity Index. It is a measure of environmental quality and indicates the well being of any ecosystem

Shannon Weiner Diversity Index ($\overline{H}$) = $-\sum_{i=1}^{s}\left(\frac{n_i}{N}\right)\log_2\left(\frac{n_i}{N}\right)$

Where, $\overline{H}$ = Shannon Wiener index of diversity;

ni = total number of individuals of a species; and

N= total number of individuals of all species.

The height of individual tree was estimated using Abney level/ Binocular and the Diameter at Breast Height (DBH) of all trees having height more than 8m was measured. The volume of wood for trees was estimated using the data on DBH (measured at 1.5 m above the ground level) and height, using the formula: $\pi r^2 h$, where r is the radius and h is the estimated height of the bole of the tree.

During the vegetation survey, herbarium was prepared for those plants, which had flowers. The Red Data Book of India and other available literature, floral herbaria pertaining to the rare/ endangered species were considered to identify the endemic, rare and other threatened categories of plants.
The major forest type of the project area is a temperate mixed evergreen forest. A total number of 94 plant species were recorded during the floristic survey in the project area. Plant diversity of the project area encompasses 20 species of trees, 30 species of shrubs and 30 species of herbs including 6 species of climbers and 8 species of grasses. An inventory of plant species, their local names, ecological status and economic values is presented in Table 4-16.

Sampling Site S_1 (Barrage/Submergence Area)

The sampling site S_1 is near the barrage site (2,860m above msl). The right bank of the Tidong Khad is dominated by the tree species of *Cedrus deodara*, *Prunus armeniaca* and *Pinus wallichiana*. A deforestation of the magnitude of 10-15% was also noticed in this area.

The possible reason seems to be easy accessibility of the site. The higher reaches of the right bank is having steep slopes and do not support any vegetation. The left bank side of the Tidong Khad is not easily accessible and has an undisturbed mixed forest. The floral composition of the left bank side includes the trees of *Cedrus deodara, Betula utilis, Pinus gerardiana, Pinus wallachiana* and *Prunus armeniaca*. The submergence area at the left bank side of Tidong Khad has mostly young trees. However, the higher reaches of left bank side have old trees of *Cedrus deodara* and *Pinus gerardiana*.

The frequency, density, abundance, basal area and IVI of the trees, herbs and shrubs at S1 are presented in Table 4-17. A perusal of the data on the ecological analysis revealed that the most dominant tree species were *Cedrus deodara* (IVI: 95.66), *Prunus armeniaca* (IVI 71.02) and *Pinus gerardiana* (IVI: 63.91). The shrubs were dominantly represented by the species of *Artemisia* (IVI: 34.80, 42.28 and 46.67) followed by *Rosa sericea* (IVI 45.89). The dominant herbs were the species of *Anaphalis* (IVI: 43.40 and 51.37) and *Anisomeles indica* (IVI: 34.28).

Diversity indices of sampling site S_1 were computed to be 2.121 for trees, 2.979 for shrubs and 3.17 for herbs. The values for all the three components of plants indicate a good environmental quality of the ecosystem at dam site.

Diversity indices of sampling site S_1 were computed to be 2.121 for trees, 2.979 for shrubs and 3.17 for herbs. The values for all the three components of plants indicate a good environmental quality of the ecosystem at dam site.

Table 4-16: Plant diversity

S. NO	BOTANICAL NAME	VERNACULAR NAME	STATUS	ECONOMIC IMPORTANCE
		Trees		
1.	*Alnus nitida* D. Don	Kosh, Kunish, Nyun	Common	Nitrogen fixing, soil binder
2.	*Betula utilis* D. Don	Bhojpatra, Pad	Common	Bark used as paper for writing religious texts, regarded as sacred
3.	*Cedrus deodara* Roxb.	Diar, Kialmang, Kelo	Common	Timber
4.	*Celtis australis*		Common	Fodder
5.	*Cupressus sempervirens*	Saru	Common	Timber
6.	*Ficus benjamina* Linn.	Dhudhi, Beduli	Common	Fodder
7.	*Juglans regia* Linn.	Khor, Akhrot	Common	Timber, dye and medicine
8.	*Juniperus indica* Linn.		Common	
9.	*Juniperus macropod* Linn.	Guggal, Dhup, Shur	Common	
10.	*Juniperus squamata* Linn.		Common	
11.	*Pinus gerardiana*	Chilgoza, Rai	Rare	Timber, fruits edible, medicine
12.	*Pinus wallichiana* A.B. Jackson	Kail	Common	Timber, fruits edible, medicine
13.	*Prunus armeniaca*	Chuli, Chul	Common	Edible and medicine
14.	*Prunus comuta*	Jamnoi	Common	Timber, leaves for fodder, fruits edible
15.	*Prunus persica*	Aaru	Common	Fruits edible, seed yield edible oil, leaves and bark used to relieve cough and cold
16.	*Pyrus malus*	Seb, Seo	Common	Fruits edible
17.	*Salix tetrasperma*	Bena, Shon	Common	Timber, agricultural implements, cabinet making, Cricket bat
18.	*Swida macrophylla*	Khagsi/Khagsa	Common	Fodder
19.	*Trema politoria*	Jivan	Common	Fodder, fiber, fuel and charcoal
20.	*Trewia spp*	Tumri	Common	Soft whitish wood used for making drums
		Shrubs		
1.	*Artemisia grrelinii*	Kunja	Common	Essential oil and medicinal
2.	*Artemisia maritima*	Seski, Buer	Common	Essential oil and medicinal
3.	*Artemisia strata*	Seski, Buer	Common	Essential oil and medicinal
4.	*Artemisia vestita*	Seski, Buer	Common	Essential oil and medicinal
5.	*Artemisia vulgaris*	Seski, Buer	Rare	Essential oil and medicinal
6.	*Astragalus chlorostachys*		Rare	Pods edible, fodder, medicinal
7.	*Astragulus amherstianus*		Common	
8.	*Berberis aristata*	Kashmal Khepacho	Rare	Medicinal
9.	*Berberis lyceum*	Kashmol, Chutrum	Rare	Medicinal
10	*Coriaria nepalensis*	Masroi, Lit Zaklo	Common	
11.	*Cotoneaster acuminate*	Chum Raonsh, Banang	Common	
12.	*Desmodium dichotomum*	Safed Kathi	Rare	
13.	*Gaultheria nummularioides*	Bhwimla	Common	Fruits edible
14.	*Hypericum choisianum*	Phulya	Rare	Fodder and medicinal
15.	*Hypericum lysimachioides* syn. *H. dyeri*		Rare	
16.	*Indigofera hochstetteri*	Kathi, Kanthi	Common	
17.	*Inula cappa*	Athhu	Common	Medicinal
18.	*Inula grandiflora*	-	Common	
19.	*Olea ferruginea*	Bair Bainj	Rare	Medicinal, agricultural implements, fodder
20.	*Persicaria polystachya*	Ama-haldu	Common	Occasionally used as vegetable, leaves used in laceration
21.	*Prinsepia utilis*	Bhekal	Common	Edible oil, medicinal
22.	*Reinwardtia indica*	Phiunli, Basanti	Common	Petals chewed as tongue cleaner, considered sacred
23.	*Rhamnus purpureus*	Gaunta, Luish	Common	Wood for agricultural implements
24.	*Rhamnus virgatus*	Chentuli,Choundalu	Common	Medicinal and fuel
25.	*Rosa sericea*	Dharkunja	Rare	Fruits edible, medicinal
26.	*Rubus biflorus*	Anchu	Common	Fruits edible and roots medicinal
27.	*Salix hastate*	Buins	Rare	
28.	*Smilax vaginata*	Peepal satta	Common	
29.	*Sorbaria tomentosa*	Bhiloka	Common	Medicinal
30.	*Zanthoxylum alatum*	Tirmira, Timri	Threatened	Medicinal

S. NO	BOTANICAL NAME	VERNACULAR NAME	STATUS	ECONOMIC IMPORTANCE
		Herbs		
1.	*Aconitum spp*	Patish , Dhoop	Rare	Medicinal
2.	*Anaphalis adnata*	Bugla	Common	Paste of leaves applied on cuts, wounds and boils
3.	*Anaphalis busua*	Bugla	Common	Leaves juice applied on bruises, cuts and wounds
4.	*Angelica glauca*	Chora	Rare	Roots yield an essential oil
5.	*Anisomeles indica*	Gobara	Common	Medicinal
6.	*Bidens spp.*		Common	
7.	*Blumia hieraciifolia*	Kakranda	Common	
8.	*Carpesium neplense*		Common	
9.	*Chenopodium opulifolium*		Common	Medicinal
10.	*Circium verutum*	Kardra	Common	Root juice taken in constipation and dyspepsia
11.	*Gentiana kuroo*	Karu, Kore	Common	
12.	*Gnaphalium hypoleuceum*	Buglu, Bugla	Common	Plant extract used in cuts and wounds
13.	*Heracleum canescens*	Kakrya, Arva	Common	Root paste applied on eczema and ring worm
14.	*Holiotropium strigosum*	Phulya, Basanti	Rare	Leaf powder used in tertiary fever
15.	*Impatiens thomsoni*	Ghad-chaul	Common	
16.	*Melilotus indica*	Ban Mathi	Common	Fodder, roasted seeds given in diarrhea and dysentery
17.	*Mentha longifolia*	Paudina	Common	Leaves used as flavoring and refrigerant, medicinally used in vomiting and indigestion
18.	*Nepeta graciliflora*	Uprya ghas	Common	Medicinal
19.	*Nepeta laevigata*	Uprya ghas	Common	Medicinal
20.	*Nepeta leucophylla*	Karda	Common	Leaves given in malarial fever
21.	*Plantago depressa*	Luhrya	Rare	Paste from leaves and seeds applied on cuts, wounds and piles
22.	*Pluchea lanceolata*		Common	
23.	*Podohyllum emodi* syn *P. hexandrum*	Ban kakri	Rare	Medicinal
24.	*Polygonatum multiflorum*	Khaul	Common	Medicinal
25.	*Potentilla atrosanguinea*		Common	
26.	*Ranunculus sceleratus*		Common	
27.	*Thalictrum javanicum*	Mamiri	Threatened	Medicinal
28.	*Urtica dioica*	Kandali	Common	Stem yields fibre, fodder, vegetable, medicinal in sciatica, rheumatism *etc.*
29.	*Vicoa indica* syn *Pentanema indicum*		Common	
30.	*Viola biflora*	Vanafsa	Common	Medicinal
		Climbers		
1.	*Clematis barbellata*, Edgew	Belkangu, Chabru, Wantah	Common	Stem used for coarse ropes, decoction of leaves used in scabies
2.	*Clemetis connata*,DC.Prodr.	Garol	Common	Leaves as fodder
3.	*Clemetis grata* Wallich.	Garol, Wantah	Common	Fodder
4.	*Cuscuta reflexa*		Common	Medicinal
5.	*Dioscorea deltoides*	Kunj Calendi, Singlimingli, Baniatakari, Gaithi	Common	Tubers edible and medicinal
6.	*Rosa macrophylla*	Pahari gulab, Kunja, Benyal	Common	Fruits edible, flowers paste applied on skin
		Grasses		
1.	*Andropogon ischaemum*			Fodder
2.	*Arundinaria falcata*	Ringal, Nirgal, Poo	Common	Widely used for mats and baskets, leaves as fodder
3.	*Arundinella setosa*	Ringal	Common	Used for brooms
4.	*Cymbopogon spp*		Common	Medicinal
5.	*Festuca gigantea*		Common	Ropes made from the leaves, also fodder
6.	*Poa pratensis*	-	Common	Fodder
7.	*Pogonatherum saccharoideum*	-	Common	Fodder
8.	*Tripogon filiformis*	-	Common	Fodder

Table 4-17: Ecological field study results for site S1

PLANTS	FREQUENCY (%)	DENSITY (IND.HA^{-1})	ABUNDANCE	BASAL AREA (HA)	IVI	DIVERSITY INDEX (SHANNON WEINER)
TREES						
Prunus armeniaca	68	132	1.94	1.527	71.02	0.53
Pinus girardiana	64	116	1.81	1.295	63.91	0.52
Pinus wallichiana	20	40	2.00	1.790	29.83	0.33
Cedrus deodara	64	92	1.44	7.127	95.66	0.48
Betula utilis	20	28	1.40	3.758	39.59	0.27
Total		**408**				**2.121**
SHRUBS						
Artemisia grrelinii	60	256	1.07	0.157	42.28	0.32
Artemisia maritima	68	400	1.47	0.135	46.67	0.41
Artemisia vulgaris	68	320	1.18	0.065	34.80	0.37
Inula cappa	48	256	1.33	0.100	32.58	0.32
Inula grandiflora	56	368	1.64	0.039	30.78	0.39
Persicaria polystachya	56	352	1.57	0.038	30.05	0.39
Rosa sericea	52	304	1.46	0.185	45.89	0.36
Rubus biflorus	56	416	1.86	0.074	36.94	0.42
Total		**2672**				**2.979**
Herbs						
Anaphalis adnata	68	9600	1.41	0.196	43.40	0.37
Anaphalis busua	56	8000	1.43	0.332	51.37	0.34
Anisomeles indica	68	9600	1.41	0.096	34.28	0.37
Bidens spp	64	8000	1.25	0.049	27.14	0.34
Blumia hieraciifolia	56	8800	1.57	0.107	31.96	0.36
Imapatiens thomsoni	64	8000	1.25	0.091	30.94	0.34
Nepeta graciliflora	44	8800	2.00	0.096	28.63	0.36
Nepeta laevigata	48	8000	1.67	0.080	26.92	0.34
Nepeta leucophylla	52	8400	1.62	0.049	25.35	0.35
Total		**77200**				**3.172**

Sampling Site S2 (close to Gautam Dogri)

The sampling site S_2 is 2 Km downstream to S_1 and close to a place named Gautam Dogri. The left bank of the site has a good forest cover of *Pinus gerardiana* and *Cedrus deodara*. However, the right bank side has no forest cover except some scattered trees, shrub and herb species.

The frequency, density, abundance, basal area and IVI of the trees, herbs and shrubs at S2 have been presented in Table 4-18. The dominated tree species are *Pinus gerardiana* (IVI: 125.98) and *Cedrus deodara* (IVI: 117.81), whereas *Artemisia* (IVI: 38.19, 39.39 and 45.88), *Rubus biflorus* (IVI 58.34) and *Persicaria polystachya* (IVI: 45.88) are common shrubs. The herbs were dominantly represented by the species of *Nepeta* (IVI: 33.08, 35.50 and 39.09) and the species of *Anaphalis* (IVI: 36.25 and 37.56).

Diversity index of sampling site S_2 was found to be 1.458 for trees. This indicates that the S_2 is not very rich in terms of biodiversity.

Table 4-18: Ecological field study results for site S2

Plants	Frequency (%)	Density (ind.ha^{-1})	Abundance	Basal area (ha)	IVI	Diversity index (Shannon Wiener)
Trees						
Pinus girardiana	72	108	1.5	8.627	125.98	0.52
Pinus wallichiana	32	36	1.125	5.012	56.19	0.41
Cedrus deodara	64	96	1.5	8.989	117.81	0.53
Total		**240**				**1.458**
Shrubs						
Artemisia grrelini	48	304	1.58	0.100	45.88	0.41
Artemisia maritima	44	208	1.18	0.097	39.39	0.33
Artemisia vulgaris	52	320	1.54	0.039	38.19	0.42
Inula cappa	40	272	1.70	0.071	37.08	0.39
Inula grandiflora	44	304	1.73	0.041	35.25	0.41
Persicaria polystachya	48	304	1.58	0.100	45.88	0.41
Rubus biflorus	40	352	2.20	0.180	58.34	0.44
		2064				**2.792**
Herbs						
Anaphalis adnata	56	9200	1.64	0.264	37.26	0.37
Anaphalis busua	48	6400	1.33	0.352	36.25	0.30
Bidens spp	36	7200	2.00	0.159	25.09	0.32
Blumia hieraciifolia	68	11200	1.65	0.246	41.58	0.41
Imapatiens thomsoni	48	6800	1.42	0.181	28.26	0.31
Nepeta graciliflora	52	9200	1.77	0.246	35.50	0.37
Nepeta laevigata	56	8800	1.57	0.312	39.09	0.36
Nepeta leucophylla	56	10000	1.79	0.159	33.08	0.38
Ranunculus sceleratus	40	8000	2.00	0.096	23.88	0.34
Total		**76800**				**3.152**

Sampling Site S3 (near the proposed site of Power House)

The sampling site S_3 is located near the proposed site of Power House, which is represented by three types of habitats. The one habitat was dominated by a dense and old forest of *Pinus gerardiana* and *Cedrus deodara*. This forest is located on a high slope of the left bank side of Tidong Khad, which is above the HRT. Most of the tree species are very old and their girth ranged from 3-7m. This area is very close to Rispa village, which is famous for Chilgoza (*Pinus gerardiana*) forest and the cultivation of apple. Another habitat is the dumping ground in riparian zone of Tidong Khad, which is represented by few shrubs and herbs species. The third type of habitat is the site where plantation of *Alnus nitida* has been done in the riparian zone of Left Bank of the river. The entire plantation is not more than 4-5 years old.

The frequency, density, abundance, basal area and IVI of the trees, herbs and shrubs at S_3 have been presented in Table 4-19. *Pinus gerardiana* (IVI: 139.82) and *Cedrus deodara* (IVI: 108.09) are common tree species. The shrubs at the sampling site S_3 were dominated by the four species of *Artemisia* (IVI: 38.74, 40.30, 41.02 and 41.22) and three species of *Nepeta* (IVI: 27.99, 28.54 and 30.00).

Table 4-19: Ecological field study results for site S3

PLANTS	FREQUENCY (%)	DENSITY (IND.HA^{-1})	ABUNDANCE	BASAL AREA (HA)	IVI	DIVERSITY INDEX (SHANNON WIENER)
Trees						
Alnus spp.	30	105	3.50	8.089	52.10	0.50
Pinus girardiana	60	225	3.75	72.800	139.82	0.48
Cedrus deodara	45	85	1.89	96.000	108.09	0.47
		415				**1.449**
Shrubs						
Artemisiamaritima	56	368	1.64	1.200	40.30	0.39
Artemisia strata	64	304	1.19	1.320	41.22	0.35
Artemisia vestita	52	400	1.92	1.240	41.02	0.40
Artemisia vulgaris	60	416	1.73	0.840	38.74	0.41
Berberis aristata	52	336	1.62	1.480	41.51	0.37
Hypericum choisianum	48	272	1.42	0.840	30.75	0.33
Persicaria polystachya	48	336	1.75	0.840	33.08	0.37
Rhamnus purpureus	56	320	1.43	0.760	33.39	0.36
		2752				**2.988**
Herbs						
Anaphalis adnata	48	8000	1.67	0.332	36.44	0.35
Anaphalis busua	60	9200	1.53	0.159	32.62	0.37
Bidens spp.	44	6400	1.45	0.332	33.42	0.31
Blumia hieracifolia	56	8000	1.43	0.173	30.81	0.35
Chenopodium opulifolium	44	6800	1.55	0.246	30.00	0.32
Nepeta graciliflora	52	8800	1.69	0.119	28.54	0.37
Nepeta laevigata	44	6800	1.55	0.246	30.00	0.32
Nepeta leucophylla	40	8000	2.00	0.186	27.99	0.35
Polygonatum multiflorum	44	6400	1.46	0.314	32.58	0.31
Tripogon filiformis	36	5600	14.32	0.051	17.61	0.28
Total		**74000**				**3.306**

Diversity indices of sampling site S_3 were found to be 1.449 for trees, 2.988 for shrubs and 3.05 for herbs. The values for all the three components of plants indicate good ecological health of the site S_3. However, it does not show rich tree diversity.

Faunal Biodiversity

Mammals

The catchment area of Tidong Hydropower project is inhabited by more than 13 species of mammals which together constitute around 8 families (Table 4-20). Most of the species are restricted to the high altitudes of Himalayas. The region is an important ecological niche because it harbors some of the threatened and rare mammalian species. As per the IUCN criterion (2010.3), two endangered and one vulnerable species while as per the National Red Data Book (NDB) the region is inhabited by 4 vulnerable and 3 endangered species. A total of 8 species are categorized as Scheduled I of Wildlife (Protection) Act (1972) in the catchment and Study area.

During the EIA study conducted in 2005, pugmarks of Snow leopard (*Panthera uncia*) were noticed in the area and photographed during the ecological survey. The Snow Leopard is listed as endangered on the IUCN-World Conservation Union's Red List of the Threatened Species. Snow Leopards are found at high elevations with snow covered peaks and rocky outcrops. These animals often follow the snow line and during heavy snow fall they come to lower altitudes for the search of pray. The adjoining areas of the project may be one of the peripheral habitats for the Snow Leopard

but it is very unlikely to be a typical habitat. Thus, it appears that the pugmark might be of some stray cat, who may not be a regular resident of the area. During the interactions with the villagers and forest officers it was mentioned that they have never seen the animal. AECOM undertook consultations with forest and wildlife officials as part of updation of the report to understand the habitat of snow leopards and its probable occurrence in the adjoining areas of the project site. It was concluded, after discussions with the forest officials that the project area is not the primary habitat of the animal. However, stray incidents of animal wandering into the areas close by were reported in past during heavy winters when the snow line descends to lower altitude. No reporting of the animal is observed in the past five years.

Table 4-20: Mammalian fauna and their conservation Status in the study area and catchment area

S.No.	Zoological Name	English name	Conservation Status		
			IUCN 2010	NRD 1994	WPA 1972
Felidae					
1	Panthera unica	Snow leopard	EN	VU	I
2	Panthera pardus	Common leopard	NT	VU	I
Canidae					
3	Canis aureus	Jackal	LC	-	II
4	Vulpes vulpes	Red Fox	LC	-	II
Ursidae					
5	Ursus thibetanus	Himalayan black bear	VU	-	I
6	Ursus arctos	Brown Bear	LC	EN	I
		Herpistidae			
7	Herpestes edwardsii	Mongoose	LC	-	IV
Mustellidae					
8	Mustela sibirica	Himalayan Weasal	LC	-	II
Bovidae					
9	Pseudois nayaur nayaur	Blue sheep	LC	VU	I
10	Naemorhedus goral	Goral	NT	-	III
11	Capricornis sumatraensis	Serow	LC	VU	I
12	Hemitragus jemlhicus	Himalayan tahr	NT	EN	I
Moschidae					
13	Moschus chrysogaster	Musk deer	EN	EN	I
Ochotonidae					
14	Ochotona roylei	Royal's Pika	LC	-	IV

LC: Least Concern, VU: Vulnerable; NT: Near Threatened; EN: Endangered;

Tidong area is also reported to be the habitat of two other endangered species namely Musk Deer and Himalayan Brown and Black Bear. However, during the EIA study period, neither Musk Deer nor Bear were sighted. During the interaction with the villagers, they mentioned that musk deer was found in earlier times but none of them saw them recently. Similarly, villagers reported that both Brown and Back Bear are common in Sangla area but never seen in the Tidong valley.

Reptiles

A Himalayan pit viper (*Ancistrodon himalayanus*), a highly poisonous snake was spotted between the boulders during the site visit conducted in September 2005, other than common lizard (*Agama tuberculata)* in the area (Figure 4-20).

Figure 4-20: Himalayan Pit Viper (left) and Common Lizard (right)

Avifauna

The catchment area of Tidong HEP harbours nearly 40 species of birds comprising of Kite, Vulture, Chukor Partridge, Tragopan, Monal, Pigeons, Parakeet, Owl, Hoopoe, Woodpeckers, Martin, Swallow, Shrike, Magpie, Cough, Crow, Bulbuls, Flycatcher, Redstart, Chat, Thrushes, Tits, Wagtails, Sparrows, Finches, buntings, etc.

During the field survey a total of 17 species of birds were recorded from the study area and catchment area (Table 4-21). Majority of the species were widespread resident, followed by summer visitors. Red-billed Cough, Rock Pigeon, White-cheeked Bulbul, Blue Whistling Thrush and House Sparrow were most common and abundant species. None of the species was migratory, endemic, threatened and Scheduled I. All species are commonly distributed in Himalaya.

Table 4-21: List of avifauna

S.No.	Scientific Name	Common name	Habit
1	*Alectoris chukar*	Chukar Partridge	R
2	*Columba leuconota*	Himalayan Snow Pigeon	R
3	*Columba livia*	Rock Pigeon	R/SM
4	*Upupa epops*	Hoopoe	SV
5	*Hirundo smithii*	Swallow	SV
6	*Lanius schah*	Rufous back shrike	SV
7	*Pica pica*	Black-billed Magpie	R
8	*Pyrrhocorax Pyrrhocorax*	Red-billed Cough	R
9	*Corvus macrorhynchus*	Jungle Crow	R
10	*Pycnonotus leucogenys*	White-cheeked Bulbul	R
11	*Pycnonotus cafer*	Redvented Bulbul	R
12	*Rhyacornis fuliginosus*	Plumbeous Redstart	R/SM
13	*Myiophonus caeruleus*	Blue Whistling Thrush	R
14	*Parus monticolus*	Green-backed Tit	R
15	*Motacilla cinerea*	Grey Wagtail	R
16	*Passer domesticus*	House Sparrow	R
17	*Emberiza schoeniclus*	Rock Bunting	R

R = Resident, SV = Seasonal Visitor, SM Seasonal Migrant

4.8.2 Aquatic Ecology

The aquatic analysis of Tidong Khad was conducted by RITES for one season at all the three sampling sites (S1, S2 and S3) during the month of September 2005.

Aquatic ecological analysis of Tidong Khad was made following the methods outlined in Wetzel and Likens (1991) and APHA (1998). Periphytons were collected using a timed scrapping technique following Ward (1974) with the help of a sharp knife for each replicate sample. The upper surfaces of at least cobble sized rocks were scrapped using a five-minute period. For enumeration of plankton population, bulk water samples were collected in polythene jars. For obtaining, net plankton from the water sample, 150 ml of bulk water was filtered through a 50 µm net and was centrifuged at 1500 rpm for 10-minute period. The sediment of the centrifuge tubes was used for enumeration of zooplankton population. A plankton chamber of 0.5 ml capacity was used for counting of plankton under the Inverted Compound Microscope. The total number of planktons present in a litre of water sample was calculated using the following formula:

Number of plankton (units l^{-1}) = $\frac{\text{Number of plankters in 0.5 ml aliquot x 0.5 x 1000}}{\text{Volume of sediment concentrate x Volume of water centrifuged}}$

Productivity of periphyton-phytoplankton of Tidong Khad was determined by the 1.93 litre molded Polysterene Chamber Method in situ measurement of the rate of primary production. Three replicates were maintained for each sampling site. The experimental chamber was kept for 4 hrs under incubation in the Tidong Khad. The modified Winkler's method was used for determination of oxygen in the light and dark chambers. The calculation of primary production of phytoplankton-periphyton was made following the methods outlined in Strickland and Parsons (1960) and Benton and Werner Jr. (1972).

Respiration (R) = O2 consumed = O2 at start (-) O2 at end in dark chamber

Gross Primary Productivity (Pg) = O2 contents of light chamber (-) O2 contents of dark chamber

Net Primary Productivity (Pn) = Pg (-) R

Macrozoobenthos colonizing the substrate were collected with the help of the Surber Sampler (0.50 mm mesh net) and by hand picking from stones. Quantitative estimation of macrozoobenthos was based on numerical counting (ind. m-2). The surface area of the stones of the sampled area was estimated by using following formula:

S = n/3(LW+LH+WH)
Where, L = length; W = width; H = height of each stone to the nearest of 0.5 cm.

Periphyton and Phytoplankton

Dominance of periphyton was present in the rapids, while, stray numbers of phytoplankton were present in the pools. Periphytons were represented by 23 members of the family of Bacillariophyceae, Chlorophyceae and Myxophyceae. However, only 14 members of phytoplankton were represented by the family of Bacillariophyceae, Chlorophyceae and Myxophyceae.

The data on frequency, density, abundance and diversity indices of periphyton dwelling in Tidong Khad is presented in Table 4-22 to 4-24 for S_1, S_2 and S_3 respectively. The total density of periphyton ranged from 3,124 ind. m^{-2} to 4,916 ind. m^{-2}, which was dominated by the members of Bacillariophyceae. Diversity indices (Shannon-Weiner) of periphyton ranged from 3.8489 to 3.9894, which show that the diversity and quality of aquatic ecosystem was good at S_3 of Tidong Khad.

Table 4-22: Field analysis result for Periphyton at S1 (RITES, 2005)

PERIPHYTON	FREQUENCY (%)	DENSITY (IND.M^{-2})	ABUNDANCE	DIVERSITY INDEX (SHANNON WEINER)
Bacillariophyceae				
Tabellaria fenestris	80	292	3.650	0.2545
Diatoma vulgaris	84	296	3.524	0.2567
Meridion circulare	68	152	2.235	0.1640
Fragilaria inflata	88	416	4.727	0.3158
Synedra ulna	80	196	2.450	0.1956
Nitzschia	80	248	3.100	0.2290
Navicula radiosa	92	312	3.391	0.2653
Cocconeis placentula	48	84	1.750	0.1064
Cymbella cistula	96	400	4.167	0.3086
Gomphonema	76	164	2.158	0.1730
Cyclotella	60	100	1.667	0.1212
Stauroneis	72	156	2.167	0.1670
Denticula	72	148	2.056	0.1609
Gomphoneis	72	156	2.167	0.1670
Astrionella	72	128	1.778	0.1451
Chlorophyceae				
Closterium leibleinii	64	116	1.813	0.1351
Zygnema	80	148	1.850	0.1609
Ulothrix zonata	76	152	2.000	0.1640
Spirogyra	76	152	2.000	0.1640
Myxophyceae				
Phormidium	36	52	1.444	0.0738
Oscillatoria tenuis	56	100	1.786	0.1212
Total		**3,968**		**3.8489**

Table 4-23: Field analysis result for Periphyton at S2 (RITES, 2005)

PERIPHYTON	FREQUENCY (%)	DENSITY (IND.M^{-2})	ABUNDANCE	DIVERSITY INDEX (SHANNON WEINER)
Bacillariophyceae				
Tabellaria fenestris	96	296	3.083	0.3077
Diatoma vulgaris	76	160	2.105	0.2083
Meridion circulare	60	104	1.733	0.1545
Fragilaria inflata	100	336	3.360	0.3311
Synedra ulna	68	92	1.353	0.1415
Nitzschia	100	408	4.080	0.3682
Navicula radiosa	88	160	1.818	0.2083
Cocconeis placentula	52	60	1.154	0.1032
Cymbella cistula	100	320	3.200	0.3220
Gomphonema	60	80	1.333	0.1278
Cyclotella	60	80	1.333	0.1278
Stauroneis	72	100	1.389	0.1503
Ceratoneis arcus	40	48	1.200	0.0872
Denticula	64	108	1.688	0.1587
Gomphoneis	24	52	2.167	0.0927
Chlorophyceae				
Closterium leibleinii	16	20	1.250	0.0438
Zygnema	52	84	1.615	0.1325
Ulothrix zonata	92	192	2.087	0.2350
Spirogyra	52	68	1.308	0.1134
Oedogonium	92	160	1.739	0.2083
Myxophyceae				
Phormidium	64	88	1.375	0.1370
Oscillatoria tenuis	60	108	1.800	0.1587
Total		**3,124**		**3.9182**

Table 4-24: Field analysis result for Periphyton at S3 (RITES, 2005)

PERIPHYTON	FREQUENCY (%)	DENSITY (IND.M^{-2})	ABUNDANCE	DIVERSITY INDEX (SHANNON WEINER)
Bacillariophyceae				
Tabellaria fenestris	96	408	4.250	0.2889
Diatoma vulgaris	96	412	4.292	0.2905
Meridion circulare	92	196	2.130	0.1812
Fragilaria inflata	100	672	6.720	0.3768
Synedra ulna	72	128	1.778	0.1345
Nitzschia	100	500	5.000	0.3240
Navicula radiosa	96	404	4.208	0.2872
Cocconeis placentula	68	116	1.706	0.1252
Cymbella cistula	100	560	5.600	0.3441
Gomphonema	92	176	1.913	0.1683
Cyclotella	80	132	1.650	0.1375
Stauroneis	32	44	1.375	0.0601
Ceratoneis arcus	40	68	1.700	0.0841
Denticula	72	132	1.833	0.1375
Gomphoneis	64	108	1.688	0.1189
Astrionella	76	148	1.947	0.1491
Chlorophyceae				
Closterium leibleinii	64	96	1.500	0.1090
Zygnema	24	36	1.500	0.0513
Ulothrix zonata	68	108	1.588	0.1189
Spirogyra	44	80	1.818	0.0951
Oedogonium	72	168	2.333	0.1630
Myxophyceae				
Phormidium	72	112	1.556	0.1221
Oscillatoria tenuis	60	112	1.867	0.1221
Total		**4,916**		**3.9894**

The data on frequency, density, abundance and diversity index (Shannon Weiner) of phytoplankton of Tidong Khad is given in Table 4-25 to 4-27 for sampling sites of S_1, S_2 and S_3 respectively. The population of phytoplankton were sparse (301.6 - 393.6 ind. /lit) at the sampling sites. The diversity index was in the range of 2.1470 – 2.4432.

Table 4-25: Field analysis result for Phytoplankton at S1 (RITES, 2005)

PHYTOPLANKTON	FREQUENCY (%)	DENSITY (IND.L^{-1})	ABUNDANCE	DIVERSITY INDEX (SHANNON WEINER)
Bacillariophyceae				
Tabellaria fenestris	40	28.8	3.600	0.1940
Diatoma vulgaris	32	20.8	3.250	0.1545
D. elongata	36	21.6	3.000	0.1587
Fragilaria inflata	36	25.6	3.556	0.1789
Nitzschia	28	22.4	4.000	0.1629
Navicula radiosa	44	32.8	3.727	0.2118
Cymbella cistula	28	31.2	5.571	0.2048
Ceratoneis arcus	40	19.2	2.400	0.1459
Astrionella	24	11.2	2.333	0.0980
Denticula	28	15.2	2.714	0.1231
Chlorophyceae				
Ulothrix zonata	32	25.6	4.000	0.1789
Spirogyra	32	18.4	2.875	0.1415
Myxophyceae				
Oscillatoria tenuis	44	28.8	3.273	0.1940
Total		**301.6**		**2.1470**

Table 4-26: Field analysis result for Phytoplankton at S2 (RITES, 2005)

PHYTOPLANKTON	FREQUENCY (%)	DENSITY (IND.L^{-1})	ABUNDANCE	DIVERSITY INDEX (SHANNON WEINER)
Bacillariophyceae				
Tabellaria fenestris	36	29.6	4.111	0.1968
Diatoma vulgaris	36	27.2	3.778	0.1858
D. elongata	40	19.2	2.400	0.1453
Fragilaria inflata	52	40.8	3.923	0.2435
Nitzschia	72	38.4	2.667	0.2341
Navicula radiosa	36	28.0	3.889	0.1895
Cymbella cistula	36	29.6	4.111	0.1968
Cocconeis	36	12.8	1.778	0.1079
Ceratoneis arcus	4	1.6	2.000	0.0205
Astrionella	36	16.0	2.222	0.1273
Denticula	20	11.2	2.800	0.0976
Chlorophyceae				
Ulothrix zonata	36	22.4	3.111	0.1622
Spirogyra	32	17.6	2.750	0.1364
Myxophyceae				
Oscillatoria tenuis	60	28.8	2.400	0.1932
TOTAL	**323.2**		**2.2370**	

Table 4-27: Field analysis result for Phytoplankton at S3 (RITES, 2005)

PHYTOPLANKTON	FREQUENCY (%)	DENSITY (IND.L^{-1})	ABUNDANCE	DIVERSITY INDEX (SHANNON WEINER)
Bacillariophyceae				
Tabellaria fenestris	60	40.0	3.333	0.2317
Diatoma vulgaris	60	40.8	3.400	0.2347
D. elongata	56	33.6	3.000	0.2063
Fragilaria inflata	64	54.4	4.250	0.2815
Nitzschia	52	39.2	3.769	0.2286
Navicula radiosa	68	42.4	3.118	0.2406
Cymbella cistula	72	39.2	2.722	0.2286
Cocconeis	32	12.0	1.875	0.0984
Ceratoneis arcus	24	6.4	1.333	0.0606
Astrionella	20	8.0	2.000	0.0721
Denticula	28	14.4	2.571	0.1129
Chlorophyceae				
Ulothrix zonata	24	20.0	4.167	0.1436
Spirogyra	36	22.4	3.111	0.1558
Myxophyceae				
Oscillatoria tenuis	32	20.8	3.250	0.1477
Total		**393.6**		**2.4432**

Zooplankton

As per RITES survey, the zooplankton population in the torrential water current of Tidong Khad was very low as depicted in Table 4-28 to 4-30 for S_1, S_2 and S_3 respectively. Zooplanktons were represented by the taxa cladocerans (01) and rotifers (03). Density of zooplankton was present in the range of 88.8 - 138.4 ind/l. The diversity index was in the range of 1.0865 - 1.2711 at all the sites. It indicates the poor diversity of zooplankton in the Tidong Khad.

Table 4-28: Field analysis result for Zooplankton at S1 (RITES, 2005)

ZOOPLANKTON	FREQUENCY (%)	DENSITY (IND.L^{-1})	ABUNDANCE	DIVERSITY INDEX (SHANNON WEINER)
Cladocerans				
Daphnia	44	19.2	2.182	0.2496
Rotifers				
Trichocera	48	29.6	3.083	0.3248
Keratella	40	20.8	2.600	0.2626
Asplanchna	40	19.2	2.400	0.2496
Total		**88.8**		**1.0865**

Table 4-29: Field analysis result for Zooplankton at S2 (RITES, 2005)

ZOOPLANKTON	FREQUENCY (%)	DENSITY (IND.L^{-1})	ABUNDANCE	DIVERSITY INDEX (SHANNON WEINER)
Cladocerans				
Daphnia	52	25.6	2.462	0.3209
Rotifers				
Trichocera	56	30.4	2.714	0.3533
Keratella	76	37.6	2.474	0.3946
Asplanchna	16	10.4	3.250	0.1800
Total		**104.0**		**1.2489**

Table 4-30: Field analysis result for Zooplankton at S3 (RITES, 2005)

ZOOPLANKTON	FREQUENCY (%)	DENSITY (IND.L^{-1})	ABUNDANCE	DIVERSITY INDEX (SHANNON WEINER)
Cladocerans				
Daphnia	48	29.6	3.083	0.2906
Rotifers				
Trichocera	72	40.0	2.778	0.3459
Keratella	56	32.0	2.857	0.3044
Asplanchna	68	36.8	2.706	0.3302
Total		**138.4**		**1.2711**

Primary Production

Primary production of Tidong Khad, as reported by RITES, was mainly contributed by periphyton-phytoplatnkton assemblage. The data on gross primary productivity (P_g), net primary productivity (P_n) and P/R ratio have been presented in Table 4-31 and 4-32. The data on P_g , P_n and P/R have been presented on terms of biomass (dry), g m^{-3}, carbon value (g C m^{-3}) and calories of energy (K cal m^{-3}) per hour (hr) and per month. The photoperiod (sunshine value) during the month of September 2005 was 12 hours.

As per the survey by RITES, the gross primary productivity (P_g) was in the range from 0.498 to 0.557 g C m^{-3} hr^{-1}. The net primary productivity (P_n) of Tidong Khad was estimated to be in the range from 0.026 to 0.075 g C m^{-3} hr^{-1}. The monthly (September 2005) gross primary productivity (P_g) ranged from 179.385 to 200.667 g C m^{-3} $month^{-1}$. However, the net primary productivity (P_n) was recorded in range from 9.459 to 27.026 g C m^{-3} $month^{-1}$.

Table 4-31: Gross primary productivity (Pg), respiration (R), net primary productivity (Pn) per hour and P/R ratio of aquatic Periphyton And Phytoplankton (RITES, 2005)

Sites	Gross primary productivity (P_g)			Respiration (R)			Net Primary Productivity (P_n)			P/R ratio
	Biomass (dry) g m^{-3} hr^{-1}	Carbon value g C m^{-3} hr^{-1}	Calories of energy K Cal m^{-3} hr^{-1}	Biomass (dry) g m^{-3} hr^{-1}	Carbon value g C m^{-3} hr^{-1}	Calories of energy K Cal m^{-3} hr^{-1}	Biomass (dry) g m^{-3} hr^{-1}	Carbon value g C m^{-3} hr^{-1}	Calories of energy K Cal m^{-3} hr^{-1}	
S_1	0.997	0.498	5.481	0.944	0.472	5.192	0.053	0.026	0.289	1.056
S_2	1.002	0.501	5.512	0.925	0.463	5.089	0.077	0.038	0.423	1.083
S_3	1.115	0.557	6.132	0.965	0.482	5.306	0.150	0.075	0.826	1.156

Table 4-32: Gross primary productivity (Pg), respiration (R), net primary productivity (Pn) per hour and P/R ratio of aquatic Periphyton and Phytoplankton (RITES, 2005)

Sites	Gross primary productivity (P_g)			Respiration (R)			Net Primary Productivity (P_n)			P/R ratio
	Biomass (dry) g m^{-3} hr^{-1}	Carbon value g C m^{-3} hr^{-1}	Calories of energy K Cal m^{-3} hr^{-1}	Biomass (dry) g m^{-3} hr^{-1}	Carbon value g C m^{-3} hr^{-1}	Calories of energy K Cal m^{-3} hr^{-1}	Biomass (dry) g m^{-3} hr^{-1}	Carbon value g C m^{-3} hr^{-1}	Calories of energy K Cal m^{-3} hr^{-1}	
S_1	358.769	179.385	1973.230	339.851	169.925	1869.180	18.918	9.459	104.050	1.056
S_2	360.796	180.398	1984.378	333.094	166.547	1832.020	27.702	13.851	152.359	1.083
S_3	401.335	200.667	2207.342	347.283	173.642	1910.057	54.052	27.026	297.285	1.156

Trophic Status of Tidong Khad

The P/R ratio of Tidong Khad was estimated by RITES to be in the range from 1.056 to 1.156. It shows that the primary productivity (P_g) is somewhat higher to community respiration, which is the indicator of autotrophic nature of the aquatic ecosystem. The higher P/R ratio (1.156) is the clear indication of better trophic status present at the sampling site S3.

Aquatic Macrophytes

Some of the aquatic macrophytes were recorded by RITES along the bank of the Tidong Khad. These macrophytes were identified as Equisetum spp., Adiantum and Selaginella spp. Aquatic macrophytes were present in the wet area of riparian zone of Tidong khad.

Macrozoobenthos

Macrozoobenthos of Tidong Khad were represented by the members of Ephemeropterans (11), Trichopterans (04) and Dipterans (01). Ephemeropterans contribution was maximum to the total macrozoobenthos (Table 4-33 to 4-35). The densities of macrozoobenthos were present in the range of 1,604 – 3,556 ind. m^{-2}.

A maximum density, in 2005, was observed at S3. It was also noticed that the health of aquatic Ephemeropterans was very good at S3. The diversity index of macrozoobenthos ranged from 3.9856

to 3.9939 in Tidong Khad project area confirms the rich diversity of aquatic insects and good environmental quality of aquatic ecosystem.

Table 4-33: Field analysis result for Benthos at S1 (RITES, 2005)

BENTHOS	FREQUENCY (%)	DENSITY (IND.M^{-2})	ABUNDANCE	DIVERSITY INDEX (SHANNON WEINER)
Ephemeropterans				
Heptagenia	72	156	2.167	0.3386
Baetis niger	56	108	1.929	0.2724
B. muticus	80	148	1.850	0.3287
B. rhodani	56	76	1.357	0.2172
Ecdynurus	60	84	1.400	0.2321
Ameletus	56	136	2.429	0.3130
Siphlonurus	68	132	1.941	0.3076
Centroptilum	68	112	1.647	0.2786
Ephemerella ignita	64	104	1.625	0.2661
Rithrogena	48	100	2.083	0.2596
Trichopterans				
Rhyacophila	40	76	1.900	0.2172
Hydropsyche	64	108	1.688	0.2724
Perla	76	40	0.526	0.1389
Isoperla	44	72	1.636	0.2095
Dipterans				
Tendipes	84	152	1.810	0.3337
Total		**1,604**		**3.9856**

Table 4-34: Field analysis result for Benthos at S2 (RITES, 2005)

BENTHOS	FREQUENCY (%)	DENSITY (IND.M^{-2})	ABUNDANCE	DIVERSITY INDEX (SHANNON WEINER)
Ephemeropterans				
Heptagenia	80	280	3.500	0.3868
Baetis niger	76	256	3.368	0.3694
B. muticus	72	124	1.722	0.2404
B. rhodani	72	148	2.056	0.2691
Ecdynurus	56	88	1.571	0.1913
Siphlonurus	72	120	1.667	0.2354
Centroptilum	88	200	2.273	0.3224
Ephemerella ignita	80	152	1.900	0.2736
Ephemerella notata	56	116	2.071	0.2302
Rithrogena	76	132	1.737	0.2503
Trichopterans				
Rhyacophila	76	148	1.947	0.2691
Hydropsyche	68	120	1.765	0.2354
Perla	60	104	1.733	0.2142
Isoperla	56	120	2.143	0.2354
Dipterans				
Tendipes	68	144	2.118	0.2645
Total		**2,252**		**3.9873**

Table 4-35: Field analysis result for Benthos at S3 (RITES, 2005)

BENTHOS	FREQUENCY (%)	DENSITY (IND.M^{-2})	ABUNDANCE	DIVERSITY INDEX (SHANNON WEINER)
Ephemeropterans				
Heptagenia	100	872	8.720	0.5204
Baetis niger	100	392	3.920	0.3884
B. muticus	84	192	2.286	0.2578
B. rhodani	96	284	2.958	0.3265
Ecdynurus	60	120	2.000	0.1889
Siphlonurus	84	164	1.952	0.2329
Centroptilum	64	132	2.063	0.2016
Ephemerella ignita	48	88	1.833	0.1520
Ephemerella notata	64	116	1.813	0.1845
Rithrogena	60	104	1.733	0.1710
Trichopterans				
Rhyacophila	84	196	2.333	0.2611
Hydropsyche	96	300	3.125	0.3368
Perla	72	152	2.111	0.2216
Isoperla	72	144	2.000	0.2137
Dipterans				
Tendipes	84	300	3.571	0.3368
Total		**3,556**		**3.9939**

Fish

RITES report mentions that that there were no fish species at sampling site S1 and S2. However, the species of Snow trout (*Schizothorax richardsonii*) and Rainbow trout (*Salmo trutta fario*) were present at the sampling site S3. This site is very close to the confluence of Tidong Khad and Satluj River and at the lowest altitude (2,260 m above msl) of the Project area. Snow trout (*Schizothorax richardsonii*) has been included in the IUCN Red List of threatened species. However, the conservation status of *Salmo trutta fario* has not been evaluated by IUCN.

As the EIA study carried by RITES, reported trout in the Sutlej, there was a general concern on the fate of the biodiversity due to the construction and operation of the Tidong project. To appreciate the aquatic ecological characteristics and the probability of fish occurrence in the Tidong stream and its tributaries (viz Shaktsanq, Ghat Leng, Dubaa Khad, Sankir khad) a fresh survey (**Annexure 4.2**) was undertaken by AECOM during Oct 2012. The study covered both abiotic and biotic factors; planktonic and periphytic assemblages; benthic organisms and fish spectra during different stages of life history viz alevin, larva, fry, juveniles, adults etc of the main stream as well tributaries.

A week- long study results showed that the main Tidong stream as well as the five tributaries (flowing in the vicinity of project area) are characterized by high transparency, low temperature, high dissolved oxygen, low carbonate alkalinity, moderate silicates value, sparse plankton and insect life. The mean water temperature of Tidong and its tributaries ranged 10.2-12.5 $^{\circ}$C, pH 7.1-7.3; dissolved oxygen 9.96-10.83 ppm' silicates 0.53-0.92 ppm. Among the biotic factors phytoplankton contributed over 92% of total periphytic/plankton counts and was mainly represented by Bacillariophycea, Chlrophycea and Desmidacea. The major taxa encountered among the diatoms are

Navicula, Gomphonema, Cyclotella, Amphora, Cymbella while the green algae were represented by Plurococcus, closterium. The Zooplankton contribution ranged between 6-8% in all the samples and these were mainly represented by Difflugia and Centropyxis.

The benthic community of the main stream and its tributaries were constituted mainly by insects – the Amphipods and Plannarian frequently occurring in other neighboring streams of Kinnaur valley were all together elusive. The insect specimens encountered belonged to families Ephemeroptera, Trichoptera, Plecoptera Neuraptera , and Diptera. The Ephemeropteron were represented by naiads of Baetis, Heptagenia, Caenis, Plecopteron by nymphs of Perla, Chloroperla's Neuroptera by larvae of Corydalinae; Trichopteron by Hydrosychae, cases of mystacides; Dipteron by Tabanus, Atherix and Pedicia.

Quantitatively speaking, the number of insects recorded per square meter were abysmally low ranging from 32-71/cum; the highest number were recorded from station 3 of Shatsheng stream and the lowest at station 7 of Ghatleng stream. However in all the insect samples, the percentage of may flies dominated (over 70%), the Baetis being the most ubiquitous in all the samples.

In order to catalogue the various fishes including Fry, Fingerlings etc. harbored by the Tidong stream/ tributaries, extensive fishing by cast net (1.0 dia; mesh 1.2cm) as well as by mosquito net cloth was done in rapids, riffles and other micro-habitats to which these denizens normally resides. On an average 20-30 cast nettings were operated by trained fisherman at each sampling site but no specimen of any fish or larvae was encountered, despite dislodging of stony bottom of the streams to find any clinging fish specimen. The shallow banks of the stream/ tributaries were also combed with mosquito nets but not a single spawn, alevin or fish juvenile could be circumscribed. Efforts were also made to locate 'redds' by studying the sandy and shallow pockets of streams along the banks but being a non- breeding season of trout the effort proved abortive.(Trout breed from late Nov. to Feb. in Himachal waters).

The virtual barren status from fishery point of view of the Tidong and conjoining tributaries may be attributed to frequent flooding; steep gradient of streams beds, ice formation during long winter months; frequent rolling of boulders, stones, gravels during rainy months, scanty food for fish and absence of any fish seed stocking programme by the state fisheries department in these stretch.

The information furnished by the officials of the State Fisheries Department Himachal Pradesh revealed that no fishing license was ever issued to any visiting angler or local residents since establishment of the department. Further in view of absence of any fish stock in the said streams, harsh terrain and inaccessibility of Moorang Valley during most part of the year, the state department too never transplanted any fish seed in the stream or adjoining khads.

The villagers during an informal discussion also reported that earlier a small number of fishes were present in the Satluj River but during the heavy flooding of 2005 the fish habitat was totally destroyed. To sum up, from the aforesaid study as well as communication with villagers, it can safely be concluded that presently the Tidong stream and the surrounding project area tributaries are devoid of any fish stock.

4.9 Socio-Economic Environment

4.9.1 Demographic features of state and Kinnaur

Himachal Pradesh is among the leading States in the country in terms of literacy. The total population of the state increased from 6 million to 6.8 million in last decade (Table 4-36). The literacy rate of the state also showed positive trends and has achieved a rate of 90.8 & in year 2011.

The Population of Kinnaur has also increased to 84 thousand in 2011 as compared to 78 thousand in 2001. The population density has marginally risen by 1 person per sq km. The sex ratio has decresed in Kinnaur but female literacy has shown favorable trends.

Table 4-36: Population of project area villages

Item	Particulars	Himachal Pradesh		Kinnaur	
		2001	2011	2001	2011
Population	**Male**	3087940	3473892	42173	46364
	Female	29989960	3382617	36161	37934
	Total	6,077,900	6,856,509	78334	84298
Population Density	**Per Sq Km**	109	123	12	13
Sex Ratio	**No of Females to 1000 Males**	968	974	857	818
Literacy Rate (%)	**Male**	86.02	90.83	84.3	88.37
	Female	68.08	76.60	64.4	71.34
	Total	77.13	83.78	75.2	80.77
Source: 2001 Census: Census of India published data; 2011 census: Provisional Population figures in www.censusofindia.gov.in					

4.9.2 Socio-economic Profile of the Kinnaur District

Kinnaur is one of twelve administrative districts in the state of Himachal Pradesh, India. The district is divided into three administrative areas - Pooh, Kalpa, and Nichar - and has five tehsils (counties).

The administrative headquarter of Kinnaur district is at Reckong Peo. The Deputy Commissioner is the pivot round whom the entire administration revolves in the district. He wields wider administrative and financial powers than any other districts of Himachal Pradesh. This system is know as Single Line administration introduced in December, 1963.

Due to the proximity of Kinnaur to Tibet, the life style and religion of its inhabitants have been influenced by Buddhism, though the majority of the people practice Hinduism. In face one of the family members is a Lama (Buddhist Priest). The Kinnaur society is divided into two broad occupational groups viz. peasants and the artisans, possibly of diverse ethnic origin. They mostly wear woolen clothes in their own distinctive way. Men wear woolen shirts called Chamn Kurti which are tailored in the village itself. Women wrap up a woolen shawl like garment called Dohru.

The staple food is wheat, ogla, phafra and barley, which are local produce. Besides these kankani, cheena, maize, chollair and bhatu are also taken. A number of dialects are spoken by the inhabitants of Kinnaur district that come under 'Kinnauri' or 'Kanauri'.

Kinnaur district has about 9,400 ha cultivable land and about 614,000 ha non-cultivable land. About 76% of the total working population is engaged in Agriculture and Horticulture. Fruits and cash crops, like seed potatoes, ginger, vegetable seeds, apples, stone fruits, etc. are grown in the district. Wheat, maize and rice are the major food crops.

Kinnaur is a coveted tourist destination. Great natural scenes, rivers valleys, high mountains, lakes and green pastures create a mesmerizing scene for tourists. The best time to visit the district is from April to October.

There are no large industries, but only 59 handloom units and 3 handicraft units in the district. Tourism industry has yet to get momentum in the district. However, in recent years, the potential of hydropower has been identified and projects are being developed in the district. Major project under execution in the district are 1000 MW Karchham Wangto, 243MW Kashang 3-stage, 402 MW Shongtong Karcham, and 100 MW Tidong-1 HEP.

4.9.3 Socio-economic Profile of the Study Area

Socio economic study in the project affected area was conducted in seven selected villages namely Rispa Khas, Lizang, Roowang, Lambar, Thangi Khas, Piwar and Charang Khas which are situated within the study area. Out of these, land for various project activities was only acquired from 3 villages, namely Lizang (Rispa Panchayat), Roowang (Moorang Panchayat) and Lambar (Thangi

Panchayat). This section gives a general picture of the villages in the study area and also details the socio-economic profile of the Project Affected Families (PAFs).

Parameters covered under demographic study are number of households, total population with sex distribution and average family size in the selected villages (Table 4-37). Thangi Khas village has the highest population (614 persons) followed by Rispa Khas (498) and Charang Khas (204), while Piwar (16) has the least population. Most of the villages have skewed sex ratio and varies from 381 in Lizang to 4000 in Lambar. Outward migration of males from the villages could be a possible reason for such an abnormal sex ratio.

Table 4-37: Population of project area villages

Villages	No. of H.H	Population			Family Size	Sex Ratio
		P	M	F		
Rispa Khas	105	498	273	225	4.7	824
Lizang	6	29	21	8	4.8	381
Roowang	29	139	79	60	4.8	759
Lambar	8	30	6	24	3.8	4000
Thangi Khas	136	614	310	304	4.5	981
Piwar	7	16	8	8	2.3	1000
Charang Khas	48	204	82	122	4.3	1488

HH=House Holds, P=Person, M=Male, F=Female; Source: Census of India, 2001

The literacy rate in the study area is 64% which is below the overall literacy rate of the district and the state (Table 4-38). The rate varies from a high of 84.3% in Thangi Khas to the lowest of 45.5% in Roowang village in the study area. All other villages show a literacy rate between 63-77%. In all the villages of the area, more number of males were found to be literate than females.

Table 4-38: Literacy rate of villages in the project vicinity

Village	Literacy rate (Percentage)		
	Persons	Males	Females
Rispa Khas	69.4	76.3	60.4
Lizang	63.0	75.0	28.6
Roowang	45.5	54.7	34.8
Lambar	69.2	100.0	60.0
Thangi Khas	84.3	93.6	74.3
Piwar	66.7	87.5	42.9
Charang Khas	77.2	84.7	72.2

Source: Census of India, 2001

Out of the total population in the project villages, the highest percentage of workers is from Lizang (90%) followed by Rispa (75%) and Charang (60%) and lowest is Lambar (47%) as given in Table 4-39. There are no small or medium scale industries in the affected villages.

Table 4-39: Workers classification in the project area villages

Village	Total Population	% of Population		% of Workers	
		Workers	Non Workers	Main Workers	Marginal Workers
Rispa Khas	498	75%	25%	88%	12%
Lizang	29	90%	10%	88%	12%
Roowang	139	59%	41%	100%	0%
Lambar	30	47%	53%	100%	0%
Thangi Khas	614	67%	33%	80%	20%
Piwar	16	56%	44%	100%	0%
Charang Khas	204	60%	40%	81%	19%

Source: Census of India, 2001

*Note: **Main workers:** Those who have worked for at least 183 days in a year; **Marginal workers**: Those who work for less than 183 days in a year; **Non-workers**: include students, dependents, retired persons, beggars etc.*

A few household industries exist in Charang khas, Thangi khas and Rispa Khas employing less than 1% of total workers population from the villages. In the Project Affected villages, the male population dominates in the category of "Main Workers" except for cultivators, while female population dominates the "Non-Workers" (Table 4-40).

Table 4-40: Main workers classification from the project area villages

Village	Cultivators (%)	Agricultural labourers (%)	Workers in household industries (%)	Other Workers (%)
Rispa Khas	73.6	23.7	0.3	2.4
Lizang	34.8	65.2	0.0	0.0
Roowang	25.6	0.0	0.0	74.4
Lambar	92.9	0.0	0.0	7.1
Thangi Khas	83.6	5.5	0.3	10.6
Piwar	88.9	0.0	0.0	11.1
Charang Khas	80.8	0.0	2.0	17.2

Source: Census of India, 2001

*Note: **Cultivators**: A person engaged either as employer, single worker or family worker in cultivation of land- cultivation includes supervision or direction of cultivation; **Agricultural labor:** A person who works in another person's land for wages in money, kind or share; **Household industry worker**: Industry conducted by the household at home; **Other workers:** includes factory workers, plantation workers, those engaged in trade, commerce, business, transport, mining and construction etc.*

4.9.4 Socio-Economic Survey of Project Affected Families

The private land acquisition for the project in execution has resulted in 28 families losing part of their agricultural land. The project did not acquire any house and none of them is rendered landless or physically displaced. One affected land parcel falling in Lizang village under Rispa Panchayat belongs to Mandir Devta Kuldev (Temple of local Deity).

A survey was undertaken to study and understand the socio economic conditions of these PAF and to examine the impact of the proposed project thereupon. A structured questionnaire (**Annexure – 4.2**) was framed by AECOM and interviews were held by the project authority with the land losers. Out of 28 affected families , 23 were contacted and data as per the structured questionnaire was collected. Important aspects covered in the questionnaire are the identification particulars of PAF, his/her family details, assets and acquisition, drinking water facilities, land utilization, cropping pattern, commercial / self employment activities etc. The information was further substantiated during interaction with women of the affected families during October, 2012 by AECOM.

The details of the land acquisition and the amount of compensation received by the individual land holders are given in Table 4-41. It is important to mention here that Mrs. Suraj Devi who had only 0.0219 ha of total holding had lost 0.0036 ha to the project and left with an unviable parcel of land. Being a woman headed family as well; she has been categorized as vulnerable family.

Table 4-41: Details of PAFs, land acquired and compensation

Sl. No	Name of the Land Owner	Village	Total land Holding (Ha)	Land acquired (Ha)	Remaining land (Ha)	% loss of land	Total compensation received (INR)	Name of Joint Owners
1	Sh. Kalyan Singh	Roowang	1.0162	0.1736	0.8426	17.1	1947505	Smt.Geeta Devi
2	Sh. Arjun Singh	Roowang	0.6645	0.0443	0.6202	6.7	414452	Sh.Chandra Kumar
3	Sh. Hans Bhadhur	Roowang	4.5527	0.0877	4.4650	1.9	1208148	
4	Sh. Aatma Dev	Roowang	1.2394	0.2666	0.9728	21.5	2371222	Sh.Karma Bhagat
5	Sh. Rangsal Giachho	Roowang	1.1735	0.1458	1.0277	12.4	1252105	
6	Sh. Govind Singh	Roowang	0.7017	0.1433	0.5584	20.4	1199563	
7	Sh. Thakur Bhagat	Roowang	3.2238	0.2621	2.9617	8.1	2155779	
8	Smt. Suraj Devi	Roowang	0.0219	0.0036	0.0183	16.4	9040	
9	Sh. Videsh Kumar	Roowang	0.3374	0.0565	0.2809	16.7	517745	
10	Sh. Ganga Ratan	Roowang	0.3376	0.0565	0.2811	16.7	517745	

Sl. No	Name of the Land Owner	Village	Total land Holding (Ha)	Land acquired (Ha)	Remaining land (Ha)	% loss of land	Total compensation received (INR)	Name of Joint Owners
11	Sh. Amar Singh	Roowang	1.1952	0.1384	1.0568	11.6	1215948	Sh Dhyan Singh
12	Sh. Devi Dayal	Roowang	1.4540	0.1072	1.3468	7.4	1088396	
13	Sh. Tanjin Nargu	Roowang	0.7343	0.1167	0.6176	15.9	1205788	
14	Sh. Jai Singh	Roowang	3.4255	0.2906	3.1349	8.5	2786647	
15	Sh. Thakur Sain	Roowang	1.1796	0.0747	1.1049	6.3	709793	
16	Sh. Pratap Singh	Roowang	0.6948	0.0373	0.6575	5.4	354896	
17	Sh. Marshal Avinesh	Roowang	1.3537	0.0665	1.2872	4.9	621676	
18	Sh. Rajeev Kumar	Roowang	0.2477	0.0798	0.1679	32.2	673118	Sh. Daleep kumar
19	Sh. Jamna Dass	Roowang	0.6459	0.0096	0.6363	1.5	24027	
20	Sh. Gawan Chhetan	Roowang	0.1248	0.0096	0.1152	7.7	24027	
21	Sh. Ram Sain	Roowang	0.4578	0.0798	0.3780	17.4	673118	
22	Sh. Sunder Lal	Lizang	0.8815	0.0088	0.8727	0.9	22099	
23	Sh. Prahlad Bhagat	Lizang	5.1719	0.0560	5.1159	1.1	721463	Sh.Gyan keerti
24	Mandir Devta Kuldev	Lizang	0.8038	0.0705	0.7333	8.8	306691	
25	Sh. Amar Singh	Lambar	0.5048	0.1143	0.3905	22.6	769408	Sh. Inder Bhagat, Sh. Vidya Rajan
26	Sh. Prithvi Pal singh	Lambar	1.0098	0.2285	0.7813	22.6	1538816	Sh. Uday Singh
27	Sh. Sujan bhagat	Lambar	3.0459	0.2468	2.7991	8.1	806460	Sh. Surender Singh
28	Sh. Chander Singh	Lambar	1.2395	0.1234	1.1161	9.9	403230	
29	Sh. Prem Lal	Lambar	3.5728	0.1026	3.4702	4.3	260153	Sh. Padam Lal, Sh. Santosh Raj
Total			**41.0120**	**3.2011**	**37.8109**	**11.6**	**25799058**	

Population Composition of PAFs

The sex and age particulars of the PAFs have been presented in Table 4-42. Out of the total sample population of 113, largest group is about 34% from the age group of 26-40 years, followed by 27%

from 41-60 years and 22% in 16-25 years. The males outnumber females in all age groups except 6-15 and 16-25 years.

Table 4-42: Age and sex wise distribution of PAFs

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Sl No.	Age	Population			Percentage
		Male	Female	Total	
1	**0-5**	1	0	1	1%
2	**6-15**	6	12	18	16%
3	**16-25**	9	13	22	19%
4	**26-40**	20	18	38	34%
5	**41-60**	16	11	27	24%
6	**60 & above**	5	2	7	6%
	TOTAL	57	56	113	

Marital Status

Out of the total population, 55% were married (Table 4-43).

Table 4-43: Marital status of PAFs

Sl No.	Marital Status	No. of Persons	Percentage
1.	Married	62	55%
2.	Unmarried	51	45%
TOTAL		113	100%

Family Pattern and Size

Fraternal polyandry was observed in the affected villages but it is rapidly losing ground to monogamy. However, they have the patriarchal system of inheritance. All the brothers of the bridegroom are considered automatically the husbands of the bride. Polyandry helps the people of Kinnaur to limit the population to sustainable levels and safeguard the family property from fragmentation.

It was observed that PAFs were dominated by nuclear families with separate kitchen, which contribute to almost 65% of the survey households (Table4-44). The size of the family varies from 1 to 10 with an average of 5.2 (Table 4-45).

Table 4-44: Family pattern of PAFs

Sl. No.	Family Pattern	No. of Households	Percentage
1	Joint	7	30%
2	Nuclear	15	65%
3	Individual	1	4%
TOTAL		23	100%

Table 4-45: Family size of PAFs

Sl. No.	No. of Family Members	No. of Households	Percentage
1	2-4	11	48%
2	5-7	11	48%
3	8 & Above	1	4%
	TOTAL	23	100%

Literacy and Language

It is observed that 38% of the PAFs have education up to primary level, while 7% and 15% of them have studied up to intermediate and high school level respectively (Table 4-46). The literacy rate amongst the land losers is lower than the literacy rate of the Kinnaur district. Overall about 28% of the population was found to be illiterate.

Table 4-46: Literacy of PAFs

Sl. No.	Education	Numbers	Percentage
1	Post Graduate	6	5%
2	Graduate	7	6%
3	Intermediate (10+2)	8	7%
4	High School (10)	17	15%
5	Primary	43	38%
6	Illiterate	32	28%
	TOTAL	113	100%

Official language of communication is Hindi in project area and most of the people use Hindi as medium of communication. Some sections of the people use certain dialect namely “Kinnauri” for day to day communication; however, they too communicate in Hindi and understand Hindi well.

Religion and Caste

The majority of the PAF households surveyed mentioned that they follow Hinduism as well as Buddhism. At least one member in each family is practicing Buddhism. From the discussion with the locals, it is evident that they are significantly influenced by Buddhism and some of them have converted to Buddhism. All the PAFs surveyed (23 families) responded of being under the scheduled tribe category.

Occupation

All the respondents covered under the sample survey informed that agriculture and agriculture-allied occupations was their primary occupation and source of income. However, most of families employ labor to carry out the agricultural and horticultural activities. Among other secondary occupations/source of income include civil contractor, government service, and pensioners.

The project has provided 38 jobs to the locals and out of these, one job each has been given to 15 land loser families. The candidates for the job were chosen by the head of the land loser family. The land loser generally, chose the younger member of the family who can work for longer duration. Though, most of the selected candidates have been absorbed by NTPGPL, few works for the contractor engaged by NTPGPL.

In addition, contractual works were also allotted to 4 persons amongst the land losers. NTPGPL sponsored 4 land losers who are also employed by them for training to Industrial Training Institute (ITI). All the expenses are being incurred by the company.

Family Income

Most of the households fall in the income groups of INR 50,001 – INR 1, 00, 000/- and INR 20,001 – INR 50,000/-, each group comprising of 78% and 17% of the households respectively (Table 4-47). The average income of a project-affected household is above INR 75,000 per annum and agriculture and horticulture is the main sources of their income.

Table 4-47: Family income of households (INR per Annum)

Sl.No.	Family Income	No. of Households	Percentage
1.	Below 20,000/-	0	---
2.	20,001-50,000/-	4	17%
3.	50,001-100,000/-	18	78%
4.	100,001-2,00,000/-	1	4%
5.	Above 2,00,000/-	0	---
	TOTAL	**23**	**100%**

Family Assets

The main asset of all 28 households is land. The 29th share of land was acquired from *Mandir Devta Kuldev* (Temple of Local God). Majority of the households i.e., 14 of them are marginal farmers who had less than 1 hectare of land (Table 4-48) and only 6 households (21%) having more than 2 hectares of land.

Table 4-48: Land holdings of PAP before and after acquisition

Sl. No.	**Land Details**	**Before Acquisition**		**After Acquisition**	
		No. of Households	**%**	**No. of Households**	**%**
1	Large Farmers	6	21%	6	21%
2	Small Farmers	8	29 %	5	18%
3	Marginal Farmers	14	50 %	17	60%
	TOTAL	**28**	**100%**	**28**	**100%**

Note: Large Farmers: >2 ha of land holding; Small Farmers : 1-2 ha of land holding; Marginal Farmers: <1 ha of land holding

If compared with the land acquired for the project, about 15 households lost less than 10%, 8 lost about 10 – 20 % of their land (Table 4-49). Rest, 4 households have lost 20 -30 % of their total landholding and only 1 household has lost above 30% of land holding.

Table 4-49: Land acquisition pattern of PAPs

Sl. No.	**Acquired Land**	**No. of Households**
1	Above 30%	1
2	20 to 30 %	4
3	10 to 20%	8
4	0 to 10%	15
	TOTAL	28

All the 23 surveyed affected households have their own houses which are constructed from wood and other building material. About 75% of the surveyed household owned livestock like Cows, Goats and Sheeps. All the respondent households have apple orchards and in addition cultivate potatoes, *rajmah* (Kidney Beans), vegetables crops and *badam* (Almond).

Incidence of Poverty in Project Area

The number of below poverty level families in the project state, project district and area and to the level of project village is presented in Table 4-50. As per the analysis less than 20% of the total households living in the project affected panchayats are below poverty line.

Table 4-50: Details of BPL families in project State, District and area

Level	Details	Total Number of Households	No of BPL Households	% of Households Below Poverty line to total families
Project State	Himachal Pradesh	1221589	282370	23.11
Project District	Kinnaur	18641	2845	15.26
Project Sub Division	Pooh	5178	1211	23.39
Project Gram Panchayat	Thangi	154	40	25.97
	Moorang	431	49	11.37
	Rispa	196	57	29.08
	Total	781	146	18.69

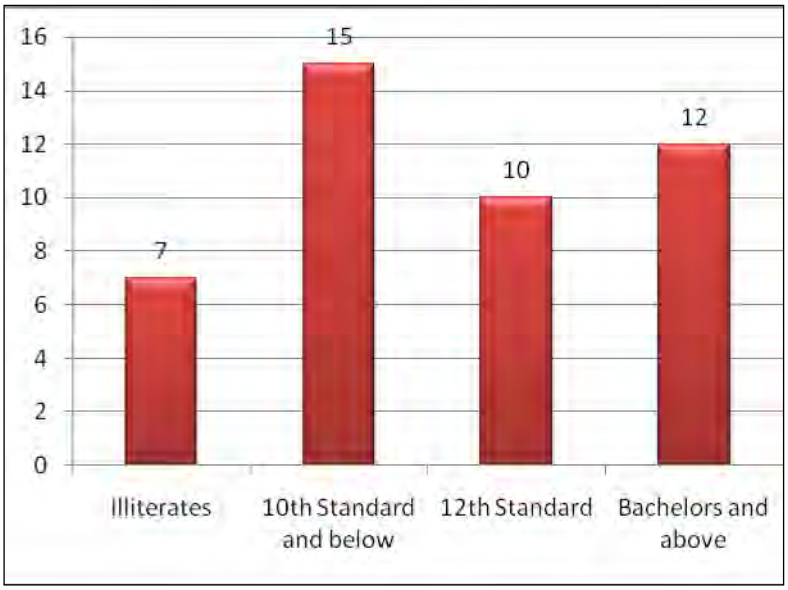
Source: Rural Development Department, Govt of Himachal Pradesh and Census of India 2001.

4.9.5 Status of Women

With the intent to seek more participation from the women folk of the PAP, meetings were conducted during October, 2012. About 15 families having 44 women were contacted and interviewed. The focus was to understand their lifestyle, daily routine, status in the family and their concerns and expectations from the project.

During these meetings, it was gathered that most of the women (30) were housewives and have been working in their apple orchards and farms. Out of these, about 20 of them have studied till the senior secondary or higher level of education. Girls are sent to pursue their primary and secondary education in schools situated in nearby villages and outside the district for higher education. The levels of literacy among the women have been given in the Figure 4-21.

Figure 4-21: Level of literacy among the women respondents

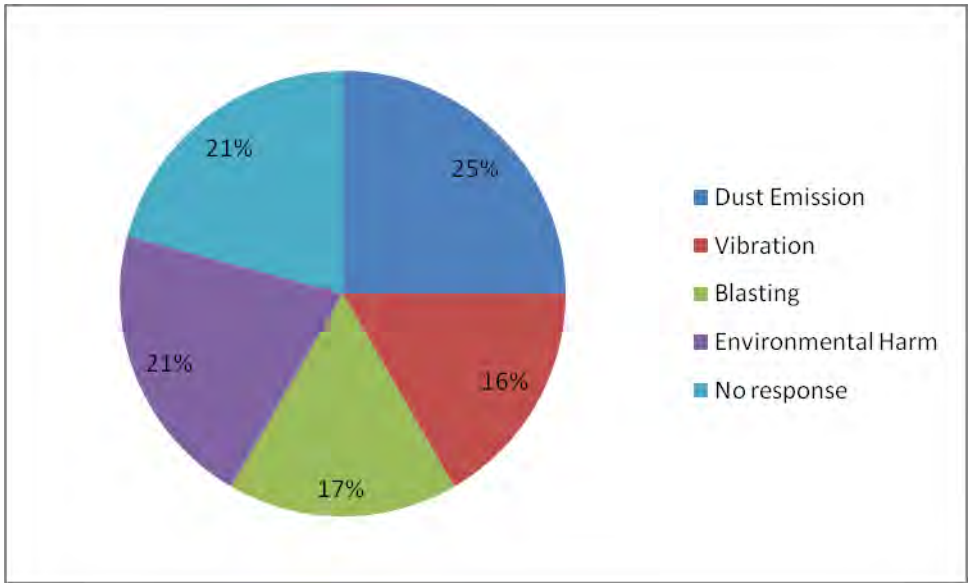


Women of 12 families out of 15 reported that they had been involved in the decision making process when the decision of selling of the land came up. Most of the families used the compensation that was received to improve their house and apple orchards, thus, exhausting the entire compensation amount by now. The decisions on financial matters are generally taken by the male members but women have an equal say in most of the matters.

In reference to health issues among the women folk, it was mentioned that gynecological problems have been the most common issue affecting the women. The non-availability of a lady doctor in the Public Health Centre has also been indicated as a major concern. As no hospitals are present in the area, the people have to travel to Reckong Peo, Rampur and Shimla to get treated for major health problem.

While asking the positive and negative impacts of the project, the women were of the view that the most common concerns were dust emission and vibration felt during the construction. Figure 4-22 showcasing the concerns of the respondents in relation to the project.

Figure 4-22: Respondents feedback relating to concerns with the project



There was a healthy response in reference to the positive outlook of the project as jobs have been provided to some of their families and roads have been improved in the area. When further asked on the expectations of women relating to the project, many of them suggested that either jobs opportunities should be created or trainings should be imparted to make them self sufficient. The most common suggestion was to impart skills relating to knitting / sewing which could be provided knitting/ sewing machines were also provided. The Mahila Mandal has been recommended to be the focal point of this training activity as well as responsible for the possession of machines as one woman from each family in the village is a member of the Mahila Mandal. This arrangement will ensure fair utilization of the resources available. Many of the women also suggested that regular health camps should be conducted so that the health issues can also be properly tackled with within the community.

On the issue of how their concerns and grievances with respect to the project are addressed, most of respondents mentioned that they voice it in the Panchayats meetings. However, most of them were not keen to attend such meetings and were satisfied with the current situation where male members are involved more actively in these meetings.

4.9.6 Indigenous Status of the People of Kinnaur

According to the Census of India 2001, 4% percent of the state population is classified as ST and the major tribes are (1) Bhot/Bodh, (2) Gaddi, (3) Gujjar (4) Jad, Lamba, Khampa, (5) Kanaura/Kinnara, (6) Lahaula, (7) Pangwala, (8) Swangla, (9) Beta, Beda and (10) Domba, Gara, Zoba.

The STs in Himachal Pradesh are not distinct tribal groups since they accept usual socioeconomic and cultural practices. There are no distinct habitats or territories in the project area where the Kinnaurs have a collective attachment. Chilgoza trees which are freely growing in the area has an economic value but this is not their main source of livelihood/income. Compensation arrangements are described in the resettlement plan.

Kinnaurs belong to upper class are not a vulnerable group because their economic, social and cultural status is same as any other non-IP group. None of the affected household fall under Below Poverty Line (BPL) category. The economic status of the people of Kinnaur is good. Though they are identified as ST but their economic, social and cultural status is same as any other non-IP group. The people of Kinnaur enjoy good infrastructure in terms of road, electricity, hospitals and education institutions.

The affected population is also not poor and none of the households rendered homeless or landless. They have source of livelihood from apple orchards along with vegetables and dry fruits for self consumption. They are educated and most of them have studied beyond Higher Secondary. The official language and medium of education is Hindi in Kinnaur. Though, the locals speak a dialect but Hindi is easily understood.

Considering, the above-mentioned aspects the project and affected people are categorized as 'C' for ADB's safeguard policy on Indigenous People.

5. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.1 General

The primary function of an Environmental Impact Assessment study is to predict and quantify potential impacts, assess /evaluate the magnitude and identify the mitigation measures.

This project is identified as Category 'A' for environmental aspects and category 'B' for social attributes. Thus, this chapter discusses anticipated positive as well as negative concerns for environment and social conditions during various phases of Tidong-1 HEP under execution. Wherever possible, the impacts have been quantified and otherwise, qualitative assessment has been made. The impacts are discussed broadly into three categories, viz. impacts during project construction and operation.

As already mentioned, the construction activities are already underway and several activities like acquisition of land, clearing of site, construction of roads, excavation of River Diversion, Spillway and Under sluice, power house and storage reservoir are almost complete. Currently, concreting of already excavated works along with additional excavation work at HRT, Pressure and Surge Shaft is underway.

This report briefly discusses the activities which are in process and adequacy of the mitigation measures taken so far along with a focus on the future activities and measures required. The impacts are segregated into two major headings, i.e., impacts during construction and during operations. The nature of impacts for a hydropower project is quite distinct during these two phases of a project.

5.2 Impact Identification

The Environmental Impact Assessment process began with the scoping process to identify the significant environmental impacts due to the proposed hydroelectric project in its different phases. The type and magnitude of the impacts, however, depend on the specific attributes of the given environment. Potential impacts on environment due to the proposed hydroelectric project activities have been summarized in Table 5-1. The impacts due to the project location are generally irreversible and cannot be mitigated through environmental enhancement measures. However,

impacts related to construction are normally short term, which can be off-set to a large extent by observing a set of precautionary measures. In a hydropower project, operation phase impacts are limited and can be mitigated following management plans strictly.

Table 5-1: Potential environmental impacts

	Identification of Potential Impacts					
	PRE CONSTRUCTION/ CONSTRUCTION PHASE					OPERATION PHASE
Major activities → / Environmental elements ↓	**Land Acquisition**	**Site Clearance**	**Contractor camps**	**Construction of Diversion Weir / HRT / PH**	**E & M**	**Operation**
Impact on Land Environment						
Land/Soil	Change in land use	Loss of trees/vegetative cover hence increase in soil erosion	Soil contamination due to solid waste dumping	Increased erosion/land slides	Pollution due to spills	Soil erosion & Siltation
Impact on Water Environment						
Drainage	-	_		Change in Natural drainage		
Surface water	-	Change in water quality and siltation	Water Pollution from Domestic wastewater	• Muck disposal • Increase in turbidity		Silt Flushing
Ground Water	-	-	-	_	-	Rise in water table
Impact on Air Environment						
Air quality	-	Dust emissions due to erosion	Fuel burning	• Dust emission • Vehicular pollution	Emission from machinery	
Impact on Noise Environment						
Noise Quality	-	Reduced buffering of noise	-	Increased noise form drilling, blasting and batching plant	Increase in noise due to heavy machinery	Increase in Noise due to turbine operations
Impact of Ecology						
Forest	_	Loss of Forest land	Fuel wood requirement for labours	_	-	Afforestation
Wildlife	_	Loss of habitat	Poaching	Relocation of animals sacred	_	_

				from vibrations		
Aquatic	_	Increased siltation causes habitat loss	-	Deterioration of fish habitat due to mud and silt	-	loss of fish habitat due to limited water
Impact of Socio-economic						
	Loss of land/ livelihood	_	_	Occupation health issues	Occupation health issues	• Increased Jobs • Better roads • Community development programs

5.3 Impacts Due to Project Pre-Construction and Construction

Although environmental impacts related to construction works are temporary in nature, its intensity could be severe unless due care is taken. Some of the impacts which are irreversible in nature may extend even well after the cessation of construction activities. Thus, it is imperative to address such issues appropriately well in advance to ameliorate the severity of such impacts to the extent possible.

Construction of such project involves various activities like site clearance, excavation, filling, blasting, tunneling, Reinforced Cement Concrete (RCC) works, etc. Keeping these activities in view, impacts of various environmental components are discussed below along with the mitigation measures.

5.3.1 Impact on Land Environment

a. Impact on Land Use Pattern

The total land required by the project is 42.2557 hectares which includes 39.0546 ha of forest land and 3.2011 hectares of private land. There will be both permanent and temporary land use changes due to the project. Permanent change will be due to the construction of various project components like reservoir, diversion structure, powerhouse, staff colony, office, access roads and other ancillary structures. However, temporary change in land use pattern is anticipated from activities such as batching plant, labor camps, etc. These temporary areas will be vacated after the construction activities are completed.

Mitigation

The land use pattern will be changed permanently by project components and staff colony, offices and access roads. No intervention can be made in these areas except that care shall be taken to keep loss of vegetation and land acquisition to the minimum and limited to the designated land.

In order to counter the adverse impacts due to forest loss, compensatory afforestation measures will be taken up by HP Forest Department in unreserved forest block C-194 of Chharang and unreserved forest block C-186 of Thangi over 79.00 hectares of degraded forest land. NTPGPL has already deposited INR 26,676,610/- (Rupees Twenty Six Million, six hundred seventy six thousand, six hundred and ten only) and the amount of NPV at the tune of INR 24,488,773/-(Rupees twenty four million four hundred eighty eight thousand seven hundred and seventy three only) to HP Forest Department for this purpose.

In addition, the Catchment Area Treatment (CAT) Plan has kept provision of about 12 % of total outlay, i.e., INR 72.484 millions, for forest conservation and improvement of Tree Cover (**Annexure 5-1**). The CAT plan also includes measures for afforestation of degraded forest land and to plant Chilgoza and other conifers in and around project areas. Other activities in the plan also provide measures for natural regeneration and replenishment of the degraded forests. An amount of INR 72.484 millions has been deposited by NTPGPL with HP Forest Department for implementation.

A Reclamation Plan of worth INR 4.558 million is proposed by the proponent for restoration of vegetation in the areas which will have temporary land use changes. Areas such as muck disposal area, batching plant, labor camp, quarry sites, etc. after the closure shall be covered with grass and plants. Local species for plantation shall be selected to restore the biodiversity of the area in consultation with forest department.

b. Impact on Soil

Any excavation work during the construction activities, whether permanent or temporary, would lead to loss of soil. Erosion of soil can also occur from removal of vegetation cover, runoff from unprotected excavated areas, muck disposal sites, quarry sites etc. Excavations on slopes would also decrease its stability. Given the topography of the area, unprotected excavations on sloping grounds may lead to landslide, especially during the rainy season.

Mitigation

Most of the excavation work has been completed, hence many of the measure are already in place like construction of a retention wall along the project roads and slope protection in the project area (Figure 5-1).

There are provisions of soil and moisture conservation works in the CAT plan where actions are to be taken up to stabilize active landslides, treatment of Nallas, bank stabilization and road side erosion and avalanche control. An outlay of INR 27,560,000 has been kept for this purpose and so far INR 2,732,680 has already been utilized for bank protection and avalanche control measures.

Figure 5-1: Retention wall provided at power house site (left) and bank protection at Lambar (right)

To mitigate the soil erosion and slope failure during rest of the project life, the following measures are suggested:

- Slopes in the excavated areas should be protected against sliding and any excavation should follow benching if the height of the excavation increases beyond 3 meters.
- All trace cutting works for road construction, adequate retaining wall or breast wall to be provided in case the geology is not self supporting.
- Slope stabilization measures will be adopted such as adequate vertical and horizontal drains, drainage along road sides, cross drainage etc.
- Controlled blasting practices to be adopted to avoid breach in retaining wall, slides etc.
- Mapping of structures likely to be impacted by vibration such as retaining walls, erosion and land stability/slides.
- Development of vegetation cover on the slopes or banks

c. Impact due to Solid Waste

The expected labor population for a period of 2.5 years of balance construction period as per schedule, although transitory, would generate large quantities of waste that needs to be disposed off without polluting the land, air and water resources of the region.

As detailed in Chapter 3, labor requirement will increase up to 500 during mid of 2015; hence all provisions shall be made to deal with maximum population at site. In India, the average per capita

solid waste generated per day is around 300 g. For about 500 workers, the solid waste generated would be approximately 150 kg (0.3 kg per day x 500 workers). Unless the solid waste management measures are taken, the waste will ultimately flow down to river creating water pollution problems.
In addition, very small quantity of bio-medical waste is produced from the dispensaries at Power house and barrage site. Inadequate waste management practices may lead to soil, surface and ground water contamination.

Mitigation

It was reported by the proponent that municipal waste from labor camps is transported to an incinerator installed at Kalpa and this practice will be continued for the whole of the construction phase. Similarly bio-medical waste is sent to Government Hospital at Reckong Peo for safe disposal.
In addition, it is suggested that the project authorities must ensure proper collection and disposal of this waste as follows:

- The solid waste generated in the camp site and site offices will be segregated as biodegradable and non-biodegradable prior for incineration at Kalpa.
- Dustbins of good and long-lasting quality should be installed at different places to collect organic, plastic, glass and other garbage separately.
- Metals, plastics and glasses in the garbage will be sold to vendors for recycling.
- The bio-medical waste will be sent to Government Hospital at Reckong Peo for disposal as it is done now.

d. Pollution due to Spills

During construction, about 30 kl and 11 kl of diesel is required at Intake point and power house respectively per month to run various construction machinery. To maintain steady supply, the project requires storage of about 16 kl of fuel at the head works and another 8-10 kl at the power house area.

The fuel usage produces burnt out lubricant oil (Waste oil) from construction equipment and DG set which is categorized as hazardous waste. About 5 liter of waste oil will be generated in a day and stored in the barrels.

Inadequate storage and handling of fuel and also waste can be a source of contamination to the soil and water of Tidong river. Improper handling may lead to leaks and spills impacting the soil and river water. The chances of such leaks or spills are rare but needs attention as uncontrolled events can lead to significant pollution.

Mitigation

The project has one secured underground diesel storage of 16 kl (fuel Pump) at the head works; however, the fuel storage at the power house area is not adequate. The diesel is stored in drums, which is prone to spills and contaminations. The project has obtained an NOC from the HPSPCB for storage and handling of the waste oil. In this regard, MOU has been signed with Shivalik Solid Waste Management Limited for the disposal of waste oil. The company is authorized by HPPCB for collection/transportation/disposal of waste oil.

For further good practices, the project authorities must ensure proper storage of these substances and the following measures should be taken to avoid any impacts:

- All hazardous waste collected at site shall be disposed off within a period of ninety days
- Segregate hazardous waste at generation point and store at a confined and designated area
- Storage of waste oil shall be in secured area with paved surface and restricted access
- The waste oil storage area needs to be provided with secondary containment and oil trap to control contamination of runoffs
- An MS tank type of facility shall be put in place immediately at the powerhouse location for diesel storage.
- Access to these storage areas shall only be given to employees who are well aware about its properties and effects and are trained to deal with any emergency situation like spills, fire etc.

5.3.2 Impact on Water Environment

A. Impact due to Muck Generated from Project

Muck is the major solid waste generated from any hydro electric project. The total muck generated will be 731859 m^3, out of this 146370 will be utilized in concrete work and balance 585489 m^3 will be disposed off. Inadequate handling of the muck generated can lead to damage of vegetation and agricultural land along the slope. Improper disposal of muck can lead to increase in sediment in receiving water bodies downstream of the construction site. The excavated material is generally loose, unstable and keeps rolling down, which not only deteriorate water quality but also affecting the water carrying capacity of the streams or river. The reduced capacity may lead to flooding during heavy rainfall or flow in the river.

Road construction in hilly terrain often generates significant quantity of wastes (muck) due to the stripping of the rocks to make way for the roads. The stripped muck is generally cleared by dumping

the material along the slopes. These dumped materials finally flow down to the valley and ultimately finds its way in to the river.

Mitigation

Based on the geological nature of the rocks and engineering properties of the soil, a part of the muck can be used as construction material. Out of total muck generation, about 32% will be reused within the project as backfilling material and construction material. Thus, it will conserve the resources required for these activities. The remaining quantity of about 585489 m^3 muck is to be transported and disposed at pre-identified, designated and adequately developed dumping locations.

For the project, four muck disposal sites were identified and these sites are provided with boulder crates and retaining wall to protect muck from flowing into the stream (Figure 5-2). Later one of the muck disposal sites was abandoned after agitation from the villagers and the Pollution Control Board also found out that the slope was too steep to qualify it as a safe disposal site. NTPGPL has complied with the instructions from the Board and at present, only three dumping sites are in operation.

Figure 5-2: Muck dumping site along Tidong River with retention wall

It was observed that the current sites need improvements and retention wall shall be provided all over the site and no dumping shall be done outside this earmarked area. Immediate repair

measures are also required at places where retention wall is damaged. More importantly, with the discontinuation of one of the site, the capacity of other operational sites is not sufficient to accommodate the generated muck. The proponent reported that the space for the additional muck disposal is available at intake point and this site will be prepared for dumping after construction of water diversion channel. It is suggested that the additional land shall be identified in consultation with HPSPCB as soon as possible and shall be provided will all mitigation measures.

Further, to stabilize the sites or restorations, all the muck disposal sites will be covered with vegetation after leveling and dressing the top surface once the dumping is completed.

c. Impact on Water Quality

Physical and biological characteristics of Tidong steam indicate that its water is of good quality and free from coliforms. There are no significant point sources of pollutants and diffused sources (agriculture & settlements) are also very sparse.

During construction, the likely impacts arise from inappropriate disposal of sewage from labor camps and colonies. The municipal waste going into the river channel could also contribute to the deterioration of water quality at least during the construction period.

As mentioned, about 500 workers will be stationed for the construction period. Taking the water demand of about 45 liters per capita per day (lpcd) for rural places with no sewerage system (CPHEEO) and assuming 80 % of this water comes out as sewerage, the total sewage production will be about 0.80 x 45 lpcd x 500 persons = 18 m^3/d. Considering BOD concentration of this domestic wastewater is about 250 mg/l and hence the BOD load contributed by labor camps will be about 4.5 kg/ day. If waste water is not treated properly it will affect the water quality adversely especially during the winter seasons when the river flow is low. If the human waste and refuse is directly drained into the river channel, the coliforms and other disease causing organisms may increase leading to water borne diseases. Therefore, in order to avoid any deterioration in water quality, the sewage from workers camp and other establishments needs to be treated before disposal.

Apart from waste water from labor camps rich in biological waste and coliforms, seepage discharge from underground works, aggregate washing discharge and batching plant wastewater contains significant amount of silt which if discharged directly into the Tidong Stream, will add to the slit content and increase turbidity.

In addition, water quality may also be affected with unchecked waste dumping or spill into the river.

Mitigation

At present there are a total of about 150 workers residing at three camp sites (refer to section 3.4.2). There are sixteen toilets with attached bathroom at the intake site, four units at adit V and twenty units at the power house. All toilets are connected with septic tank-soak pit arrangement to ensure proper disposal of sewage generated.

Facilities for the present condition are adequate. However, the following mitigation measures are suggested during rest of the construction phase of the project:

- For additional labor accommodation (peak demand of 500 workers), proper toilet and bathing facilities will be provided and waste water from these shall not be disposed off directly to land or water. The water will be collected and directed to septic tanks (of about 25m^3) followed by a soak pit. Cleaning schedule of these tanks will be prepared and followed
- Once the septic tank is full, it should be cleaned and collected sludge to be disposed to the nearest composting facility.
- No discharge from the septic tanks should be allowed to flow to the streams but instead it shall be passed through soak pits
- Desilting tanks should be provided for seepage water at each opening of underground works from where such water is discharged. These tanks should be designed in accordance to the silt load in the tunnel discharge to ensure the retention time of 2 hours. Cleaning schedule will be prepared for these tanks with a frequency so that they are cleaned before their effectiveness is reduced. Silt removed from the tanks will be used for leveling of land or dumped into the designated muck dumping sites
- Areas where desilting basin cannot be provided, rock filters may be created to arrest silt
- As detailed earlier, all the garbage shall be collected and disposed off adequately to the disposal site or to the incinerator
- Leakage of oil wastes from oil storage and vehicles should be avoided in order to prevent potential contamination of streams or ground water
- Surface runoff from oil handling areas/devices should be treated for oil separation before being discharged into the river.
- Waste Oil/ grease/ lubricants are categorized by MoEF as Hazardous Wastes. All such waste will be collected and stored at a protected place and sold to a vendor authorized by HPSPCB or MoEF

- Segregation of storm water shall be properly carried out to avoid its contamination from any waste, i.e., municipal or hazardous.

5.3.3 Impact on Air Environment

a. Impact due to Construction Activities

Construction activities have two-fold impacts, i.e., dust generation and emission from fuel burning to run the construction equipments. Construction period impacts on air quality is mainly due to the activities like site preparation, approach roads, excavation, drilling, blasting, foundation, tunneling, deployment of machinery, transportation, sand quarrying, storage to time and through different stages of development of project.

The construction activities have already started and dust generation (SPM) from the project activities has been a major concern. The fugitive SPM may cause immediate effect on the construction workers who are directly exposed to the fugitive dust in addition to its effect on the neighboring community.

In addition to dust, fugitive emissions from various construction machineries will also result in the increase in SPM, NO_X and SO_2 levels in the air.

Mitigation

The emission from construction activities is of temporary nature and restricted to project site only. There are several measures in place to reduce these emissions and it is suggested to continue these actions in future in order to reduce the impacts.

- Power supply from Himachal Pradesh Electricity Board is used for electrically operated construction machinery/equipment and this arrangement shall continue to reduce the consumption of diesel
- The use of DG set would be limited during power failure as a backup
- For fugitive dust control, sprinkling of water on the project roads will be continued
- Grading operation to be suspended when the wind speed exceeds 20 km /hr
- All storage piles shall be adequately wetted or covered with plastic to ensure protection of ambient air from fugitive emission during wind storm
- The wind barriers of 50% porosity will be installed three sides of all storage piles

- All the stone crushers if installed for project activities will be installed with suitable pollution control arrangement and obtained through consent from HPSPCB
- Concrete batching plant will be located at closest possible location to the point of use so that the requirement of transit mixers/ delivery trucks is minimized
- Operation time of construction equipment will be optimized through modifications in the work schedule
- All stationary machines/ DG sets / construction equipment emitting the pollutants will be inspected weekly for maintenance and should be fitted with exhaust pollution control devices.

b. Impact from Vehicular Movement

The project construction would require about 63 thousand m^3 of fine aggregate, 0.13 million m^3 of coarse aggregate, 49 thousand tons of cement, 577 tons of steel and about 0.71 million m^3 of muck to different muck disposal sites within the project area. These would have to be transported from source to the construction site/batching plant. The course and fine aggregate would be transported from the quarry site but the steel and cement would come all the way from their source via nearest railway station at Kalka. In addition, for the operation and construction machinery, about 1.5 million liters of POL (Petroleum, Oil & Lubricant) would also be transported to the project site. Transportation of aggregate, sand, muck in and around the construction site would add SPM and other pollutants from vehicular emissions to the local air shed.

Transportation of the construction material from Kalka to the project site would put considerable pressure on the Kalka-Peo road and reduce its service life. Locally the PWD road is used and presently, it has a load of around 40 to 45 light and heavy vehicles every day. This load is expected to raise to around 80 to 90 vehicles per day during peak construction activities of the Project.

The increased traffic on this road would also increase air pollutions and the same would disperse in the vast volumes of available clean background air not having any noticeable impact on the air quality along this route.

Temporary increase in traffic flows on the road network linked to the project would lead to potential delays and congestion on already narrow roads thereby increasing idling of engines and pollution.

Mitigation

Currently, sprinkling of water along the roads and construction area are being carried out to minimize dust emissions (Figure 5-3) but it is not adequate and its frequency needs to be appropriately increased specially during the dry seasons.

Figure 5-3: Water sprinkling system mounted on a truck

Other measures that are required to be in place in order to keep vehicular emission in check are as follows:

- Frequency of sprinkling water on roads shall be increased and maintained on hourly basis in dry seasons. Special attention will be provided for the roads stretches passing through villages
- Idling of delivery trucks / tractors and other construction equipment's should not be permitted during the periods when they are unloaded or are not in active use
- Effective traffic management to be undertaken to avoid significant delays in and around the project area
- Road damage caused by sub-project activities will be promptly attended to with proper road repair and maintenance work
- The project roads and PWD road from NH-22 will be inspected and the debris left by the tractor - trolleys will be removed as early as possible.
- As far as possible the movement of heavy, wide or slow-moving loads will be planned at times when traffic volume on the roads concerned is least
- Liaison with the police and other authorities prior to the movement of any abnormal loads or any over dimensioned consignment

5.3.4 Impact due to Noise and Vibrations

The primary noise generating activities at during construction could arise from:

- Blasting & Drilling,
- Concreting & Mixing,
- Casting and Material movement.

For the tunneling, drill and blast method is used which generates noise and vibration. In addition, several construction equipments are operated at the construction site to generate noise levels at source in the range of 80-140 dB (A) (Table 5-2).

Table 5-2: Typical noise level of construction equipment

Sl. No.	Equipment	dB(A)
1	Drilling Machine	120-130
2	Motor Scraper	85-95
3	Face Shovel	80-90
4	Dump Truck	80-90
5	Compactor	80-85
6	Dozer	80-90
7	DG Set	80-110
8	Pumps	80-100
9	Grouting m/c	80-100
10	Jack Hammer	130-140
11	Vibrators	70-82
12	Compressors	90-95

The noise is most prominent at the work phase, the personnel operating the machines and workers stationed near to the machines are prone to exposure of high levels of noise for extended periods. Continuous exposure of workers to high level of noise may result in annoyance, fatigue and may cause temporary shift of threshold limit of hearing and even permanent loss of hearing.

The impact of noise produced during construction will be limited to a distance of about 50 to 200 meters at which the noise level of various equipment will come down below 55 dB(A). As there are no sensitive receptors around the project site to have direct noise impact, it could therefore, be concluded that the noise produced during construction activities will not have much significant impacts.

The blasting activity generates ground vibrations and travels a long distance from the blast site. These vibrations could be felt by human and also scare the wild life in the area. During one of the consultation, villagers form Lambar complained about strong vibrations felt during the blasting at intake site. However, there has been no reported damage to the permanent structures or house.

Mitigation

It is important to mention that most of the drill and blasting work has already been finished and hence any major impact is not envisaged in future. The impacts from concreting will be local. However, the following mitigation measures are agreed by the proponent to ensure least impacts:

- The construction works will be carried out during the day time. The work hours should be limited depending on convenience of the local people.
- The construction equipment generating high noise must be designed to have an adequate muffler system.
- All stationary noise generating equipments such as air compressors and power generators should be used away from the residential area.
- The Acoustic Enclosure should be provided to all noise generating equipment e.g. compressor and the walls of the enclosure should be insulated so as to comply with the 75 dBA at 1m sound levels specified by CPCB, MoEF.
- The total sound power level, Lw, of a DG set should be less than, 94+10 log10 (KVA), dB (A).
- Noise from the DG set should be controlled by providing an acoustic enclosure or by treating the enclosure acoustically.
- The DG set should also be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A).
- A proper routine and preventive maintenance procedure for the DG set, compressors and vehicles should be set and followed in consultation with the respective manufacturer which would help prevent noise levels from deteriorating with use.
- Provision of proper Personal Protective Equipment (PPEs), i.e., ear muffs and war plugs, will reduce noise impact on personnel.
- Movement of vehicles should be restricted to day time only.
- Restriction on pressure horns.

- Controlled blasting techniques such as Noiseless Trunk Delay (NTD) technique etc. to be adopted to reduce vibrations.
- Over ground blasting time should be established during day time only. The established time will be notified and displayed in project area at strategic places such as main gate, project office, project roads, near blasting site etc.

5.3.5 Impact on Ecology

a. Impacts on Vegetation

As mentioned earlier, the project requires 39.0546 ha of forest land and 3.2011 ha of private land. The trees approved for felling on diverted forest land and damaged trees on adjacent non diverted forest land were estimated by the Forest Department for the purpose of compensation to be paid by NTPGPL. As per estimate, approximate number of trees have been removed is 1261.

There was a general concern that improved access to the presently virgin area during and after construction of the project would put pressure on the forest adjoining to the project site and may lead to degradation of nearby forests if not managed properly.

During the construction period, the area will have large number of labor and there could be a tendency to collect wood from nearby forest for various purposes legally or illegally which can affect the health of the forest.

Out of 30 species of trees present in the project area of Tidong-1 HEP, Chilgoza *(Pinus geraradiana)* is the rare tree species which is economically very important. Therefore, an effort should be made for the minimum damage to the Chilgoza trees. After a careful scanning of shrubs present in the project area, it has been found that one shrub species *(Zanthoxylum alatum)* is of threatened category and the 8 species *(Berberis aristata, B. lyceum, Desmodium dichotomum, Hypericum choisianum, H. lysimachioides syn H. dyeri, Olea ferruginea, Rosa sericea* and *Salix hastate*) of shrubs are rare. Four species of rare categories and one species of threatened category of herbs are also present in the project area. The loss of the forested area and vegetation by the project structures and facilities is unavoidable but rare and threatened category of plants shall be protected.
Due to various project activities, additional 373 trees on non diverted land were damaged during construction till date. The Forest department assessed the damage of trees and NTPGPL has deposited a sum of INR 8.3 million to The Forest Department as compensation. Such violations need to be avoided.

Mitigation Measure

Several measures are in place to minimize the loss of forest area and vegetation. NTPGPL has already deposited INR 26,676,610/- (Rupees Twenty Six Million, six hundred seventy six thousand, six hundred and ten only) and the amount of NPV at the tune of INR 24,488,773/-(Rupees twenty four million four hundred eighty eight thousand seven hundred and seventy three only) to HP Forest Department for compensatory afforestation in unreserved forest block C-194 of Chharang and unreserved forest block C-186 of Thangi over 79.00 hectares of degraded forest land. The afforestation activities have not started as yet and the proponent is following up with the department on a regular basis.

Guards are already posted at the project roads to check any illegal entry to forests. Consultations with villages and forest department officials have been made to keep a strict vigil on the forest areas.

For the future, the following measures must be adhered to:

- The trees to be cleared shall be marked, documented and demarcated properly in presence of Forest officials and project representative. The contractor will be given order to cut only designated sites and tree under strict supervision of the project environmental officer.
- To avoid the illegal extraction of firewood, provisions for room heating facility and common geysers are to be made in labor camps. Contractor should be made responsible to provide free fuel wood for the above arrangements contractually.
- The firewood will be acquired from designated wood deports only.
- During the project construction, control of fire wood is difficult to control. It is difficult to make out which wood had been collected from forest department and which one has been illegally acquired. It is therefore suggested that the use of wood in labor camps be totally eliminated and only diesel fired chullas must be mandatory.
- Preference will be given to employ local work force to minimize the burden on fuel wood resources.
- Project proponent and contractor should inform their migrant workers at the time of induction on the prohibition of roaming in the forest areas without the permission of the management. Notice on this regard will be posted in the camp notice boards on permanent basis. Anyone found roaming or exploiting forest resources without the knowledge of the management should be penalized.

- Vigilance to be kept on the adjoining forest areas and forest entry points in the project area by deploying security guards and patrolling nearby areas. Vigilance may be enhanced by engaging local communities/ gram panchayat through constitution of joint committees.

b. Impact on Terrestrial Fauna

The Study area of the project (10 km radius area) does not encroach into any Wildlife Sanctuary or National Park. The possibility of existence of a wildlife corridor was discussed with the forest department and the local communities. After discussion, it was concluded that this area does not constitute a corridor for movement of wildlife.

During blasting, ground vibrations are generated. These vibrations may not be perceived by humans but could sometime scare wild animals. The wild animals tend to locate themselves in far away areas where the ground vibrations are not felt. This often brings a re-distribution of wild animals in the area. The re-distribution could cause territorial conflict within the same species or could alter the prey-predator ratio. To a lesser extent, atmospheric noise generated by the project machinery could also scare animals.

During the EIA study, the pugmarks of Snow Leopard were noticed. The region is also a habitat of Black and Brown Bear and Musk Deer. On further discussions with villagers and forest officers, nobody has ever seen any of these animals in Tidong in near past. Thus, it is difficult to associate impact of this project on these rare species.

During the discussion with the Forest Department, it was evident that the opportunity for poaching might increase because of the accessibility of the site due to the construction of better roads by villagers or workers.

Mitigation

To avoid and minimize the negative impacts on wildlife following safeguard measures will be adopted:

- All mitigations measures suggested in ambient noise level section will be strictly adopted.
- Anti-poaching measures like intensive patrolling will be undertaken with the help of the forest department.
- Strict restrictions and joint surveillance with villagers as suggested in flora section will be imposed to ensure that no worker or villager will harm any wild animal or bird.
- Provisions will be made for the supply of free fuel for worker's camp to avoid forest degradation and destruction of animal habitats.

- If any wild species is ever encountered in the work area, the same should be immediately reported to the project authority and forest department.

c. Impact on Aquatic Fauna

The aquatic biodiversity in Tidong is limited and no fish are been reported there. Recent fish survey by AECOM has refuted the presence of the species of Snow trout (*Schizothorax richardsonii*) and Rainbow trout (*Salmo trutta fario*). Moreover, flow in Sutlej will not be affected as water diverted to the HRT will be released in the Sutlej river.

5.3.6 Impact on Socio-economic Conditions

a. Impact due to Acquisition of Land

The private land acquisition for the project in execution has resulted in 28 families losing part of their agricultural land. The project did not acquire any house and none of them is physically displaced. Majority of the households have lost less than 20% of the land holding followed by 4 families who lost between 20%-30% of the land holding. Only one family lost about 32% of its land. The land acquisition pattern indicates that all the land losers have some land left for sustenance and none have been rendered landless.

As mentioned earlier, the land was acquired through the Land Acquisition Act by the Government of Himachal Pradesh and the land was handed to the proponent after acquisition. The land was acquired by the State Government through the LAA of 1894 and the Collector was to assess the current land value based on recent transactions in the area. The area being remote, no land transaction had taken place in the immediate past before the acquisition and therefore, the collector decided the market value of land based on the adjoining area, namely Rispa and Pibar. Based on the land acquired for the transmission lines between Karcham and Jhakri of Bhawanagar project and an additional 20% increase, the amount of compensation for the acquisition of private land was suggested as INR 74,99,900 per hectare for irrigated/orchard land and INR 16,66,200 per hectare for un-irrigated/uncultivable waste land (Attached letter of ADM-cum-land acquisition collector, Pooh dated 30th June 2009 as **Annexure 5.2**). In addition, compensation was also made for the 4 kutcha/semi-pucca structures and 173 fruit trees on the acquired land. A Solatium at the rate of 30% (as per the LAA) was also paid to the land losers.

All the land owners have reportedly accepted the compensation with protest. About 20 of them have filed petitions in August 2009 to the District Judge of Kinnaur under Section 18 of the LAA seeking enhanced compensation against the Himachal State, Land Acquisition Collector and Tidong Power Generation Pvt. Ltd. The petition indicates that the Land Acquisition Collector wrongly

assessed the land cost and failed to assess the actual value of the land in the locality. The petitioner claims that the actual land cost should be INR 2 million / Bigha. The petitioners also mentioned that the land compensation is much lower than that has been granted by HPSEB in the same Tehsil and adjoining village and for the construction of Kasang Hydro-Electric Project. The petition did not contest the compensation paid for the trees and the structures and appears that they were satisfied with the compensation. The case hearings are in process and court's decision is still pending.

The forest products of Neoza (Chilgoza) trees in the region are considered as the common property of the Village Panchayat. The income from the yield is shared amongst the households. The diversion of forestland and loss of Chilgoza trees for the project has resulted in loss of income for the Panchayats and to the villagers.

Mitigation

The NTPGPL provided the compensation amount as decided by the Government who acquired the land under the LAA. It is required to mention that if the compensation amount is enhanced by the Court and Government, the proponent is willing to abide to those orders.

To address the limited impact on loss of income for the direct affected families and the affected panchayats the Deputy Commissioner, Kinnaur in consultation with the representatives of the affected panchayats and NTPGPL have developed a Resettlement and Rehabilitation Scheme for Project Affected Families and affected villages of Tidong-I. The revised draft scheme is forwarded to The Principal Secretary (Revenue), Government of Himachal Pradesh for approval and taking further necessary action. The approval of the scheme is awaited. Based on the proposed R&R Scheme for the project Resettlement Action Plan (RAP) have been prepared and submitted as a separate document, which includes provision of R&R plan and also provide for additional measures to address ADB's SPS requirements.

NTPGPL as per the Hydro Power Policy, 2006 of Government of Himachal Pradesh and in compliance with the Implementation Agreement with the Government of Himachal Pradesh is contributing 1.5% of the project cost i.e., INR 80.30 Million for the local area development activity. For the affective implementation a Local Area Development Committee (LADC) is formed under the Chairmanship of Deputy Commissioner, Kinnaur. Till the end of September 2012 NTPGPL has contributed an amount of INR 54.60 Million towards the local area development fund. A number of development activity such as construction of path ways, community buildings, temples, protection walls etc have been undertaken in the 3 affected panchayats of Moorang, Thangi and Rispa. The details of the disbursement of the fund and the utilization are presented in the Community Development Plan document prepared separately.

In addition to the above NTPGPL as part of its CSR principles is also undertaking a number of initiatives for promoting local culture and tradition. Till end of September it has spent INR 4.17 Million for various activities. The details are presented as part of the CDP document referred above. The CDP in addition to presenting the status of the various activities taken up so far also focuses on the works to be undertaken to address the concerns and needs of the neighborhood community.

The Project proponent has also paid the compensation for the diverted forest land which includes the net present value (NPV) and includes the monetary value of Non Timber Forest Products (NTFP).

In addition NTPGPL has also provided direct financial support to affected Panchayats for community development works and addressing any direct or indirect impacts from project activity. For this it has paid INR 51.80 Million to the 3 affected gram panchayats.

NTPGPL in consultation with affected panchayats also agreed to pay compensation for the loss of earnings form Chilgoza trees damaged during the construction process. The payment will be made by 30th November of each year based on the prevailing wholesale rate in Reckong Peo in first week of the same month. Upon approval of all the stakeholders the disbursement is proposed to be initiated from year 2013 for the period of 40 years and made through Deputy Commissioner/ Additional District Magistrate as appropriate (**Annexure 5.3**).

The social issues need attention and project proponent shall maintain close association with the villagers and panchayats to resolve the issue amicably.

b. Impact on Human Health and Safety

Labor population along with their families would also be vulnerable to the increased incidence of diseases (like cholera, gastroenteritis) caused due to lack of sanitation (water supply and waste disposal). Workers will also be exposed to several occupational hazards while working in the project at different components such as electrical hazard, fall of a person due to hazard while working at a height, hazard of falling object from overhead / in underground work, hazard of flying rock due to explosion, hazard of unwanted explosion while handling explosive, fire hazard, hazard of tunnel collapse, hazard of drowning into river, fire hazard, etc.

Mitigation

Regular health checkups and EHS training are conducted for the workers. During remaining construction period, the practice shall be continued and following measures shall also be implemented:

- The proponent should organize health awareness campaigns though street theaters and issue of pamphlets in local language.

- Provision shall be made so that locals can use health care facilities at the project site.
- Pre-employment health checkup for all the workers and employees, provision of safe drinking water, sanitation, garbage management and healthcare facilities would control and prevent the occurrence of diseases in the project area.
- Proper leveling of the site and provision of drainage to avoid water stagnation.
- Safety audit by an expert agency to be conducted for the project at regular intervals.
- Adequate PPEs to be made mandatory to all the persons entering work sites.
- Training and awareness programmes to be conducted for all the workers.
- Handling of explosive to be ensured in the strict supervision of licensed person only
- Explosive to be strictly stored in licensed magazine only and if found in any other place, strict action should initiated against the responsible person. Accurate inventory of the explosive received, issued and person in-charge for issued explosive should be maintained.
- Explosive to be transported in licensed explosive van only under the strict supervision of licensed person. Left over explosive from work sites should be sent back to the magazine immediately.
- The site shall be provided with fire extinguishers and sand buckets to deal with accidental fires.
- Smoking is strictly prohibited in and around the storage of explosives and hazardous waste storage.

c. Provision of Jobs

The project has positive benefits in terms of provision of jobs and contracts to localities. About 15 people from project affected families were given jobs and about various works of worth INR 150 Million have been given to local contractors from affected panchayats. This indeed has contributed to the well being of some of the locals.

In addition, the compensation distributed to the PAFs, was also reported to be utilized in improving apple orchards, buying land or constructing houses, which will give these families extra income and financial security from additional assets.

5.4 Impacts due to Project Operation

Unlike industrial projects, hydropower projects attract very less impacts during operations. In these projects, the operation is the phase of environmental restoration. Many of the appropriate environmental measures adopted during the construction shows its benefit during the project operation phase. The operation phase is not labor intensive unlike construction. Not more than 50 staff will be required during this phase.

5.4.1 Impact on Water Environment

a. Impact on Water Quality

The water availability will be restricted due to the project in lean season and water will be diverted through a tunnel for power production. However, this is not anticipated to cause any impact on agriculture or domestic usage as river water at this stretch is not used by any villager for irrigation or any other purpose.

The wastewater will be generated from staff colony but as discussed only 50 people may be stationed for the operational needs of the project. Thus, total waste to be discharged will be 0.80 x 45 lpcd x 50 persons = 1.8 m^3/d. Considering BOD concentration of this domestic wastewater will be about 250 mg/l and hence the BOD load contributed by labor camps will be about 0.45 kg/ day.

During operation a colony will be provided for about 50 people and a waste of about 15 kg will be produced from this colony, which needs proper attention to avoid water and soil pollution.

Mitigation

Domestic wastewater from the residential staff colony will be treated through septic tanks and soak pits. Properly treated water conforming to the desired standards[4] will either be reused for greenery development or released into the natural water channels.

The solid waste generated in the staff colony will be very less and providing incinerator may not be viable. The available facility at Reckong Peo which is the district head quarters will be utilized to dispose-off the solid waste.

b. Impact due to River Level Rise

The water impoundment in the reservoir by the barrage structure will be in 0.4844 ha which will not cause any significant impact to the upstream. There will be no submergence of orchard / agricultural

[4] General Standards for Discharge of Environmental Pollutants Part –A: Effluents as referred in Schedule-VI under Rule 3A of The Environment (Protection) Rules, 1986.

fields. However, due to fluctuation in water level there could be some slide or erosion till Full Reservoir Level (FRL).

Mitigation

It is suggested to provide protection to the river banks in the critical areas.

c. Impact due to Water Stagnation

The stagnant water and vegetation provide favorable breeding place for vector life such as mosquito and snails. The project being a run-of-the-river scheme does not have any significant impoundment of water except for a balancing reservoir of about 2 ha. As water will be flowing, the chances of mosquitoes to thrive are less. Moreover the project is in high altitude and the temperature is low most of the year. Under these condition mosquitoes do not exist. The field survey showed that the typical vector borne diseases like malaria are not common in the project area. Low temperature is also a reason for absence of malaria incidents. Increased health facilities due to the project would also improve the situation.

Mitigation

Though chance of any disease due to the impoundment of water is negligible but all precautionary measures will be taken to mitigate such situation immediately. The medical team in the project will be properly instructed to keep a watch and take care of any reported case.

5.4.2 Impact on Air quality

Once the construction is over, all heavy machines and vehicles will be discontinued. Only source of air pollution will be 4-5 vehicles to be kept for transport of staff or to bring office or kitchen supplies. This will contribute minimally to the total load in that region.

As suggested an incinerator will be provided which will contribute to the air pollution, but the impact will be negligible as the incinerator is proposed to be double chambered and electric type. Moreover, it will be fitted with air pollution control equipment to meet standards.

Mitigation

As the vehicular movement generates fugitive dust in the area, hence project roads will be paved and sprinkling of water shall be practiced in unpaved areas.

5.4.3 Impact on Ecology

a. Impact on Forests

In hydro project, generally the operation phase is the phase of ecological restoration. Many of the undesirable ecological impacts during the construction can be reversed during the operation phase.

Many of the remedial actions taken during the construction phase display the beneficial impacts during the operation phase. For example, the restoration of the much disposal areas undertaken during the construction phase stabilizes and the scar gets covered with vegetation during the operation phase. The CAT, compensatory afforestation etc also demonstrates the beneficial impacts during the construction phase.

However, there could be deleterious impacts during the operation phase. The improved access to the project sites will open an avenue to the villagers and other interested parties as encroachers for illegally entering into the forests which are currently pristine. It is anticipated that increased human activity in the area might increase the pressure on the forest. On the other hand, the requirements of fuel wood for heating and cooking will be replaced by electricity generated by hydropower projects, ultimately reducing deforestation.

Mitigation

- HP Forest Department is required to tighten the forest access and improve the surveillance to control on illegal entrants into the forest areas adjoining to the project.
- NTPGPL will depute security personnel to check the forest entrants from the project areas.

b. Impact on Wildlife

There is no additional impact of wildlife due to the operation of hydropower project. It has been mentioned in the construction impacts section that some of the animals could be redistributed due to blasting operations. Since during the operation phase, there will be no blasting, the scared animals will return to their original habitat and things will return to normalcy.

c. Impact on fishes in reduced flow zone

As per the Government of Himachal Pradesh Notification no. MPP-F(2)-16/2008 of Department of MPP and Power, projects shall ensure a minimum flow of 15% of the lean season discharge of the stream, immediately downstream of the diversion structure of the project throughout the year. As per the mentioned notification and based on the water availability, the project needs to discharge a minimum of 0.3 cumec of water downstream of the diversion structure. However, NTPGPL has committed to release 0.5 cumec of water downstream of the diversion structure to maintain the aquatic life though the latest ecological study conducted by AECOM indicates the poor aquatic life in the Tidong Khad.

Mitigation

It is important to note that about 260 m downstream of diversion structure; five streams join Tidong River (Refer to section 4.3.2). These steams will make some contribution to the overall flow of the

river but discharge data of these streams is not available to predict total water in Tidong beyond 260 m from diversion.

Since there are no fishes near the head works, no impact due to the reduced release of water is anticipated on the riverine ecology.

NTPGPL has deposited money to Directorate of Fisheries, Government of Himachal Pradesh for Fisheries Development Plan. The plan includes:

a) Development of sustainable fisheries in Sangala (Fishery department is proposing fish development in Sangala since the gradient of the river and aquatic life do not support the fish development in the Tidong Khad).

b) Adequate replacement of Riverine fish fauna through stocking

Directorate of Fisheries proposes to stock an exotic species, *Salmo gardnerii gardnerii* (Steelhead Trout), in addition to the Snow and Brown Trout.

The above mentioned measures are not yet initiated, though NTPGPL is following up with the Directorate of Fisheries to ensure that the above plan for which they have deposited money is implemented to maintain the riverine ecology of the Tidong River.

The Directorate of Fisheries may reconsider the introduction of a new exotic species in the Tidong River in view of the fact the cause of decline of Snow Trout in Himachal Rivers is mainly because of the introduction of new exotic species. In addition, development of fish stock in the reservoir is not considered a good practice as the entrainment of fish, fish seeds and other material will damage the turbine and also mortality of fishes.

5.4.4 Impact on Socio-economic conditions

Once the project is operational, the project has several benefits to the immediate affected community and society in large.

Directly, it will provide good access roads and health facility at site during emergencies. In addition, the project will be benefited from several grants being given to State Government, Panchayats under Local Area Development (LADA), Corporate Social Responsibility (CSR) and Fisheries development etc. These grants will be utilized in several programs toward bank stabilization, afforestation, fishery seeding, renovation of temples, panchayat bhawans, schools, water tanks, road improvement etc.

5.5 Decommissioning of Project

Decommissioning activities depend on the proposed subsequent use of the site, but they typically consist of removal of infrastructure (e.g., turbines, substations, roads) and reclamation of the project site, which may include re- vegetation wherever required.

NTPGPL shall prepare a detailed decommissioning plan at least one year prior to the commencement of decommissioning. During this planning the following measures shall be ensured:

- Inform the community and relevant stakeholders about decommission and proposed subsequent actions
- Remove all structures turbine, including foundations to the extent possible
- Remove all waste collected at site, including the demolition debris
- Noise and dust emissions to be kept low during the decommissioning
- Roads and culvert to be retained after consultation with the community
- Heavy vehicle movement to planned and informed to the community
- Landscape development

5.6 Cumulative Impacts

5.6.1 Impact on Sutlej Basin

Tidong is one of 14 well known tributaries to river Sutlej during its 320 km course in Himachal and Punjab. Projects under operation, execution and under allotment together constitute about 9600 MW (Table 5-3).

Contribution of Tidong-1 HEP on entire Sutlej basin will be negligible as 100 MW represents only about 3% of cumulative capacity of projects under execution on Sutlej basin and only 1% of overall potential on the basin.

Table 5-3: Project on Sutlej in various stages

Category	Capacity (MW)
Projects Under Operation	3,277
Projects under Execution	3,080
Projects allotted / under process of allotment	3,157
Projects to be re-advertised	144
TOTAL	**9,657**

Source: HP State Electricity Board

5.6.2 Cumulative Impact of 100 MW Tidong-1 and 60 MW Tidong-2

Tidong-2 HEP (60 MW) is planned in the upstream of this project. The execution of Tidong-2 is not yet started as the matter is under litigation. No information is available on the Detailed Project Report (DPR) of Tidong-2 but a schematic diagram of Tidong-1 & 2 HEPs on the stream is shown in Figure 5-4.

It is evident that Tidong-2 will have environmental impacts and that may add up to the environmental impacts of Tidong-1. The impact will be more pronounced if the construction of these two projects overlaps. The valued environmental components (VEC) studied to have cumulative impact of both the projects include; i) Private Land Acquisition; ii) Forest Land diversion; iii) Loss of NTFP; iv) Influx of additional laborers; v) Decrease in economic base of affected population; vi) Damage to local culture; vii) Negative health impacts; viii) Increased traffic volume; ix) Increase in dry stretch of Tidong stream; x) Silt enhancement in river basin; xi) Shrinkage of wildlife habitat; etc.

The cumulative impacts are identified for proposed Tidong-1 & 2 projects and are discussed in environmental and social categories in the Table 5-4. Tidong-2 has been delayed due to legal issues between the government and the initial project proponent. After resolving of the matter, detailed investigations are to be conducted and clearances will be obtained before starting the work on site. Therefore, it is very unlikely that the timeframe of both the site construction works will overlap with each other. Therefore, it is understood that any activity on the ground for Tidong-2 may take 1-2 year's time. This would effectively mean that the peak labor force of the Tidong-1 would have moved out or will be in the stage of moving out when the Tidong-2 commences, hence, there will limited overlap of labor influx. Some of the labor engaged with Tidong-1 will effectively move into Tidong-2 which will also reduce any further migration from outside. Regarding ecological flows and traffic load on PWD road, a detailed study needs to be conducted to ascertain the exact amount of

water to be released to fulfill the environmental requirements of the affected stretch of the stream and a detailed traffic movement and safety study for the common PWD road.

Figure 5-4: Schematic Diagram for Tidong-1 HEP and Tidong-2 HEP

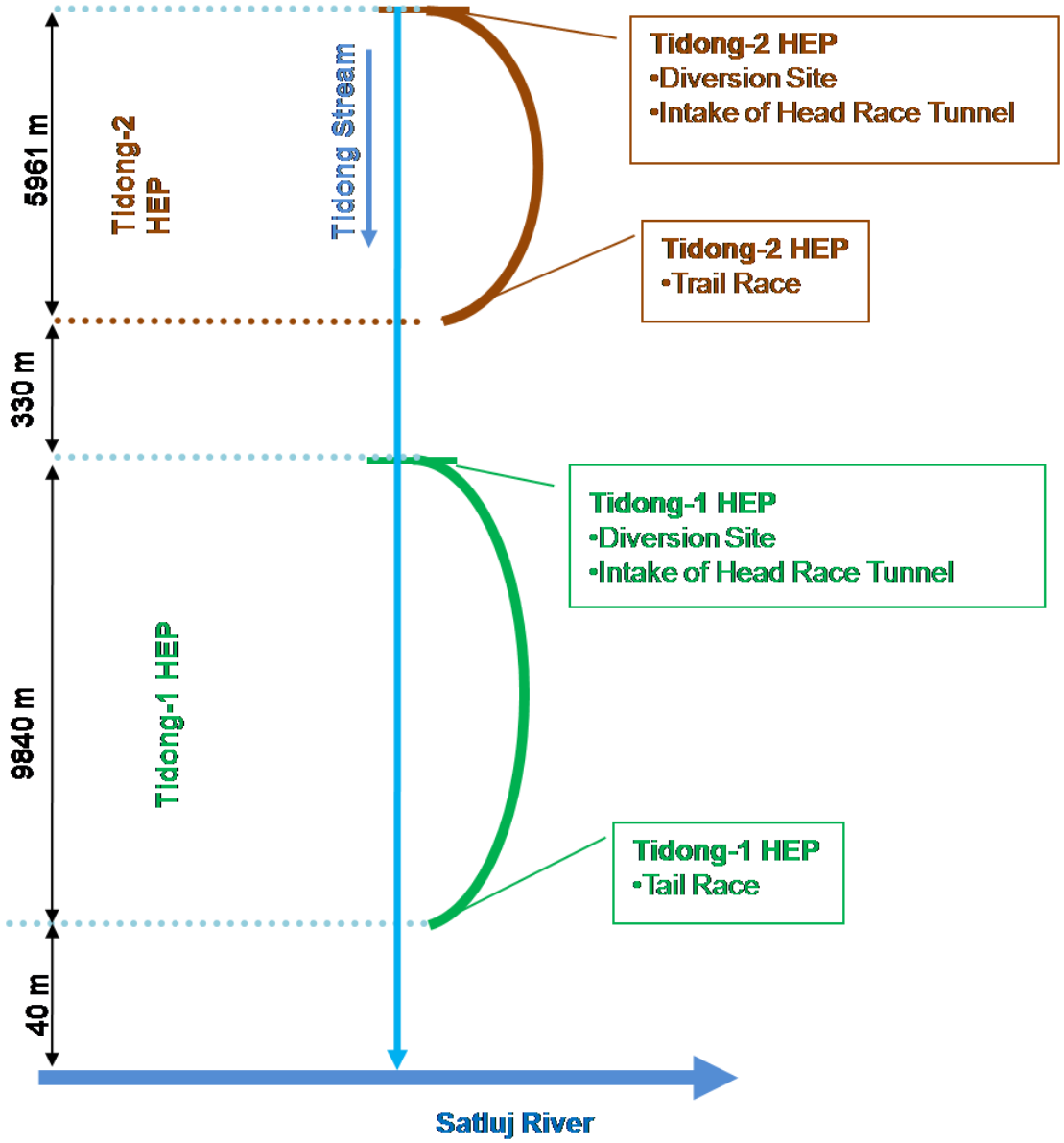


Table 5-4: Analysis of Cumulative Impacts on Valued Environmental Components (VECs) for Tidong

Component	Concern	Cumulative Impact (Y/N)	Material Cumulative Impact (Y/ N)	Mitigation measures	Responsibility
Physical Environment					
Water Quantity	Tidong 1 and 2 are just 300m apart and after commissioning, will have cumulatively affect on stretch of about 16-km of Tidong stream except 330 meters between the two projects. It may cause shortage of water in the stream and effect aquatic life.	Yes	Yes	Detailed study to be conducted by an independent agency, to assess minimum flow to be maintained in the affected stretch of river during lean season.	Both (Tidong-1 HEP & Tidong-2 HEP)
Water Quality	Cumulative amount of slit from both the projects will be higher if constructed simultaneously.	Yes	No	Catchment area of Tidong-2 and 1 will be common. Cumulative catchment area treatment measures will improve the overall silt load from the area.	Forest department to implement the CAT pan.
Air quality	The traffic load on PWD road along Tidong stream will increase significantly if vehicles from both the projects are included on this road.	Yes	No	No mitigation measure is envisaged as impact will not accumulate to a material level	
Noise	Operation of Tidong 1 and construction phase for Tidong 2 will have cumulative noise levels in the area between power house of Tidong 2 and intake of Tidong 1	Yes	No	Each project need to implement the noise abatement measures properly.	Both (Tidong-1 HEP & Tidong-2 HEP)

Component	Concern	Cumulative Impact (Y/N)	Material Cumulative Impact (Y/ N)	Mitigation measures	Responsibility
Land use change	Tidong 2 envisages using more of Forest land and it will cause a permanent land use change.	Yes	Yes	Afforestation and land development measures including pasture land development to be adopted	Both (Tidong-1 HEP & Tidong-2 HEP)
Biological Environment					
Terrestrial Ecosystem / Vegetation	Loss of forest ecosystem; Loss of plants with economic value; Diversion of forest for Tidong-2 would lead to loss of trees including NTFP i.e. Chilgoza, fuel wood, etc. extracted by the villagers as per the existing law. Additional work force for Tidong-2 HEP may create an extra pressure on Fuel wood resources from remaining forest. In extreme case villagers may be forced to buy fuel wood, to fulfill their needs causing further loss in income.	Yes	No	No mitigation measure is envisaged as impact will not accumulate to a material level	
Wildlife and Wildlife Habitats	Forest area for Tidong-1 has been considered as peripheral zone of wildlife habitat. However the forest area concerned Tidong-2 may fall in higher altitudes i.e. above 3000 msl and at the inward side of the peripheral habitat zone for wildlife of the region. This will shrink the movement zone of the animal, especially the leopards.	Yes	Yes	Impact on wildlife to be studied, in consultation with local forest department, with special emphasis to the specified endangered and vulnerable species in the area. Conservation measures suggested in the study to be ensured.	Tidong-2 HEP

Component	Concern	Cumulative Impact (Y/N)	Material Cumulative Impact (Y/ N)	Mitigation measures	Responsibility
Fishes	Effect on fish population, due to decrease in water flow and available water depth in the downstream of diversion structure.	Yes	No	No mitigation measure is envisaged as impact will not accumulate to a material level	
Socio economic Environment					
Social	In case the private land is acquired for Tidong -2 then there is a possibility that same families may lose their land from villager Lambar who have lost their land to Tidong-1. However, preliminary information collected reveals that Tidong -2 may not acquire any private/village land but may require forest land only. This may affect the utilization of the forest resource that villagers harness to augment their economic base.	Yes	Yes		Both (Tidong-1 HEP & Tidong-2 HEP)
Cultural	Additional labour requirement by project in close proximity can lead to increased migration with more pressure on the local infrastructure. The villages in the vicinity will be increasing exposed to outside communities and customs for longer duration. There could be an acute shortage of rented accommodations, vehicle and food joints leading to new in migration of more entrepreneurs and increase in cost of living. Project affected area has a distinct tribal culture of Kinnaur and migration from other states may affect the local culture.	Yes	Yes	Isolation of migrant workers from local habitation. Establishment of labor camps. Provision of facilities in the camp such as pre-employment health check up, health centre, canteen, food, bathroom, toilets, drainage, water treatment system, waste	Both (Tidong-1 HEP & Tidong-2 HEP)

Component	Concern	Cumulative Impact (Y/N)	Material Cumulative Impact (Y/ N)	Mitigation measures	Responsibility
	Cultural conflicts may also arise. Effect on food habits, dresses, religious faiths and beliefs, place of religious importance, etc. may be anticipated.			management system, etc. Community liaison officer to be appointed to monitor and control the interaction with local population.	
Economical	Decrease in income from Non Timber Forest Produce (NTFP)	Yes	Yes	Loss of income for affected villagers from NTFP to be assessed in detailed and compensation to be provided.	Both (Tidong-1 HEP & Tidong-2 HEP)

6. ANALYSES OF ALTERNATIVES

6.1 General

This section of the report presents the analysis of the alternatives considered for the proposed project. The following scenarios have been considered:

- No project scenario;
- Alternate methods of power generation;
- Alternate location for the proposed project;

6.2 No Project Scenario

As per the CEA, India has a total installed capacity of 209,276MW, till the end of October 2012, generated from both conventional and non-conventional sources. The total electricity generation in the country during the month of September 2012 has been 73.08BU with a growth rate of 3.66% from the last year. The Load Generation Balance Report 2012-2013 has projected electrical energy demand of 985317MU for 2012-13 and peak electricity demand of 140090MU. A capacity addition of 17956MW during the year 2012-2013 comprising 15154MW of thermal, 802MW of hydro and 200MW of nuclear power station has been considered.

The total installed capacity of the northern region as on 31st October, 2012 is 56989.15MW. As per CEA estimates, Chandigarh, Delhi and Himachal Pradesh faced negligible energy shortage while Haryana, Punjab, Rajasthan and Uttarakhand faced energy shortage in the range of 3-4% and in Uttar Pradesh the range was 11.3%.The maximum energy deficit in Northern region was in Jammu and Kashmir and it was 23.6%. Projections up to year 2022 indicate that the power demand is going to be almost double for the northern region in the coming years[5].

Table 6.1: Power Demand Forecast in Northern Region of India, 2011-22

	Electrical Energy Requirement (GWh)			Peak Electric Load (MW)		
Region	**2011-12**	**2016-17**	**2021-22**	**2011-12**	**2016-17**	**2021-22**
Northern Region	294841	411513	556767	48136	66582	89912
All India	968658	1392066	1914508	152746	218208	298253

[5] http://www.cea.nic.in/more_upload/epsr_17_highlights.pdf

In order to meet the gap in the demand and supply in the northern region, the installed capacity of the region needs to be increased through power generation projects from renewable sources such as hydro power. Himachal Pradesh has 20GW of net hydro-electric potential due to the presence of five major river basins, i.e. Sutlej, Beas, Chenab, Ravi and Yamuna. The proposed hydropower project intends to contribute towards bridging the demand supply deficit in the northern region and the country.

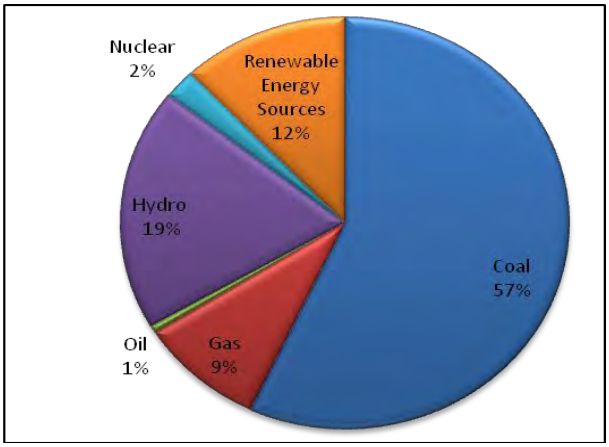
6.3 Alternate methods of Power Generation

6.3.1 Electricity Generation Options

The electricity sector in India has the world's fifth largest installed capacity of 207.34 Gigawatt (GW) as of August, 2012. Captive power plants generate an additional 31.5 GW. Thermal power plants constitute 66% of the installed capacity, hydroelectric about 19% and rest being a combination of wind, small hydro, biomass, waste-to-electricity, and nuclear.

In terms of fuel, coal-fired plants account for 57% of India's installed electricity capacity followed by hydropower which accounts for 19%, renewable energy for 12% and natural gas for about 9%. The source wise installed capacity in India is presented in Figure 6-1.

Figure 6-1: Source Wise Installed Capacity



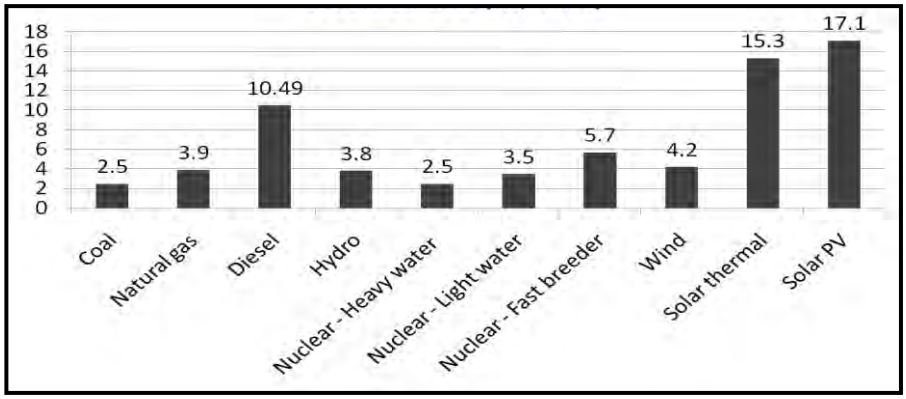
Source: Ministry of Power, 2012

Majority of the coal reserves of India are characterized by low calorific value and high ash content. The iron content is low in India's coal and toxic trace element concentrations are negligible. The natural fuel value of Indian coal is poor. India is endowed with economically exploitable hydro-power potential to the tune of 148,700 MW of installed capacity as per estimates by CEA.

6.3.2 Cost for Electricity Generation

There are several alternatives available for energy generation. To assess the economics of power generation, levelised cost of power generation which includes the initial investment costs, operations and maintenance, cost of fuel and cost of capital, has been considered (Figure 6-2). It can be seen that the cost of power generation from hydro power plants is almost the same for natural gas.

Figure 6-2: Levelised Cost of Power Generation (INR/KWh)



Source: LBNL, CERC, CSTEP & NPCIL

6.3.3 Reliability of Power Generation

For assessing the reliability of power generation, the plant load factor can be used as an indicator. The load factor of an energy technology is the ratio (expressed as a percentage) of the net amount of electricity generated by a power plant to the net amount which it could have generated if it were operating at its net output capacity. The plant load factors for different power generation sources are presented in Table 6-2.

Table 6-2: Plant Load Factors

Technology	Plant Load Factor
Combined Cycle Gas Turbine (CCGT)	70-85%
Waste to Energy	60-90%
Coal	65-85%
Nuclear Power	65-85%
Hydro	30-50%
Wind Energy	25-40%
Wave Power	25%

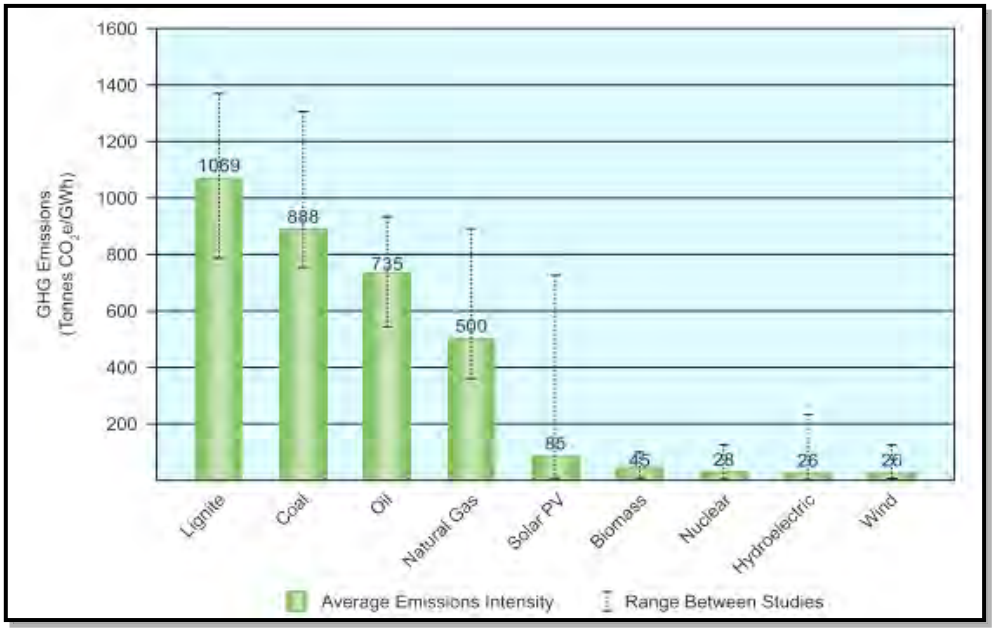
Source: Renewable UK

The hydro power plants have a plant load factor in the tune of 30-50 %, which is lesser than that for conventional power generation sources with higher load factor of 60% - 80%. However, it is higher than those of other renewable energy options such as wind and wave energy.

6.3.4 Green House Gas Emissions

Coal fired power plants have the highest Green House Gas (GHG) emission intensities on a lifecycle basis. Although natural gas and to some degree oil, have noticeably lower GHG emissions; biomass, nuclear, hydroelectric, wind, and solar photovoltaic all have lifecycle GHG emission intensities that are significantly lower than fossil fuel based generation (Figure 6-3).

Figure 6-3: Lifecycle GHG Emissions Intensity of Electricity Generation Methods



Source: World Nuclear Association Report

World Nuclear Association (WNA)'s report places wind energy's 26 tonnes CO2e/GWh emission intensity at 7% of the emission intensity of natural gas and only 3% of the emission intensity of coal fired power plants. In addition, the lifecycle GHG emission intensity of hydropower generation is consistent with renewable energy sources including biomass, hydroelectric and nuclear.

6.3.5 Rationale for Selection of Hydro Power Generation Option

As discussed in the above sections, the hydro power generation option is well developed in India and is the second largest source of power generation. The economics of power generation from hydro power is favorable and almost comparable to natural gas option. The hydro power generation

is also one of the cleanest energy generation options and has a suitable plant load factor as well. Additionally, hydropower projects help in grid stabilization.

6.4 Alternate Location for the Proposed Project

The proposed project was conceived by the Government of Himachal Pradesh. The site selection and the alignment of project components such as the head works, tunnel, power house and other components was also carried out by the Government of Himachal Pradesh. Bids were then called out for identifying private parties for development and operation of the project. The location and alignment of various project components were pre-defined in the bid document and very less leverage was provided to the developer for altering the site locations. During the detailed designing stage, however, the possible alternatives were considered for:

- Routing of Head Race Tunnel;
- Selection of Surface or Underground Power House
- Alternate road alignment

6.4.1 Routing of Head Race Tunnel

Two alternatives, along each bank of Tidong stream, were considered for the alignment of the head race tunnel. A comparative evaluation was carried out based on factors such as availability of approach roads and geological stability and is presented below in Table 6-3. Considering the above factors, the left bank alternative was found to be suitable for the alignment of the Head Race Tunnel.

Table 6-3: Comparative evaluation of the alternatives

Parameter	Left Bank Alternative	Right Bank Alternative
Geological Stability	The area is geologically stable and has suitable topography for development of power house.	The area is geologically unstable especially near surge shaft, pressure shaft and powerhouse locations.
Length of Tunnel	The length of the tunnel in this alternative will be shorter and will negotiate two tributaries.	The length of the tunnel will be more as compared to the left bank alternative and will have to negotiate five tributaries.
Approach Road	No existing approach road is available.	An existing approach road is available. However, construction of a new bridge will be required across Sutluj river or Tidong Khad for providing approach to the powerhouse site.

6.4.2 Selection of Surface or Underground Power House

As part of the survey and investigations, two alternatives for the powerhouse were studied i.e., underground and surface powerhouse. Considering the discharge and high head available for power generation, the Pelton Machine was found to be most suitable. As per requirement of the Pelton Machine, centre line of machine is to be kept well above the HFL and therefore the surface powerhouse is preferable as no head gain will be possible in the underground powerhouse configuration. Also, the topography at the power house site is also suitable for a surface powerhouse.

6.4.3 Alternative route for access roads

The following two alternatives were considered for the access road to power house:

- Access road passing through village Rispa
- Access road along the left bank of the Tidong stream, passing through Moorang Panchayat

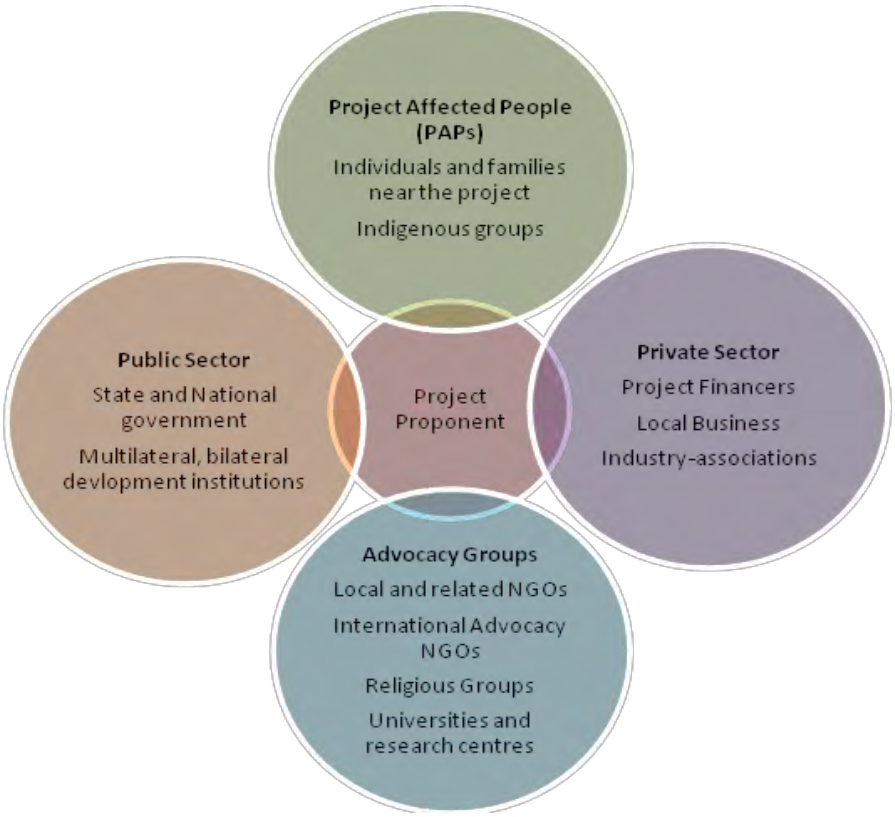
However, as part of consultations with the Panchayats, the Rispa Panchayat raised concerns regarding the alignment of the road and the alternate option of constructing the road on the left bank of the Tidong stream i.e., passing through Moorang Panchayat. A 2.46 km long approach road along with a steel bridge on Tidong Khad to reach the Power House has been constructed.

7. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

7.1 General

Public consultation plays a critical role in raising awareness of a project's impacts and gaining agreement on management and technical approaches in order to maximize benefits and reduce negative consequences. Public consultation can lead to reduced financial risk (from delays, legal disputes, and negative publicity), direct cost savings, increased market share (through good public image), and enhanced social benefits to local communities.

Figure 7-1: Relationship of stakeholder with project proponent



A public consultation, information and disclosure process was also formulated for Tidong and outlines community engagement activities to be undertaken during the preconstruction, construction, operation and decommissioning phases of the project. The objectives of the process is to ensure that:

- all stakeholders are identified and included in the consultation and disclosure process;
- initial information disclosure about the project is accurate and comprehensible to the non-technical stakeholders and the local population;
- adequate and timely information is provided to the project affected people and other stakeholders;
- all stakeholders are given sufficient opportunity to voice their opinions, concerns and suggestions;
- these opinions, concerns and suggestions of the stakeholders influence project decisions;
- regular feedback is provided to the stake holders on the project activities future plans.

7.2 National Regulations, Policies with respect to Information and Consultation

Various acts, policies and regulations have provisions for public consultation / hearing / disclosure to make project affected families and civil society aware of the developments of the project, especially during the land acquisition and environmental clearance stage. Regulations and requirements related to Public consultation, information and disclosure, applicable to the project, are listed as below.

- Environment Impact Assessment Notification, 2006
- The Land Acquisition Act, 1894
- National Rehabilitation and Resettlement Policy (NRRP) 2007
- Panchayats Extension to Schedule Areas Act, (PESA) 1996
- Himachal Pradesh Panchayati Raj Act, 1994

The gist of the above mentioned policies are already given in Chapter 2 on 'Legal and Administrative Framework'.

7.3 Identification of Stakeholders

A stakeholder is any group or individual who may affect or be affected by a specific project. Stakeholder identification is useful to prioritize, analyze and assess stakeholder issues while creating management systems and strategies to address specific concerns. Stakeholder identification is undertaken to determine who will be directly or indirectly affected, positively or negatively, by a project (commonly called project affected people or project-affected groups), and who can contribute to or hinder its success (commonly called other relevant stakeholders).

NTPGPL has carried out consultations with the project stakeholders to varying degrees, depending on level of impact, at strategic points during the life of the project. The stakeholders identified for the Project have been presented in Table 7-1.

Table 7-1: Stakeholder Mapping

Stakeholder Group	Profile of the Stakeholder
MOEF, Government of India	The Ministry has accorded the project Environment Clearance and Forest Clearance for diversion of forest land. MoEF will monitor the various activities undertaken by the project for compliance with conditions of Environment Clearance and Forest Clearance. The external reporting made to these agencies and their observations will guide the project activities.
Government of Himachal Pradesh	The state government holds the stake via Department of Multipurpose Projects and Power as "First Party" in Implementation agreement, and for the overall supervision of the project in the state.
HPSPCB	The project has obtained Consent To Establish from State Pollution Control Board under the Air and Water Act. The project will abide by the conditions of the consent.
HP State Forest Department	The State forest department shall be directly responsible for the forest area in the project area and adjacent forest directly exposed to the project work and the migrant workforce.
Block and District Administration	The district administration is responsible for addressing all issues and grievance pertaining to land acquisition. The Block Development Office as well as Land Acquisition Collector Cum – Additional District Magistrate (ADM), Pooh, District Kinnaur, have already acquired the land for the project and transferred it to NTPGPL for the development of the proposed project.
Local Area Development	The LADC is constituted by the Government for the hydel projects, wherein Deputy Commissioner and concerned SDM is the Chairman

Authority (LADA)	and Member Secretary respectively. It is obligatory for every hydel project to contribute 1.5% of the project cost to Deputy Commissioner for the development of the affected area. These funds will be spent by Local Area Development Committee for the development of affected area due to implementation of the proposed project.
Project Affected Families	The acquisition of land was undertaken by the district administration through the office of Sub district Magistrate as per the Land acquisition Act. The PAFs have received their compensation through the government agency and during the course of acquisition NTPGPL has agreed to various request and demands put down by the local community. The PAF are key stakeholders as the adherence to commitment by NTPGPL can be detrimental in deciding the extent of cooperation and support they receive from the affected community.
Local Community	They represent the villagers of Thangi, Rispa and Morang wherein the project is located. They will be affected by movement of men and machinery to project site, noise from construction, blasting, migrant population etc. There will be sharing of community resources such as road, hospitals etc due to project activities and influx of migrant workers.
Panchayat: Thangi	Lumbar village where the upstream construction is proposed falls under the Thangi Panchayat. Lumber village however is located at about 8-km upstream of Thangi Village. 2009. Thangi Panchayat has issued a NOC after entering into an agreement with the project on 13-Jan-2009 with certain conditions by the Panchayat
Panchayat: Rispa	NTPGPL has obtained a NOC from Rispa Panchayat dated 5-Apr-2009. The proposed power house for the project falls in village Lizang of Rispa Panchayat. This NOC has been issued by the Panchayat after entering into an agreement with the project on 30-Mar-2009 with certain conditions by the Panchayat for issuing the NOC for project.
Panchayat: Morang	The access road to proposed power house and proposed staff colony for the project falls in village Roowang of Morang Panchayat. NTPGPL has obtained a NOC dated 1-Apr-2009. This NOC has been issued by the Panchayat after entering into an agreement with the project on 31-Mar-2009 with certain conditions by the Panchayat for issuing the NOC for project.

7.4 Stakeholder Engagement Process – Review of Past Consultations

NTPGPL has carried out several consultations with various stakeholders such as affected families, local administration and panchayats. Some of the most significant formal stakeholder consultations

organized for Tidong HEP are listed below and proceedings, apprehensions and responses from these consultations are summarized in the subsequent sections:

a. Public Consultation as per EIA Notification, 1994 in association with HPSPCB – July, 2006

b. Consultation with Gram Panchayat, Rispa and Tidong Valley Paryavaran Samrakshan Vikas Samiti by project representatives –July, 2006

c. Involvement of villagers of Rispa in joint enumeration of affected trees on adjacent forest land by State Forest Department along with project representatives – September, 2006

d. Series of project specific consultations during 2005 to 2012 with three affected Gram Panchayats, for seeking support for the execution of project. About 20 consultations with the members of village and Gram Panchayat Rispa, 18 consultations with Gram Panchayat Thangi and about 10 consultations with the members of village and Gram Panchayat Morang were conducted

e. Clean Development Mechanism (CDM) Stakeholder Consultation collectively with members of villages, gram panchayats of all three affected villages, district administration and other concerned government departments

f. Consultation of Project Affected Families and affected Gram Panchayat members by IFC and NTPGPL, April -2011

g. Consultation with women of Project Affected Families and Mahila Mandals, October, 2012

7.4.1 Public Consultation as per EIA Notification 1994 (and 2006)

A Public Hearing with the local community at the block level was undertaken as part of the EIA study conducted for the project. HPSPCB had scheduled the public hearing in Moorang Tehsil near proposed diversion structure in Village Lumber, Panchayat Thangi and near proposed power house in Village and Panchayat Rispa.

The meeting was chaired and supervised by the ADM, Shimla. The Public notice pertaining to the same was published in English and Hindi in the newspapers by the State Pollution Control Board. Out of the two panchayats, locals of Rispa did not participate in the meeting as they had concerns about the location of some project facilities. However, Public Consultation at Lambar was carried out as per schedule on 21st July, 2006. This consultation was attended by representatives from HPSPCB, three representatives from NTPGPL, other concerned departments and nearly 150 villagers.

It is important to mention that, Morang village was not a part of the project when the EIA was undertaken and therefore was not included in the public consultation process as required under the EIA notification.

The key concerns raised during the Public Hearing are as summarized below:

- The villagers were worried that construction of the proposed 2.7 km long approach road from village Lumber to Adit-1 would cause destruction of large number of Chilgoza, Deodar, Kail and Bhojpatra trees. The project proponent informed the villagers that about 39.05 ha of forest land (including 1261 trees) would be diverted for the project. To compensate the loss of trees, afforestation of nearby degraded forest will be taken up.

- The villagers expressed their concern that the construction activities at Adit-1 are likely to generate large quantities of muck and improper disposal of this muck can cause damage to adjoining areas which included orchards and house. NTPGL informed the villagers that muck disposal was planned only at designated dumping sites in such a way that no spillage of excavated material takes place and cause no damage to houses and orchards. It was informed that the HPSPCB will be conducting continuous monitoring for ensuring compliance to norms. All the muck disposal sites will be covered with vegetation after leveling and dressing the top surface. Layer by layer filling of muck will be done and compacted mechanically.

- The Gara and Duba Khad lies in the alignment of HRT and water from these khads is used for irrigating about 800 bighas of land, which lies in the landslide prone zone. The villagers were concerned that these khads might dry due to the construction of HRT. In response, the proponent informed, that inventory of water sources, falling in the project area has been prepared by ADM-Pooh and a video graphic survey has been conducted for all those sources. NTPGL further informed that the tunnel has been aligned deeper to obtain a minimum rock cover of about 157 m over the tunnel at the point of crossing. However, in case damages are observed due to project activities, it will be adequately compensated by the project proponent.

- The HRT is proposed to pass from below the Piber village which makes it most vulnerable village in the project area. The project construction can cause destruction of forest in the Piber area which is one of the major sources of wood, manure and natural herbs for the villagers. It was informed only 39.05 ha of forest land (including 1261 trees) would be diverted for the project. To compensate the loss of trees, afforestation of nearby degraded forest will be taken up.

- It was a common concern that construction and associated emissions will affect the crop of apple, apricot and almonds. Proponent informed that almost all the works will be underground and there will be no major emissions (point or fugitive) from the project. The project proponent had ensured that fugitive dust emissions from the roads will be suppressed by keeping road wet by sprinkling water regularly through water tankers.

- The villagers expressed their apprehension about the impact of project activities on the existence of species of animals and plants. In response to this apprehension, it was apprised by NTPGPL that the project site area does not harbor any wildlife at or near the site of powerhouse or barrage. The wild animals like snow leopard, bear etc live at high altitude and are quite away from the proposed site.

- The proposed project will attract labor from outside the local area. Laborers from different culture may arrive with different mannerism, way of interaction, faith, beliefs, dressing, superstitions etc. The villagers feared that this difference can cause conflicts, quarrels leading to law and order problems. The project assured the villagers that interaction of migrant labor with the local community will be avoided to the extent possible.

- Other issues like Cold desert, danger to National Security, melting of glaciers were also discussed during the process of Public Consultation.

Detailed minutes of the public consultation area attached as **Annexure -7.1**, covering issues raised and also the response of the project proponent.

7.4.2 Consultation with Gram Panchayat, Rispa and Tidong Valley Paryavaran Sanrakshan Vikas Samiti in July, 2006

To understand and incorporate the concerns of the community from Rispa Panchayat, another meeting was conducted on 22nd of July, 2006. The meeting was attended by 19 participants from Rispa Gram Panchayat and Tidong Valley Paryavaran Samrakshan Vikas Samiti, which is a group formed for the conservation of Tidong valley and is represented by villagers from Rispa Panchayat. The key issues discussed in the meeting were the proposed alignment of access road through village Rispa, associated social and environmental concerns over existence, cultural and water security of village Rispa.

The responses of NTPGPL to the concerns of villagers of Rispa are given below:

- The alignment of proposed access road to Power house and Surge shaft was altered and proposed along the right bank of Tidong Khad so that it does not pass through Rispa village.

- With the alteration of the routing for access roads, the concerns of the community over cultural heritage of the villages were also addressed.

- The villagers had expressed concerns about the water security. It was clarified that no source of water exists near the proposed location of Power house, surge shaft and switch yard

A road length of 1.5 km passing through Rispa panchayat could however not be avoided due to location of the surge shaft. The site clearance for road construction involved tree felling and NTPGPL and Forest Department invited the locals from Rispa Panchayat to participate in the enumeration of the trees vide letter dated letter dated 13th September, 2006.

7.4.3 Consultations with all three affected Gram Panchayats (Thangi, Rispa and Morang) during 2006 to 2012

The project area falls in three Gram Panchayats; Thangi, Rispa and Moorang. NTPGPL carried out consultations with all the three affected gram panchayats before the acquisition of private land. NTPGPL has also signed agreements with commitments towards development of the region and has obtained "NOC" from the affected panchayats (Refer **Annexure 7.2**).

The major commitments made by NTPGPL as part of the agreements for the three panchayats are provided below:

Panchayat Moorang

- An amount of INR 10 million shall be provided for development works at Moorang.
- 70% of the total workers for construction shall be employed locally.
- 70% of the total contracts to be awarded to Moorang Panchayat.
- 50% of the vehicle required for transportation shall be hired form Moorang Panchayat.
- Mining of Construction material (i.e., sand and other material) shall only be allowed till electricity production or maximum till 8 years.
- Areas of mining are used by villagers for their last rites and hence area shall be earmarked for these activities.
- Provisions shall be made so that locals get construction material for their home for free of cost.
- Villagers must have free access to their land and forest.

Panchayat Rispa

- An amount of INR 20 million shall be provided in addition to the provisions committed under LADA, R&R Plan and EMP.
- 30% of the total workers for construction shall be employed from Rispa.

- Priority shall be given to the residents of Rispa in the contract works.
- Priority shall be given to the residents of Rispa to hire vehicles for Transportation.
- 20 no of street lights shall be provided at Village and operation and maintenance cost of these lights shall be borne by proponent.
- INR 0.3 million shall be given for a making a temple.

Panchayat Thangi

- An amount of INR 20 million shall be provided in addition to the provisions committed under LADA, R&R Plan and EMP.
- Priority shall be given to the residents of Rispa in the contract works.
- Priority shall be given to the residents of Rispa to hire vehicles for Transportation.

NTPGPL has honored all the direct financial support stated in the above agreements and disbursed INR 50.18 Million to the 3 affected panchayats. It has also honored the commitments towards employing the local people both by NTPGPL and contractors. The details are presented as part of the CDP document prepared separately.

In addition, NTPGPL has assured to provide water in case of non availability due to project activities. NTPGPL has also agreed to provide compensation for loss of crops and if any, due to project activities.

NTPGPL as a part of the stakeholder engagement process has carried out several consultations with the three panchayats. A list of all the meetings conducted so far has been provided in Table 7-2 and details of attendees and minutes of the meetings are provided in **Annexure-7.3**.

Table 7-2: Details of consultation conducted with panchayats

Thangi Panchayat	Rispa Panchayat	Moorang Panchayat
1. 12th April, 2005	1. 19th April, 2005	1. 9th December, 2006
2. 24th March, 2006	2. 24th April, 2006	2. 15th December, 2006
3. 22nd April, 2006	3. 22nd June, 2006	3. 7th January, 2007
4. 6th July, 2006	4. 21st July, 2006	4. 5th May, 2007
5. 12th July, 2006	5. 22nd July, 2006	5. 20th June, 2008
6. 20th July, 2006	6. 23rd September, 2006	6. 16th February, 2009
7. 21st July, 2006	7. 24th September, 2006	7. 29th March, 2009
8. 7th March, 2007	8. 25th September, 2006	8. 31st March, 2009
9. 3rd March, 2008	9. 5th January, 2007	9. 1st April, 2009

10. 21st June, 2008 11. 22nd June, 2008 12. 27th September, 2008 13. 15th December, 2008 14. 16th December,2008 15. 13th January, 2009 16. 3rd August, 2010 17. 4th August, 2010 18. 5th August, 2010 19. 1st July, 2011 20. 19th April, 2012	10. 1st February, 2007 11. 29th April, 2007 12. 16th April, 2008 13. 23rd June, 2008 14. 24th June, 2008 15. 2nd February, 2009 16. 10th February, 2009 17. 30th March, 2009 18. 5th April, 2009 19. 23rd July, 2010 20. 1st July, 2011 21. 18th April, 2012	10. 26th July, 2010 11. 28th July, 2010 12. 24th February, 2011 13. 1st July, 2011 14. 14th April, 2012

7.4.4 Clean Development Mechanism (CDM) Stakeholder Consultation in February, 2011

CDM Stakeholder's meeting was conducted by Tidong Power Generation Pvt. Ltd. at Up-Mohal Roowang, Tehsil Morang in which local villagers, government officials and district administration were invited. A total of 132 people participated in the meeting held on 24th February, 2011.

The participants were apprised about the project details along with profile of NTPGPL under which Tidong Power Generation Pvt. Ltd. is operating as one of the group companies. The Project Proponent also informed the participants about the payments made them to the Forest Department, Fisheries Department, HP State Pollution Control Board and LADA against Environment Management Plan.

7.4.5 Consultation of Project Affected Families and affected Gram Panchayat members by IFC and NTPGPL, April -2011

Focused group discussions were carried out by team from IFC on 19th April, 2011. The locals expressed their willingness for the development of the project. They informed that they were pleased with the development of hydro power projects in the region including development of proposed Tidong-II upstream of Tidong-I.

The community discussed their concerns about dust generation from project activities and impact of blasting for surge shaft road construction. Villagers also requested to increase employment opportunities and to install additional street lights. The villagers also requested to strengthen the grievance redress system and to take up development activities of the cremation ground. Detailed minutes of the discussion can be referred in **Annexure-7.4**.

7.4.6 Consultation with women of Project Affected Families and Mahila Mandals, October, 2012

For making the consultations, gender inclusive, consultations were carried out on 9th and 10th October 2012, with women of project affected families and women groups such as mahila mandals in the area (Details attached as **Annexure 7.5**). About 16 families having 48 women were contacted and interviewed. The focus was to understand their lifestyle, daily routine, status in the family and their concerns and expectations from the project.

The women interviewed informed that the project has benefitted them in terms of generation of employment opportunities and better road connectivity. However, they also expressed concerns about the dust emissions and vibrations generated during blasting operations. The villagers from Roowang, however expressed some resentment regarding the compensation rates.

The Mahila Mandals of village Moorang, and Rispa were also consulted during this meeting. Both Mahila Mandals are registered with Additional District Collector office at Pooh. These groups have one women member from each household in the village. Every two years, the Pradhan and 5 -8 executive members are selected based on consensus, who takes all administrative decisions consulting all members.

The main activities and programs run by these mandals include maintaining cleanliness in the village, preserving cultural heritage and raising awareness about dowry and ill effects of liquor consumption.

The consultations also focused on identifying how the project could benefit women. The women informed the employment opportunities should be created for women in the project or trainings such as knitting / sewing so that they can become self sufficient.

The following other suggestions were also made:

- The project can organize regular health camps focused on gynecological problems of women;
- NTPGPL can provide knitting machines and training to women
- Monetary support to Mahila Mandal to conduct their duties properly
- Monetary support to buy utensils for Mahila mandal to be used for community

It is observed that mahila mandal acts as the focal point for women related issues as one woman from each family in the village is a member of the Mahila Mandal. It can be inferred, that any help to Mahila Mandal will ensure fair utilization of the resources available.

NTPGPL will address the above development concerns and others suitably in their CDP prepared for the project.

As part of the disclosure process some of the documents disclosed to the 3 affected panchayats include 1) Executive Summary of ESIA report,b2) Grievance Redress Mechanism for affected families and locals, 3) Emergency Response Plan for the project and 4) Plan for sharing of the 2% CE INR revenue for local communities.

7.5 Ongoing and Proposed Consultation and Community Relations

Public consultation with affected families and other stakeholders is an ongoing activity. Therefore regular consultations will be continued with the concerned stakeholders throughout the life of the project. As a part of the stakeholder engagement process the following consultations are suggested to be conducted for the project (Table 7-3).

Table 7-3: Consultation and disclosure to be conducted

Event / Tasks	Target group	Schedule / frequency
General information disclosure meetings about project status and current matter of concern addressing environmental and social aspects of the plant operation	Project affected panchayats and families	• Continuous process to be undertaken on Six monthly basis during construction phase • Before the commissioning of project • Every six months during operation phase
Consult on Traffic Movement during various stage of Construction	Project affected panchayats and families	To be undertaken prior to movement of heavy components or machinery related to construction
Consultation before retrenchment (If applicable)	Local workers and contractors	30 days before retrenchment when particular construction activity is about to complete
Information and consultation on grievance redress and dispute	All the project labourers,	• Grievance Redress mechanism to be communicated. • Meeting to be conducted every

Event / Tasks	Target group	Schedule / frequency
settlement mechanism set up by the project	contractors, employees, Project affected panchayats and families	6 months throughout project life.
Dissemination of information on Emergency preparedness and Disaster Management Plan	Project affected panchayats and families Labours and contractors	• Before commissioning of project • Regular drill may be conducted every six months or as agreed with Panchayats. • Handouts may be distributed for general awareness

7.6 Resources and Responsibilities

To ensure proper implementation of the Public Consultation and Disclosure and the Rehabilitation Action Plan/ Community Development Plan the following process is in place:

- The project has appointed a Project In-Charge who has the overall responsibility of managing and implementing the stakeholder engagement plan, whereas Community Liaison Officer and Manager- EHS have been appointed and provide the support in implementation. Support is also extended by HOD- EHS and Social Manager at corporate office as and when required.

- During various stages of consultations the above mentioned representative will have the discussions with the target groups in their respective matters. They will ensure that right focus group is identified for each consultation and informed well in advance to the consultation or desired milestone. Experts will also ensure that correct information is being shared in the local language.

8. GRIEVANCE REDRESS MECHANISM

8.1 General

Grievance Redress Mechanism (GRM) is already in place for the Tidong HEP to receive and facilitate concerns and grievances of not only the local communities, Panchayats and other stakeholders but also for the workers employed for the project. The purpose of the GRM is to record the grievances and find mutually acceptable solutions for problems like employment, disputes with project activities, damages to private property, community development needs, socio-economic development of villages etc. The project will share information about these mechanisms to the stakeholders and workers through locally appropriate communication tools.

This section describes both the community and the workers redress mechanism which are in place.

8.2 Grievance Redress for Community

In order to establish a documented and structured approach towards understanding community expectations and managing their concerns, NSL has a Grievance Redress Cell (GRC) in place. The GRC needs to convene meetings monthly and takes steps to redress the grievance of the community.

8.2.1 Structure of GRC for Community

For the community the GRC has three levels of redress, at Site, Divisional and Corporate office of NTPGPL.

Level 1: Site Grievance Redress Committee

- The site level grievance cell comprises of the Vice President (VP) along with Community Liaison Person (CLO). The VP is available at the Reckong Peo office while the CLO is available at the site as well as Reckong Peo depending on his engagement.
- The site in-charge at all locations of head works; power house and adits are also considered to be part of the GRC (level 1).
- A member from the respective Panchayat or respected elders from the community is also included in the committee.

Any individual/ group with concerns pertaining to onsite work such as pollution abatement, transportation, traffic, occupational health, etc. may be directly registered verbally or in writing to the

above nominated person at site or at the Reckong Peo office. Similarly for concerns related to job opportunities, compensation, small contracts, etc. may be directly received verbally or in writing to the Reckong Peo Office. The issues registered at this level will be appropriately acted upon within two weeks of the date of receipt of complaint based on the assessment of GRC.

Level 2: Divisional Grievance Redress Committee

- The person in charge at Shimla office of NSL or any other responsible officer heads this committee. Any concern from stakeholders which are not resolved at site and Reckong Peo office can be registered at this level either verbally or in writing. The complaint will only be entertained if it is not resolved at Level 1.

- The cell includes Patwari or similar officers from the Revenue office for issues related to land dispute and claims. Panchayat members or influential members of the PAF will be included in the Level 2 GRC.

- The issues registered at this level will be resolved within 1 weeks of the date of receipt of complaint.

Level 3: Corporate Grievance Redress Committee

- Level 3 of GRC is to be headed by the Chief Executive Officer (CEO), along with EHS and Social Head. A member from the respective Panchayat shall be included in the committee.

- Issues unresolved from the previous levels or issue with greater reputational risks will be undertaken at this level. If the conclusion arrived at this level is not acceptable to the complainant then legal recourse can be opted for.

- The issues registered at this level will be resolved within 2 weeks of the date of registration.

8.2.2 Method of Registering the Grievance

Any person / group of persons having grievance with the project can register their concerns at Level 1 by suitable means of registering i.e. verbal or written. In case the issue is not resolved at Level 1, a written complaint or verbal communication needs to be made to Level 2 and similarly for Level 3.

- Any grievance communicated verbally has to be written on “Grievance Register” with allotment of a serial number by the nominated person who has received the verbal grievance.

- The Generic Grievance Redress Form is attached as **Annexure 8.1** and this format is to be used to file and keep records.

- On receiving the complaint, the project authority will issue an acknowledgement of the complaint immediately (in case of hand delivery) or by post to the complainant through registered post within next two days.

- The complaint boxes will have to be cleared twice a week and gist of the complaints has to be noted down along with date and name of the complainant with an allotment of serial number to the complaint in a permanent register i.e. “Grievance Register”.

8.2.3 Processing of Complaint

Different problems are to be addressed in different manners depending on the type of grievance; however, the generic approach to resolution of all grievances must include the following steps:

- The complaint received will be reviewed and screened for the factual details and will be considered for resolution at local level.
- The grievance will be assessed to determine if the issues raised in the complaint fall within the mandate of the grievance mechanism and the complainants have standing.
- If the complainant requires intervention then it will be considered for resolution otherwise it will be rejected and the same will be communicated to the concerned complainant.
- The grievance will be evaluated to clarify the issues and concerns raised in the complaint, to gather information on how others see the situation and to identify whether and how the issues might be resolved.
- All options for solving problems will be explored, with or without the assistance of independent, third parties.
- Internal decision-making processes, whereby issues are handled by designated NSL officials, using stated standards and criteria, to develop and propose a company response to the grievance and to allow for an appeals process.
- Joint problem solving in which the NSL and the complainant engage in direct dialogue.
- Third-party decision making to offer a solution when a voluntary agreement is not possible.
- Grievance tracking, monitoring, and reporting to the community will be undertaken as soon as a mutual consent is arrived at.

8.2.4 Communication of Mechanism to the stakeholders

Formal information of Grievance Redress Committees constituted, as suggested above, will be communicated to the respective stakeholders and nominated members of the committee. This communication can be made through personal letters, letter to *Gram Panchayat*, pamphlets, posters, public announcement at strategic locations. The stakeholders will be encouraged to approach this cell with their concerns and suggestions.

8.2.5 Meeting of Grievance Redress Committees

The site committee will meet at least once every fortnight in the first 6 months of implementation, and thereafter once, every month. At every Grievance Redress Committee meeting, the issues raised in the last meeting and report on action taken, will be summarized. Issues that cannot be resolved at the GRC would be referred / directed to next designated levels. Divisional and Corporate Committees will convene their meetings as and when required.

8.2.6 Closing of Grievance

The complaints lodged in the GRC Register will be resolved amicably by the above mechanism and closed by informing to the complainant directly with closing signatures on the GRC Register or by sending registered post to the complainant, in case he is not approachable. The resolution shall be informed to respective Gram Panchayat also in writing for display at a common place for information to interested parties.

8.2.7 Current Status of Grievance Redress

The project authorities have reported that villagers, pradhans and several stakeholders do regularly visit their office if they have any issues or complaints; however, the villagers raised this point in the meeting that they are not aware of the actions that are supposed to be taken when a complainant approached this office. The project authorities have already placed complaints boxes at the sites and in their office as well to receive written complaints (Figure 8-1). A register is also maintained to record the details of the people visiting the offices.

8.3 Grievance Readdressed for Workers

The workforce related concerns and grievances will be handled in accordance to the project GRM. This is to maintain open and transparent dialogue with the workers (both direct and contracted workers) which will ensure that the worker's grievances are properly handled and addressed in a timely and appropriate manner.

The mechanism will remain active throughout the life cycle of the project. All contractors employed by NTGPGL shall replicate the GRM and ensure its implementation in addressing worker issues.

For workers, the grievance cell is functional at the site level but it has not been formalized in totality. There are provisions of collecting complaints at site and grievance boxes are also placed at site office. However, officials of NTPGPL have reported that the issues raised so far were very minor and so this was handled at the site level only.

Figure 8-1: Grievance box placed at NSL office in Reckong Peo and Site Offices

To counter any grievances which might arise from the workers, a need is felt that there should be a structured GRC and records of all complaints and actions taken which needs to be maintained. Thus, the following section outlines the strategy on forming a GRC for the workers which should be communicated to all contractors and workers also.

8.3.1 Structure of GRC for Workers

The GRC shall consist of company representatives at site and corporate levels and will be designed at four levels – Tier I to IV. The representatives proposed at different tiers of GRC are as below:

- Tier – I: The Site Supervisor and Local HR Head
- Tier – II: Project Manager and Local HR Head, Corporate HR Head and CEO will be the key stakeholders in the committee.
- Tier – III: Corporate HR Head
- Tier – IV: CEO of NSL

The GRC will meet at the project site or corporate level as and when the grievances are filed by the workers. The procedure for filing complaints and the process to be followed thereafter is depicted in Figure 8-2:

- Any employee/ worker who has a grievance, can communicate the issue in written format to the responsible project Site Manager/ In-charge (Tier – I). Secured complaint boxes have already been provided at the camp site and project offices. If the worker wishes to remain anonymous, he/she can write down the grievances and drop it in the available complaint boxes.

- The site HR Head will open the complaint boxes every fifteen (15) days and forward the grievances to the Project Site Manager/ In-charge for further action. The grievances will be redressed at the site level through the concerned site supervisor with the support of local HR head within 3 working days.

- If the site supervisor fails to address the grievance within stipulated period of time or to the satisfaction of the complainant, the grievance will be referred to the Project In-charge (Tier – II). The Project In-charge along with local HR Head will resolve the concerns within next 3 working days. The minutes of the Grievance Committee meetings at the site level will be recorded and circulated as a Grievance Issue Tracker to key stakeholders in the company and unresolved issues will be escalated to the next Tier of committee.

- If the Project In-charge fails to redress the grievances within a time frame of 3 working days, the Tier – III of GMC, Corporate HR Head will review the grievance and try to redress it within 5 working days of receiving the complaint.

- The issues that cannot be resolved at the corporate HR level will be referred to the topmost Tier of the GMC; the CEO of company for resolution. The CEO will take all the necessary actions to address the issue within 5 workings days of referral.

- The worker/ complainant will have the opportunity to be present at the committee meetings and discuss the grievance at all the levels of GMC.

- If the grievance remains unresolved even after going through all the levels of GRC, the complainant will have the option to approach the appropriate court of laws for redress.

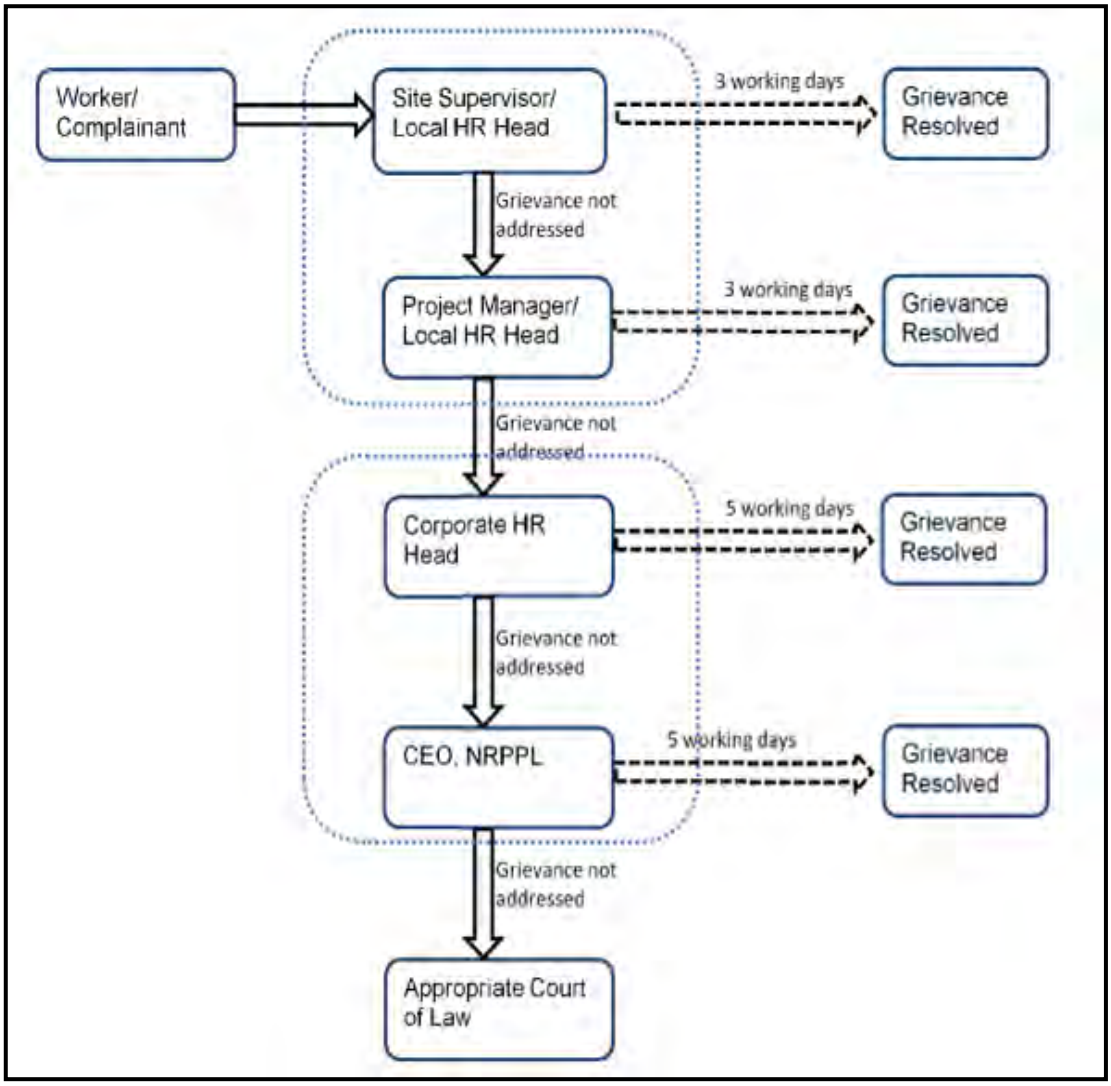
8.3.2 Method of Registering the Grievance

The GMC will keep a record book of all the grievances concerning labor and working conditions brought to the notice of NTPGPL staff and to the GRC. The written record of grievances will include the following details –

- Name of the complainant (not required if the complainant wishes to be anonymous)

- Date of complaint

Figure 8-2: Process Flow Diagram for Grievance Redress Mechanism



- Nature of complaint
- Follow up action undertaken
- Final result
- Date of communication of decision to complainant
- Implementation of decision
- Appeals if any

8.3.3 Communication Procedure

The Grievance Redress Mechanism will be documented in English and Hindi language and copies will be kept at the site and corporate offices. The GRM will also be displayed at notice board at all the project offices and camp sites. All the employees and workers will be informed about the Grievance Redress Procedure in the induction program at the start of employment. A copy of GRM and its procedure will be provided to the workers during induction.

8.3.4 Anti Harassment Procedure

It is the responsibility of NSL to provide all its female employees and workers a safe working environment. The Supreme Court in its order dated 13-08-1997 has passed an Order laying down norms and guidelines to be followed by every employer for tackling the incidents of sexual harassment of women at workplace. Below are examples of conduct that depending upon the circumstances, may constitute sexual harassment:

- Unwelcome sexual jokes, language, epithet, advances or propositions.
- Written or oral abuse of a sexual nature, sexually degrading or vulgar words to describe an individual.
- The display of sexually suggestive objects, pictures, posters or cartoons.
- Unwelcome comments about an individual's body.
- Asking questions about sexual conduct.
- Unwelcome touching, leering, whistling, brushing against the body or suggestive, insulting or obscene comments or gestures.
- Demanding sexual favors in exchange for favorable reviews, assignments, promotions or continued employment or promises of the same.
- Showing sexual implicit material/picture or sending sexually oriented or double meaning jokes/reference etc.

A special counselor (preferably female) or three-member committee headed by a woman will be appointed for addressing the sexual harassment issues raised by women workers. The contact details of counselor or committee members will be communicated to the women employees by the HR head at site. The details will also be displayed on the notice boards along with Grievance Redress Mechanism. The women workers can directly approach the counselor or committee without the need of going through the GRM framework. The employees may submit the written complaint to counselor/ committee. The Counselor/ Committee shall approach the corporate HR Head regarding all sexual

harassment issues. The complaints will be thoroughly investigated with due regard to the privacy of the individuals involved and appropriate actions will be taken within 5 working days to address the issue in a timely manner. NSL shall ensure that strict action will be taken against the offender.

NSL will also organize workshops every six months to create an awareness of rights among the female employees. If the complainant is not satisfied with the decision then the specific offence comes under the Indian Penal Code or any other law and the employee may initiate action in accordance with the law by making a complaint with the appropriate authority.

8.3.5 Review of the system

The complaint records that are maintained under GRM will be reviewed every year by the site HR Head to assess the effectiveness of Grievance Redress Mechanism. The review will include evaluation of records for types of grievances received, level to which grievance was escalated, average response time, implementation of decisions and appeals made by complainants. Based on this, the GRM framework will be modified for improvements during the life of the project.

9. ENVIRONMENTAL MANAGEMENT PLAN

9.1 General

Environmental Management Plan (EMP) enumerates a set of measures to be taken during implementation and operation of the project and to mitigate the possible adverse impact of a project. Adverse environmental impacts perceived from different projects differ from each other. Therefore, the mitigation measures also differ from project to project. EMP for a hydro electric project includes several mitigation measures and relates to both abiotic as well as biotic components of the environment. Based on the findings of the Environmental and Social Assessment and consultation with communities, management plans for mitigation, monitoring and performance improvement measures for identified social and environmental impacts has been prepared.

The mitigation measures for reversible impacts from 100 MW Tidong-1 HEP identified in Chapter-5 of this report and this chapter details 7 different plans, along with their implementation procedure and suggested organizational arrangements. The following plans are detailed in the following subsections:

- Pollution Abatement Plan
- Solid Waste and Muck Management Plan
- Biodiversity Conservation and Management Plan
- Construction Labor Management Plan
- Traffic Management Plan
- Health and Safety Plan
- Emergency Preparedness Plan

As said in previous sections to address the social impacts a Resettlement Action Plan and a Community Development Plan are prepared and presented in separate documents. However the implementation and monitoring mechanism for managing environmental and social impacts is presented in this section. It also captures the budgetary provisions made for the respective management plans, the disbursement and utilization status.

9.2 Clearance and Approval Status

To ensure the regulatory compliance and obtaining clearances and approvals required for the project at the different stages a legal register will be maintained by NTPGPL and contractors for respective clearances and approvals. A mechanism will be established to update the legal register with the new regulations introduced time to time. As per the policies and legal framework, the statutory clearances and approvals obtained by NTPGPL for execution of Tidong Hydro Electric Project are listed in Table 9-1.

Table 9-1: Clearance and Approvals required

Sl. No.	Clearance / approval Required	Competent Agency	Stage for implementation	Responsibility	Status
1	Implementation Agreement	Government of HP	Pre-construction	NTPGPL	Completed
2	Techno-economic Clearance of Detailed Project Report	HP State Electricity Board, Govt. of HP	Pre-construction	NTPGPL	Completed
3	Environmental Public Hearing	HPSPCB	Pre-construction	HPSPCB and NTPGPL	Completed
4	No Objection Certificate/Consent to Establish for hazardous wastes	HPSPCB	Pre-construction	NTPGPL	Completed
5	Consent to Operate from pollution angle and authorization for handling hazardous wastes	HPSPCB	Pre-construction	NTPGPL	Completed
6	Environmental Clearance as per EIA notification, 2006	MoEF, Government of India	Pre-construction	NTPGPL	Completed
7	Forest Clearance for diversion of 39.0546 ha. of forest land by the MoEF	MoEF, Government of India	Pre-construction	NTPGPL	Completed
8	Private Land acquisition - 3.2011	Government of HP	Pre-construction	NTPGPL	Completed

Sl. No.	Clearance / approval Required	Competent Agency	Stage for implementation	Responsibility	Status
	ha under Land Acquisition Act, 1894				
9	No Objection Certification for using stream water for generating hydro power	Irrigation and Public Health Department (IPH), Government of HP	Pre-construction	NTPGPL	Completed
10	No Objection certificate towards from fisheries perspective	Department of Fisheries, Government of HP	Pre-construction	NTPGPL	Completed
11	No Objection Certificate for using Public utilities	Public Works Department (PWD), Government of HP	Pre-construction	NTPGPL	Completed
12	Registration under Building and Other Construction Workers Act, 1996	Department of Labour, Government of HP	Construction	NTPGPL	Completed
13	Labour License	Department of Labour, Government of HP	Construction	NTPGPL	Completed
14	Consent to Operate for Air and water/ Authorization for handling Hazardous wastes	HPSPCB	Operation	NTPGPL	To be obtained before commissioning
15	Factories License	Directorate of Factories, Government of HP	Operation	NTPGPL	To be obtained before commissioning

9.3 Pollution Abatement Plan

The impact on air, water and noise due to this project also need consideration. This section suggests mitigations and management plan for the pollution abatement.

9.3.1 Water Pollution Control

The sources of water pollution could be identified as sewage from labor colonies, entry of muck in the river, seepage from construction activities. The dumping of solid waste generated from project near river can also affect the water resources in the area.

The following mitigation measures are suggested to be followed during the construction phase of the project:

- The untreated wastewater from construction labor camps and employee residential colonies will not be drained in the Tidong river.
- The project will provide septic tank and soak pit for disposal of sewage from construction labor camps.
- The project will install sewage treatment plant for treatment of wastewater from permanent residential colonies.
- Adequate measures will be undertaken to ensure that wastewater from project activities does not leach into natural water bodies.
- NTPGPL will install an incinerator for disposal of the waste generated from residential colonies during operational phase.
- Recyclable waste like plastic bottles, canes will be segregated and sold to recycling vendors authorized by HPSPCB.
- High turbidity water from tunneling and construction work will be collected in desilting basin of adequate size to low settling of suspended particles. Provide rock filters where ever desilting basin cannot be constructed.
- Water should be treated by providing retention time of 2 hours in a tank to enable the settlement of slit.
- Surface runoff from oil handling areas/devices should be treated for oil separation before being discharged into the river.

- The silt will be cleaned periodically to ensure that retention time is maintained. Silt to be used for leveling of land or dumped into designated muck dumping areas.
- The check dams, crate walls, spurs, vegetative spurs etc. will be provided on all the tributaries in upstream and downstream wherever necessary to control silt flow.
- The flushing of desilting chambers will not be carried out during lean season.
- The project proponent shall establish a procedure for water quality surveillance and ensure safe water for the workers.
- Adequate quantity of river water to be maintained after the diversion of water into the HRT. The remaining water in the Tidong stream should be minimum 15% of the lean season discharge of the river and suitable enough to fulfill the environmental need of the stream.
- Water quality monitoring for portable and well as river water shall be done as per monitoring plan provided later in this section.
- A detailed epidemiological study related to water borne diseases shall be carried out and the data shall be compiled for every year in the project area. This data would help the authority in finding out the trends for incidence of water related diseases prevalent in the area, which would help them to take suitable remedial measures for reducing or eradicating the occurrence of these diseases in future.

9.3.2 Air Pollution Control

During construction period the impact on air quality will be mainly due to the activities like site preparation, approach roads, excavation, drilling, blasting, foundation, tunneling, deployment of machinery, transportation etc. Though the estimation of air quality during construction shows insignificant impact on ambient air quality, nevertheless certain mitigation measures which shall be adopted to reduce the air pollution are presented below:

- Sprinkling of water on the project roads, at 2 -3 hrs frequency during day time when traffic movement is expected to ensure that there is no fugitive dust emission from the roads due to movement of vehicles.
- The project roads and PWD road from NH-22 will be inspected and the debris left by the tractor - trolleys will be removed as early as possible.
- Road damage will be promptly attended to with proper road repair and maintenance work

- Idling of delivery trucks / tractors and other construction equipment's should not be permitted during the periods when they are unloaded or are not in active use. Effective traffic management to be undertaken to avoid significant delays in and around the project area.
- Stone crusher with in-built water sprinkling systems, which will sprinkle the water during entire process of stone crushing to stacking and over the piles of grit, will be installed away from habitation areas or villages.
- All the stone crushers, if installed for project activities, will install suitable pollution control arrangement and obtain consent from the state pollution control board.
- All stationary machines/ DG sets emitting the pollutants shall be inspected weekly for maintenance and should be fitted with exhaust pollution control devices.
- Concrete batching plant will be located at closest possible location to the point of use, so that the requirement of transit mixers/ delivery trucks is minimized.
- Land grading operation shall be suspended when the speed of wind is more than 20 km/hr.
- As soon as the construction activity is over the surplus earth will be utilized to fill up the low-lying areas, or adequately managed.
- All storage piles shall be adequately sprinkled with water or covered with plastic to ensure to protection of ambient air from fugitive emission wind storm
- The wind barriers of 50% porosity will be installed three sides of all storage piles
- Ambient air quality shall be monitored as suggested later in this section

9.3.3 Noise and Vibrations Control

Noise would be generated at the time of construction of powerhouse, tunneling, machine operations, running of pumps, drilling machines, blasting, plying of dumpers etc. Continuous exposure of workers to high level of noise may result in annoyance, fatigue, and may cause temporary shift of threshold limit of hearing and even permanent loss of hearing. The impact of noise is limited as habitations are generally away from construction sites. But vibrations are felt at Lambar village and needs proper management measures.

The following measures shall be taken for noise and vibration control.

- The construction work occurring within 100-150 meter of a residential area, the work hours should be limited depending on convenience of the local people.

- The construction equipment generating high noise must be designed to have a high quality muffler system
- All stationary noise generating equipments such as air compressors, power generators should be used away from the residential area
- The total sound power level, Lw, of a DG set should be less than, 94+10 log10 (KVA), dB(A)
- Noise from the DG set should be controlled by providing an acoustic enclosure or by treating the enclosure acoustically.
- The Acoustic Enclosure should be provided to all noise generating equipment e.g. compressor and the walls of the enclosure should be insulated with fire retardant foam so as to comply with the 75 dBA at 1m sound levels specified by CPCB, MOEF.
- A proper routine and preventive maintenance procedure for the DG set, compressors, and vehicles should be set and followed in consultation with the respective manufacturer which would help prevent noise levels from deteriorating with use.
- Provision of proper PPE, i.e., ear muffs and war plugs, will reduce noise impact on personnel.
- Movement of vehicles should be restricted to day time only.
- Restriction on pressure horns.
- Controlled blasting techniques such as Noiseless Trunk Delay (NTD) technique etc. to be adopted to reduce vibrations.
- Over ground blasting time should be established during day time only. The established time will be notified and displayed in project area at strategic places such as main gate, project office, project roads, near blasting site etc.

9.3.4 Environmental Monitoring Plan

Regular monitoring is essential to assess the changes in pollution concentration and employ mitigation measures accordingly. The project proponent has involved Regional office of HPSPCB to design the monitoring schedule and also for carrying out sampling and analyses of various parameters (Table 9-2). The contract has already been issued to Board for entire lifetime of the project for about INR 4 Million.

Table 9-2: Parameters and frequency of monitoring

Sl. No.	**Type**	**Locations**	**Parameters**	**Frequency**	**Duration of Monitoring**
1	Ambient Air Quality	Barrage site, Powerhouse, Lambar village, Roowang village, Lizang Village	SO2, NOx, CO, PM10, PM2.5	24 hourly 1 sample / week / location	Construction phase
2	Stack emission	DG Sets Incinerator	SO2, NOx, CO, PM10, PM2.5	1 sample / month / location	Construction and operation phase
2	River Water	500 m U/s and 1000 m D/s of diversion structure and powerhouse	BOD, DO, TSS, Conductivity & Turbidity Coliform	1 sample / month / location	Construction and operation phase
3	Waste water	Seepage water from underground works Labour camp discharge STP outlet	TDS, BOD, COD, TSS, TDS, Conductivity	2 samples /month / location	Construction phase STP during operation
4	Drinking water	Work area, labour camps/ colony	Drinking water parameters as per IS:10500	2 samples /month / location	Construction phase
5	Noise Levels	Barrage; PWD Road Near Barrage; Power House; Lambar village; Roowang village; Lizang Village	Equivalent noise levels	1 sample 24 hourly day and night /month / location	Construction phase at all locations At powerhouse site and Lizang during operation

The contractor and their sub-contractors will be responsible for implementing the mitigating measures to control the pollution. The site engineer and project manager will review the implementation and activities of the contractors. The site engineer will note the contractor's compliance in the construction log book and during the weekly meetings to review. The site engineer will call the contractor's attention to any lapses and if the lapses are serious he may institute proper fines and penalties as provided for in the contract document.

9.4 Solid Waste and Muck Management Plan

This section of the report presents the solid waste and muck management plan and suggests measures for the following types of waste:

- Municipal solid waste from labor colonies and colony (later phase)
- Biomedical waste
- Construction and Hazardous waste
- Muck from excavation

9.4.1 Municipal Solid Waste Management

As estimated, total solid waste would be 150 kg/d from all the labor camps meeting peak construction phase. The waste will consist of food material, paper, plastic, metals, and glass. It is estimated most of the portion of waste will be organic in nature and it is expected that about 10% of the waste generated will be glass and metal in nature.

Considering the quantity and composition of waste the following measures are suggested for collection, storage, transport and disposal of waste.

Collection and Storage

- All labor camps and suitable locations at workplace shall be provided with dustbins
- Separate and labeled bins will be provided to collect degradable and non-degradable solid waste.
- All workers will be instructed to put garbage in designated bins as per segregation.
- The recyclable portion such as plastic bottles, cans, etc. shall be segregated at storage.

Transport and Disposal

- Solid waste shall be transported in covered truck.
- Recyclable waste shall be sold to the recycling vendors authorized by the HPSPCB and the local administration.
- The solid waste will be sent to nearest incinerator available at Reckong Peo the district head quarters for disposal since the municipal solid waste generated will be very less.

9.4.2 Biomedical Waste Management

At present, very small quantity of biomedical waste is produced from the dispensaries at site. The biomedical waste is hazardous in nature and inappropriate handling may lead to health risk of workers. Thus following management measures are suggested:

- Bio-medical waste shall not be mixed with other wastes.
- Bio-medical waste shall not be stored more than 48 hours at site
- Records shall be maintained on the quantity and type for storage, transportation, treatment and disposal.
- The waste shall be stored and transported in the container with proper color codes and labels as defined in Bio-Medical Waste (Management and Handling) Rules, 1998
- It will only be disposed at authorized site, i.e., Government Hospital at Reckong Peo for disposal.

9.4.3 Construction and Hazardous Waste

This category will mainly have waste from construction sites, i.e., metals, obsolete machinery and equipments, concrete, packaging material; and hazardous waste like used oil, empty containers etc.
Most of the construction waste is recyclable and will be sold to the scrap dealers. All care will be taken that construction waste will be stored in designated dump yards.

About 10 to 20 l of waste oil is generated in a month and stored in the barrels. To deal with this waste the following measures are suggested:

- Segregate hazardous waste at generation point and store at a confined and designated area.
- To avoid contamination of soil and storm water, the storage area shall be cemented and covered.
- Access to these storage areas shall only be given to employees who are well aware about the properties and effects and are trained to deal with any mishaps.
- Proper labeling of the material shall be done while storage.
- A MS tank type of facility exists at barrage site and same must also be planned at power house site.
- Empty containers of oil and other waste shall be disposed of to authorized vendors only

9.4.4 Muck Disposal

A large quantity of muck is likely to be generated as a result of construction of various project components viz. river diversion works, desilting chambers, head race tunnel, adits, surge shaft, penstock, power house, tail race channel, approach roads etc.

The total muck generated will be 731859 m^3, out of this 146370 will be utilized in concrete work and balance 585489 m^3 will be disposed off in the 5 earmarked dumps (Table 9-3). The total capacity available for dumping is 842232 m^3. Among these dump PA2 dump has been abandoned to prevent damage to the trees. Excluding PA2 dump the total capacity available is 710432 m^3, which will be sufficient to dispose off the muck. At present, the muck is disposed in PA1-B and PA4. The PA 1A and PA3 will be developed in future.

The identified muck disposal areas are shown in Figure 9-1. The muck disposal sites are provided with retaining walls to protect the muck from flowing into the stream.

Table 9-3: Details of muck disposal sites

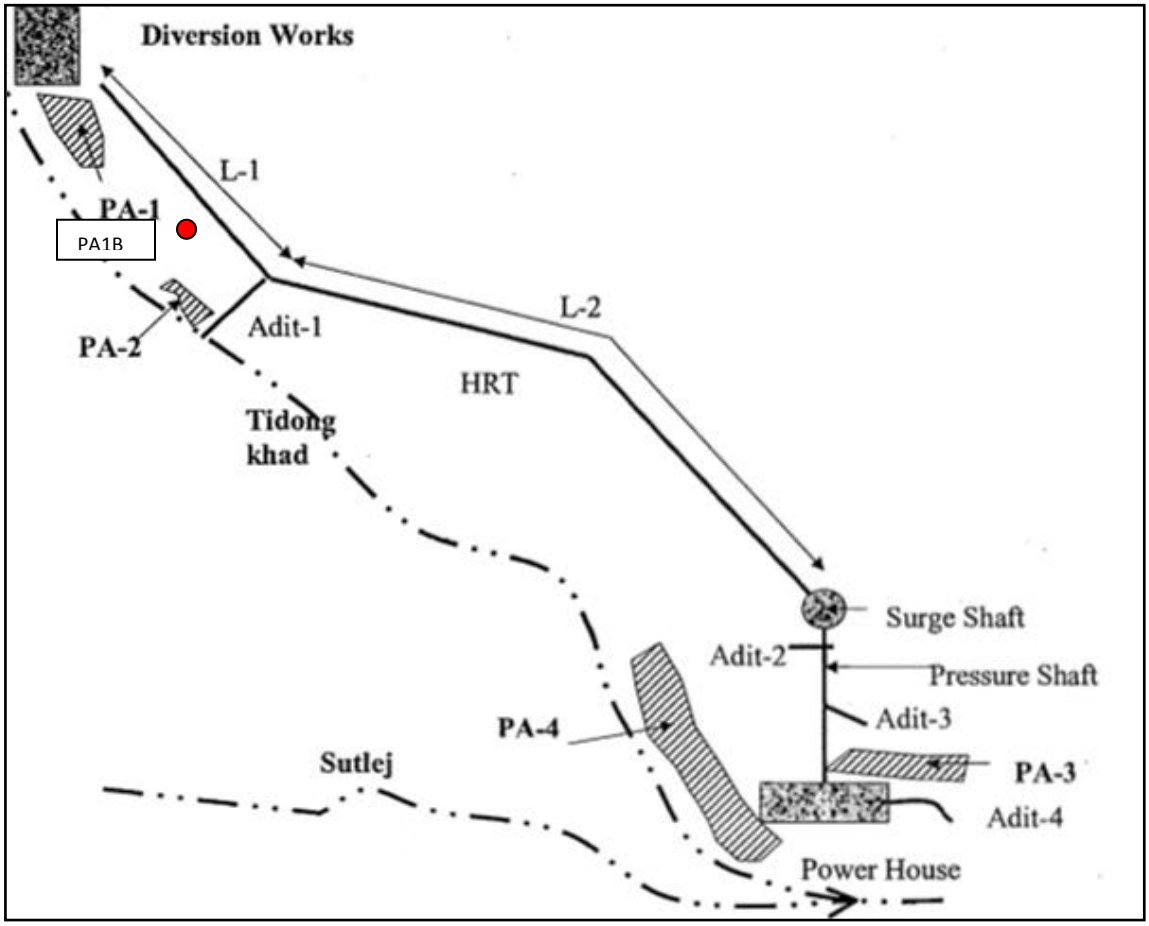
Dumping area Location	Muck generated from	Actual Dump Capacity (m^3)	Muck to be dumped (m^3)	Muck Dumped as on December 2012 (m^3)	Remark
PA 1: A -Near Diversion Point	Barrage, under sluice, desilting basin reservoir, tunnel intake and HRT till audit 1	131800	103000	Nil	Not yet developed
PA 1: B- Near Crushing Plant		276200	200900	252000	Active
PA 2**- Near Audit 1		107652	106000	8000	Abandoned
PA 3- Near Power House towards Audit 3	Surge shaft, valve house, Audit 2,3,4, road	77180	76000	Nil	Not yet developed
PA 4- Near Power House	Pressure shaft, power house, switchyard, tailrace, road	249400	245959	124393	Active
Total		**842342***	**731859**	**384393**	

Note:-
** The total capacity of 842342 m^3 is available but only 731859 m^3 will be utilized.*
***The total dump capacity available after abandoning PA2 dump is sufficient to dispose-off 585489m^3 (Total Generation 731859 m^3- Utilized 146370 $m^{3)}$ of muck generated.*
 # 51,000 m^3 of muck is used near the dump for reclamation of crusher site.

In order to make sure that non-compliance must not happen again, necessary measures shall be taken as follows:

- Consultations with HPSPCB shall be carried out to assess the suitability of a new dumping site which is identified near intake site
- The dumping of muck shall be provided with retaining wall and regular maintenance of these structures shall be done so that muck will not flow and washed away in the river
- The muck will be filled in these areas in layers and compacted mechanically.
- Dumping sites on sloping ground will be protected adequately against any possible slide/slope failure through engineering measures i.e. retaining wall.
- The entire muck disposal area on completion of the filling operation will be provided with a layer of good earth on the top, dressed neatly and covered with vegetation after closure.

Figure 9-1: Location of the muck disposal site (PA 1-4)



To be able to carry out this work a cost provision of INR 1.97 million has been made as provided in Table 9-4.

Table 9.4: Cost of development and restoration of muck disposal sites

Sl. No.	Item	Cost (INR In Millions)
1.	**Engineering measures:**	
	Levelling of sites before dumping	Part of Engineering Estimate
	Boulder crate as per requirement	Part of Engineering Estimate
	Catch water drain as per requirement	Part of Engineering Estimate
	Masonry Retaining wall as per requirement	Part of Engineering Estimate
	Fencing in selected patches for 2.5 km @ INR 200,000/km	0.50
	Provision of top soil for plantation (25% of total area) including levelling/dressing, 10980 cum@ INR 60/cum	0.67
2.	**Biological measures:**	
	Plantation for 3.66 Ha @ INR 27,310/- per ha including of 5 yrs maintenance	0.099
	Beautification works LS	0.60
	Total	**1.87**

9.5 Biodiversity Conservation and Management Plan

The components covered under Biological conservation and management plan include vegetation, wildlife and aquatic life. Measures have been suggested to mitigate damages already been done and also to avoid sever impacts in future.

9.5.1 Forest \Vegetation Conservation Plan

The project does not involve diversion of any protected areas, i.e., wildlife sanctuary, national parks or any protected area. Some of the common species found in the region are *Cedrus deodara, Betula utilis, Pinus gerardiana, Pinus wallachiana* and *Prunus armeniaca*. About 39.0546 ha of forest land has been diverted for the project, having 1261 trees. In addition 590 trees on no-diverted land were destroyed during various construction activities. Thus, a total of 1851 trees were cleared due to this project so far. Not to mention that several herbs and shrubs would have also been damaged, which together constitute the overall ecology of the area.

The potential impacts of these activities are loss of vegetation cover, induced soil erosion and bank failures, loss of income to villagers due to loss of economic importance trees (*Pinus gerardiana*).

To mitigate these impacts following measures are suggested:

- Workers will be located in labor camps/ colonies so that they don't set up labor colonies in the vicinity of the forest and wilderness areas.
- Fuel wood requirement of labors for cooking, heating and other proposes will be made available by the contractor or proponent.
- Strict restrictions and surveillance on the workers from entering forest area
- Efforts will be made to minimize the cutting of trees for various construction activities in future
- For common kitchen diesel or gas will be used to reduce wood usage.
- All wood will be purchased from HP forest department depot.

In addition to these measures two very significant programs will be taken up.

Compensatory Afforestation

The compensatory afforestation will be carried out by the HP Forest Department, Government of Himachal Pradesh (Divisional Forest Officer, Kinnaur) over 79.00 hectares of degraded forest land. The Forest Conservation Act of 1980 stipulates strict forest protection measures and outlines procedures (Guideline 1/08-1 (ii)) for compensatory afforestation if the Department accepts conversion of forestlands for other purposes:

- If non-forest land is not available, compensatory forest plantation is to be raised on degraded forest land to the extent of twice the affected or lost forest area;
- If non-forest land is available, compensatory afforestation is to be raised over an area equivalent to the affected/lost area of the forest.

For this purpose, an amount of INR 26.676 millions has already been deposited by NTPGPL to the HP Forest Department towards compensatory afforestation. However no progress has been made in this matter by forest department.

Catchment Area Treatment Plan

The Catchment Area Treatment Plan has been developed for the period of 10 years. However most of the activities will be completed during the initial 5 years and later half of the plan period will be mainly for the maintenance of plantation area.

The CAT plan aims to develop the catchment area in an integrated manner by improving vegetative cover over the degraded and blank areas through afforestation and bio-engineering measures. It also envisages an active participation of the local community and to treat the flood prone nallas, stabilization

of Tidong River bank, road side slopes by providing suitable bio-engineering structures and soil conservation measures include Nurseries, Forest Conservation & Improvement of Tree Cover, Pasture Improvement, Silvicultural Operation, Soil & Moisture Conservation Works, Road side avenue Planting and Landscaping, forest infrastructure development, Rural Infrastructure Development, Treatment of Private Lands , Fuel Saving Devices, Rain/ Snow Harvesting Structure, Wildlife Management, Training and Studies, Awareness and Publicity , Operational Supports, Agricultural Support, Horticultural Support, Animal Husbandry Support, Development of ECO Tourism, Provision of Eco Task Force, Provision for Allied Activities, etc.

Detailed CAT Plan prepared in October 2007 has been approved by HP Forest Department can be referred separately. An amount of INR 72.484 millions has been deposited by NTPGPL with HP Forest for implementation.

The implementation authority for the CAT Plan for Tidong-I HEP is the Project Officer - Cum Divisional Forest Officer, Kinnaur Forest Division stationed at Reckong Peo. The release of funds and monitoring is through the Conservator of Forest (C.F), stationed at Rampur. The implementation works have started during 2010-2011 and as per the information by the Project Officer-Cum Divisional Forest Office, Kinnaur Forest Division stationed at Reckong Peo it is only about INR 11088000/- (15% of the total planned outlay) is being spent till end of March 2012.

9.5.2 Wildlife Conservation Plan

During the construction phase, various adverse impacts on the wildlife are anticipated in the surrounding areas of the proposed project in terms of increased noise levels, land vibrations during tunneling and blasting, poaching or destruction of forest areas etc. However the impact of fauna is estimated to be low as most of the Critically Endangered/Endangered or schedule I listed species (as per Wild Life Protection Act) identified in the region are not reported to be seen for a long time in Tidong.

Keeping in view the concern for wildlife enhancement and conservation in the project area, the project envisages a contribution of INR 0.5 million towards wildlife conservation program apart from the provision in CAT Plan of INR 8225000.

In view of conservation of wild life, MoEF in its clearance conditions stipulated to establish a Musk deer farm in the project area near Piber/ Sholling which shall include ex-situ breeding of the animal. However, client reported that HP forest Department has conveyed to develop Ex-situ Pheasants breading Centre in place of Musk deer. The proponent has agreed to the change in plan and thus an amount of INR 925000 has been allocated through CAT Plan.

To avoid and minimize the negative impacts from these activities in future following safeguard measures shall be adopted:

- Strict restrictions shall be imposed on the workers at project sites to ensure that they do not cause any danger or harm to the animals and birds.
- A worker's code of conduct prohibiting hunting, fishing and possession of wildlife for human consumption shall be developed by the project.
- Anti poaching measures like intensive patrolling shall be undertaken.
- The access of workers in the neighboring forest area either private or public shall be restricted and controlled by the project.
- Delayed blasting techniques would be utilized to minimize the impact, as a result of noise and vibration generated due to blasting.
- All the gates/ entrances to tunnel and other project components will be kept closed during night time when no activity is being undertaken. This will prevent the chances of animals getting trapped in tunnel.
- If any animal is seen or get trapped inside the tunnel, Forest Department will be informed immediately. Only Forest Department officials will be allowed to deal in such cases.
- The project will be bound by the rules and regulations of the Wildlife (Protection) Act (1972) and Rules (1995), Biological Diversity Act (2002) and Rules (2004), Forest Conservation Act (1980), Forest Conservation Rules (2003), Environment Protection Act (1986) and Rules (1986), for the preservation of habitats and protection of wild animals.

9.5.3 Aquatic Ecology Management Plan

As per the EIA baseline data on fishes in the Tidong stream, it is apparent that fish are not found in the Tidong stream. However, near the confluence with Satluj, Snow and Rainbow trout were reported in the EIA report but when confirmed with second survey in 2012, no fish species was found. The villagers also reported absence of fish in the area. Thus this project will not have any impact on the fish.

However, as conservation measures a fishery development plan has been developed by Directorate of Fisheries, Himachal Pradesh and the following actions are suggested for the project:

- Develop sustainable fisheries in Tidong reservoir,

- Adequate replenishment of fish by producing and stocking their seed to offset the loss of auto breeding/ auto stocking besides losses due to degradation of aquatic eco-system,
- Creation and strengthening of infrastructure for the production of fish seed at the fish farm located at Sangla, Himachal Pradesh,
- Procurement of fish seed of improved phenotypes and genotypes of the existing/ residential fish species
- Providing help to farmers in affected area for setting up of trout raceways.

NTPGPL has already made payment of INR 11.1 million to the Department of Fisheries towards Fisheries Development Plan. Out of this, only INR 3.204 lakhs were utilized till September 2012.

The monitoring of fisheries development plan will undertaken by the steering committee constituting of the following members:

1.	Secretary (Fisheries) to the HP Government	Chairman
2.	Representative of Proposed Project	Member
3.	Director-cum-warden of Fisheries	Member
4.	Representative of construction agency	Member
5.	Assistant Director of Fisheries	Member Secretary

Minimum Ecological Flow

The most effective mitigation measure during project operation, towards the impact on aquatic ecology, is to allow discharge in the affected stretch of river i.e. length of about 9.8-km between diversion structure and tailrace channel.

As discussed in impact assessment, it is mandatory to release the minimal flow in the stream which has been defined by the Government vide its Notification no. MPP-F(2)-16/2008 of Department of MPP and Power, government of Himachal Pradesh, that the ROR projects shall ensure a minimum flow of 15% of the lean season discharge of the stream, immediately downstream of the diversion structure of the project throughout the year.

In this matter, NTPGPL has committed to release 0.5 cumec of water downstream of the diversion structure to maintain the aquatic life. NTPGPL will install online electronic flow meter to ensure this release and report to HPSPCB.

9.6 Construction Labor Management Plan

As detailed in section 3.4.2, there are three labor colonies, one at head works, Adit V and the other near power house. Currently, not more than 150 labors are employed but this number will increase to 500 next year when peak construction work will commence.

The camps have rooms which are made of Corrugated Galvanized Iron sheets, internally lined with wooden ply for thermal insulation. The accommodation has a minimum space of 4-4.5 m^2 per person. These camps have common kitchen, toilet and bathing facilities. Drinking water facilities are found to be appropriate too. A marked improvement has been seen in labor accommodation and house-keeping practice in the present labor camps.

The contractor is responsible for the provision, maintenance and operation of the labor camps. The contractor will establish house rules to maintain the peace and order of the camps, and institute penalties and fines to violators. Serious violation of the camp house rules could be ground for dismissal. The site engineer and the owner's safety engineer reserves the right to regularly inspect and monitor the conditions of the camp, call the contractor's attention for any potential problem and in the event the contractor failed to correct the deficiencies, the site engineer has the right to have the deficiencies corrected and charge the correction work to the contractor's account plus overhead.

In order to ensure that the good conditions prevail and additional laborers to be accommodated next year shall also get comfortable accommodations and good working conditions, a detailed management plan is drawn.

The Construction Labor Management Plan must encompass the following aspects in general and all measures shall be taken to implement these:

- Wherever possible recruit locally from available workforce to minimize social conflicts
- Provide for training as per the job requirement as specified in the Construction Health and Safety Plan.
- All wages and compensations shall be paid as per national labor and employment law such as but not limited to Factories Act, Minimum Wages Act, Trade Unions Act and Workmen's Compensation Act.
- No person below the age of 18 shall be employed;
- No discrimination shall be done based caste, age, sex etc with respect to recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment,

access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices.

- Properly maintained accommodations shall be provided to immigrant workers and ensure that these labor camps are properly maintained.
- Proper water supply, sewage collection and waste management measures shall be provided at camp sites.
- Worker shall be provided with common kitchens run on diesel or LPG or else fuel wood shall be provided to cater to their needs
- The contractor shall provide a safe and healthy work environment to the laborers
- A grievance redress mechanism for workers shall be put in place to raise workplace concerns. The workers will be informed about the grievance mechanism at the time of recruitment.

9.6.1 Labour Camps/ Accommodations

To provide proper accommodation facilities the labor camps must have the following measures in place:

- The labor accommodation shall be provided away from the existing settlements in the area to avoid social conflicts among villagers and laborers;
- The accommodation will be provided on twin sharing basis made of insulated material and locally available building material
- For each worker, a minimum floor surface area of 4 to 5.5 m^2 shall be provided with a minimum ceiling height of 2.10 m about 15-20 % additional area shall be provided for circulation;
- The accommodation will be duly insulated to keep the temperature around 20^{o}C notwithstanding the need for adequate ventilation;
- Both natural and artificial lighting facilities shall be provided and maintained in the accommodation;
- Piped water supply will be made available to these facilities and sufficient arrangements will be provided to keep the common places need and clean. Provisions for hot water during the cold seasons will have to be made in the labor colonies.
- These camps will be supported by common latrines and bathing facilities duly segregated for male and female labor. A minimum of 1 unit to 15 males and 1 unit for 10 females shall be provided

- The workers with families shall be provided with individual accommodation comprising bedroom, sanitary and cooking facilities;
- A canteen facility for the construction workers will be provided and the food will be of appropriate nutritional value and will take into account religious/cultural backgrounds;
- All doors and windows shall be lockable and mobile partitions/curtains shall be provided for privacy. Facilities for the storage of personal belongings for workers shall be provided.
- Disposal of sewage will be made through a septic tank-soak pit arrangement;
- Dustbins shall be provided for collection of garbage and will be removed on a daily basis;

All the labor camps will be directly managed by the contractor in-charge of Labor camps and will be inspected by the Manager EHS and his team on weekly basis. This inspection will focus on the following parameters of the camps:

i. General observations on cleanliness;

ii. Canteen hygienic conditions;

iii. Drinking water availability with respect to source, cleanliness of storage tanks and water quality;

iv. Provisions of sanitation facilities, water availability in toilets, their cleanliness and drainage;

v. Provisions of garbage segregation and disposal;

vi. Fuel used for cooking

vii. Ventilation in rooms and living place temperature

Non Compliances observed during the inspections will be taken up with contractor by NTPGPL site in-charge for suitable redress.

9.6.2 Water Supply

The water demand for the labor camps has been estimated to be 18 KLD (Refer section 5.2.2.c). Water provided at camp sites shall conform to the Indian Standard Specifications for drinking water. The direct usage of water from streams shall not be allowed and water shall be appropriately treated. The NTPGPL's environment team shall regularly monitor the quality of drinking water available in the labor camps.

Status of compliance will be submitted to Head – EHS. In case of non-compliance, suitable corrective action will be taken immediately. In case of non compliance with the Drinking Water Specifications, additional treatment shall be provided or alternative sources of water supply shall be arranged.

9.6.3 Wastewater

The labor colonies will result in generation of wastewater. About 80% of water supply shall be generated as sewage/wastewater. A septic tank and soak pit will be provided for disposal of sewage. These septic tanks and soak pits shall be designed as per Bureau of Indian Standards (i.e.IS:2470).

9.6.4 Fuel Arrangement

Although canteen facilities will be provided in the labor camps, there will be additional fuel requirement for heating etc. To ensure that the influx of labors in the project area does not lead to deforestation, necessary arrangements for supply of fuel wood to the labors on an individual basis shall be done. Considering 15 kg of wood required for one person in a month, the fuel requirements for the peak construction phase have been estimated to be about 7500 kg/ month or 75 quintal/ month.

NTPGPL shall purchase fuel wood from H.P. State Forest Corporation by establishing one depot within the project area. No labor or staff shall be allowed to collect fuel wood from the adjoining forests of the project area.

9.6.5 Canteen

Common kitchen and canteen, facilities should be built in adequate and easy to clean materials and kept in a clean conditions. If workers can cook their own meals, kitchen space is provided separate from their sleeping areas and free fuel should be provided for cater the need of cooking. Canteens should have a reasonable amount of space per worker. Standards range from 1 square meter to 1.5 square meters per person present at any point of time.

9.6.6 Solid Waste Management

The municipal solid waste generated from labor camps and permanent residential colony, shall mostly comprise of compostable wastes like vegetable matters and combustible waste like paper, cans, plastic and some non-degradable waste like glass/glass bottles.

For about 500 workers, the solid waste generated would be approximately 150 kg (0.3 kg per day x 500 workers). It is expected that about 10% of the waste generated will be glass and metal in nature which

will be segregated at source and could be sold in the market. For rest of waste NTPGPL will install an incinerator for disposal of the waste generated from residential colony during operational phase.

9.6.7 Security of Work Force

The contractor shall put in place the following security measures to ensure the safety of the workers.

- Access to the camp shall be limited to the residing workforce, construction camp employees, and those visiting personnel on business purposes;
- The construction campsites will be guarded and barricaded and access will be controlled. Visitor access will be maintained in a register;
- Adequate, day-time night-time lighting shall be provided;
- The campsites shall be provided with fire-fighting equipment and portable fire extinguishers.

9.6.8 Occupational Health and Safety Management for Construction Labour

The dispensaries which are functional at present shall be maintained for the laborers throughout the construction phase. The Health Centre would not only serve the site personnel but also the project affected families and the project affected villages. Regular health checkups shall be carried out for the construction laborers every six month and health records shall be maintained.

The Occupational Health and Safety of workers shall be a priority and all the provisions towards occupational health, safety & hygiene will be adhered. These requirements broadly include the protection against following:

- Excessive noise, vibration, etc.
- Fire
- Fencing of motors
- Lifting and carrying of excessive weight
- Dangerous and harmful environment
- Overhead Protection
- Slipping, tripping, cutting, drowning and falling hazards
- Dust, gases, fumes etc.

- Electrical hazards
- Vehicular Traffic
- Stability of Structures
- Illumination of passageways, etc
- Stacking of materials
- Disposal of debris
- Excavating and tunneling works
- All other applicable requirements in the acts and rules.

All the worker will be provided with appropriate PPE as desired by the job they are involved apart from the following common equipments:

- Eye Protection gears
- Ear plugs
- Head protection and other protective apparel
- Safety helmets and shoes

The employer / contractor will ensure the test and periodical examination of all lifting appliances at a suitable frequency.

NTPGPL's Site in-charge will enforce implement the above requirements and it will be contractor's prime responsibility for implementing this requirement on the work site and thereby ensuring safety of the labors. Every site will have daily, weekly and monthly HSE checklist for their site specific equipment and work environment.

Safety officer of NTPGPL and his team will monitor the implementation of these requirements.

9.6.9 Consultation and Grievance Mechanisms

A Grievance Redress Mechanism shall be functional throughout the project life. The employees shall be informed about the grievance redress mechanism at the time of joining and shall be made aware about the processed and mechanisms to articulate their grievances. The workers subjected to disciplinary proceedings arising from behavior in the accommodation shall have access to a fair and transparent

hearing with the possibility to contest decisions and refer the dispute to independent arbitration or relevant public authorities. In case conflicts between workers themselves or between workers and staff break out, in such cases workers shall have an easy access to the review committee for a fair conflict resolution mechanism.

9.6.10 Contractor Management

The proposed project shall involve several contractors but the overall responsibility of the project will be of NTPGPL. The project proponent shall ensure the following:

- All contractors are aware of the proponent's environmental and social obligations. This shall be done through briefing sessions where NSL's E&S commitments shall be discussed with the contractors
- The contract agreements shall include specific commitments regarding the development of labor camps, handling complaints and grievances, adherence to labor laws and international commitments, protection of forests etc. These commitments to be monitored by the EHS team
- The contractor shall provide adequate training on social behavior and community interaction to the workers engaged by them
- The Social Officer of NTPGPL shall interact with the contractors to ensure consistency in approach to communicating with the Community, and in resolving grievance
- The project proponent shall ensure that adequate contractual obligation are added to contract awarded to ensure that the migrant labor is adequately, trained, briefed and facilitated during the course of the project.

9.7 Traffic Management Plan

It is expected that there will be increase of traffic for construction related activities of the Project. This would increase pollution, disturb local people in the area and also increase chances of road accidents. Hence a Traffic Management Plan (TMP) is prepared to address the following aspects and minimize the adverse impacts.

- Traffic Management Planning
- Access Route Selection and Management
- Road-Related Accidents
- Parking Facilities

- Drivers' Training
- Vehicle Management and Maintenance
- Community Liaison and Safety

9.7.1 Traffic Management Planning

The efficient management and planning of transport will require the implementation of following measures to:

- Appropriate speed limits for various motor vehicles and construction equipments will be determined as part of the traffic management based on type of roads available en-route the location to and fro of the project component where construction material is to be transported project;
- Establish safe sight distances including within construction areas;
- The movement of heavy, wide or slow-moving loads will be planned at times when traffic volume on the roads concerned is least;
- Vehicles shall enter and exit project area in a forward direction, in case reversing is required it will not be done unattended;
- Provide proper signage around the construction areas to facilitate traffic movement
- Regular inspection of access roads conditions and whenever, necessary, repair of construction traffic related damages will be done;
- Movement of special loads such as hazardous materials and heavy loads will be supervised by the project proponent;
- Appropriate supervision will be provided to control flow of traffic when machinery needs to cross roads;
- Local authorities will be informed about the construction period, including abnormal load traffic movement schedules;
- Training and testing of heavy equipment operators and drivers, including vision tests, with records kept of all trainings;
- Create traffic awareness among the local people and inform parents to keep children from exposing themselves to the traffic in the construction area. Vehicle traffic will be minimized during the periods when children are travelling to and from schools falling on traffic routes;

- Records of all accidents involving project vehicles will be maintained and adequate corrective action procedure will be followed;
- If road closures are required, diversions will be planned and communicated to the authorities and affected communities in advance. All diversion will be constructed to the specifications of the applicable road authority and will be maintained in good drivable conditions until the completion of the re-instatement work;
- The project traffic or any project activity will not obstruct the access to neighboring properties;
- Ambulance and fire services will be consulted regarding road diversions. Road diversions will not increase the response time of these services to local communities; and
- In the case of open excavation works, all road diversions will employ traffic control devices to warn and protect the public and construction personnel.

9.7.2 Access Route Selection and Management

The construction equipment and other materials are transported to the upstream works through a 17 km long PWD road taking off from NH-22 at Moorang Bridge up to Lambar village. The road is a one lane road and at present the traffic movement is very slow. In addition to this, a 2.8 km long road is constructed for Powerhouse and Surge shaft access and another 2.7 km long road to access Adit 1 from PWD road at the upstream works. Both of these roads also include the construction of Belly Bridge for crossing the Tidong stream.

Access to project areas will be allowed only through specified approach roads. The new project roads are designed and built in accordance with the project design specifications and to channel storm water safely, adequate slope and cross-fall drainage has been provided. Further to this following actions are suggested for rest of the project life:

- The traffic management is to be monitored on daily basis to evenly spread traffic flow during a day so as to avoid congestion and minimize chances of road accidents;
- Contractor will comply with all statutory vehicle limits with respect to width, height, weight, loading, etc;
- Paved roads will be cleaned regularly and un-pave roads will be stabilized to reduce offsite transport of soils and avoid dust generation;
- The condition of approach roads used by project will be monitored throughout the construction period and they will be maintained in a good conditions as per the project specifications;

- Hard core surfaces shall be used on approach roads to keep roads free from mud, dust, debris etc;
- Personnel/sweepers shall be appointed to clean hard standing area and to remove any mud/debris deposited on the access roads and public highways;
- Project vehicles carrying dusty material shall be covered/ sheeted to avoid the deposition of loose materials on approach roads.

9.7.3 Road-Related Accidents

Hazards to personnel associated with vehicle transportation, both on road and off-road, will present one of the most significant risk exposures of the project.

- Record of all the accidents that occur on construction site will be maintained by clearly specifying the cause of accident, injuries, corrective actions taken and implementation of actions;
- Adequate First aid arrangement will be made at both power house and headwork location.
- NTPGPL and Contractor shall also review the procedures and make arrangements for the following:
    - Source and number of qualified drivers needed, hours of driving and rest periods,
    - Drivers' training and approval,
    - Driver, vehicle and load security arrangements,
    - Driver's communication with control point and vehicle equipment,
    - Language/communication,
    - Source and number of suitable vehicles required, Vehicle quality and specification,
    - Vehicle preventative maintenance programme,
    - Vehicle routes, route planning and alternative routes,
    - Emergency recovery of vehicle;
    - Strategic vehicle parking locations,
    - Inspection and audit of the project transport system.

9.7.4 Parking facilities

- Parking facilities as detailed above have been provided for all project vehicles, machines, transportation vehicles within land acquired for the implementation of the project.
- No vehicle and machine will be allowed to be parked along the community roads, PWD roads;

- Signage will be placed around the construction areas to facilitate traffic movement and parking, to provide directions to various components of the works, safety advice and warnings;
- All signs shall be posted in both English and Hindi language;
- Provision for dedicated parking area will be made near the project office, intake site and other suitable location for the private vehicles of construction personnel;
- Overhaul provisions will be made for any accidental spill of oil or fuel during parking or whenever the vehicle is idling.

9.7.5 Driver Training

- Drivers will be suitably trained in accordance with driver training requirements;
- All drivers will be also be trained and evaluated in defensive and off-road vehicle operation;
- Driver qualifications, skills of drivers and contractor's driving assessors will be checked by NTPGPL in accordance with the contractor's approved training requirements;
- Unauthorized passengers in project related vehicles will be strictly prohibited;
- Training will be provided in both Hindi and local language understood by drivers;
- All the personnel who drive vehicles as a part of contract will have to be in possession of a driving license at all times.

9.7.6 Vehicle Management and Maintenance

The project proponent will ensure the following in respect of vehicle maintenance, noise and emission standards:

- Project will ensure that vehicle fleet working on the project (whether directly for the contractor or for the contractor's subcontractors) is maintained according to the manufacturers' specification;
- An up to date database of all vehicles and construction equipments deployed across various project component locations will be maintained;
- The database shall contain details about the periodical maintenance, schedule of maintenance, vehicular emission and noise emission testing done as per Indian regulatory requirements, copy of PUC certificates etc;
- All vehicles shall be maintained so that their noise and emissions do not cause nuisance to workers or local people;

- New vehicles/equipment purchased 'as new' after contract award shall comply with emission standards in force on the purchase date;
- Older vehicles/equipment not purchased 'as new' after contract award shall be maintained so that noise and emissions levels are no greater than when the vehicle/ equipment was new;
- Movement of construction machinery and vehicles through and near existing settlements will be avoided during night time hours;
- Oil and fuel leaks must be addressed within 24 hrs of observation or reporting on any vehicle or construction equipment;
- All heavy vehicles like cranes, battery operated trolleys etc. will be provided with reversing siren.

9.7.7 Community Liaison and Safety

NTPGPL will engage the Community Liaison Officer to carry out traffic safety awareness programme as part of road safety awareness programme on behalf of NTPGPL power and contractor. He will be engaged with communities and facilitate the following actions:

- When required, the Officer shall seek support of local administration for management of heavy traffic and closure of community used roads;
- Communities will be advised well in advance of project progress and near term activities where transport issues have the potential to impact local communities;
- Information such as duration, start and finish of project activities, timing of road closures, diversions will be discussed with communities;
- Communities will be consulted while upgrading existing roads to facilitate their use for project purposes;
- Special efforts will be made to brief women on safety measures for themselves and children;
- The Community Liaison Officer Schedule for execution of traffic management plan

9.8 Health and Safety Plan

The purpose of this document is to identify the health and safety hazards associated with project activities during construction phase and to provide guidance on safe working procedures in accordance with NSL's corporate social environment health and safety policy and also to comply with the national statutory legislations related to occupational health and safety.

9.8.1 Health and Safety Regulations

The national statutory laws related to health and safety is presented below:

- The Factories Act, 1948 and The Himachal Pradesh State Factories Rules;
- The Building & Other Construction Workers (Regulation of Employment & Conditions of Services) Central Rules, 1998;
- The Mines Act, 1952 The Mines Rules, 1955 The Mines Vocational Rules, 1966 and The
- Mines Rescue Rules, 1985;
- The Motor Vehicles Act, 1988 The Motor Vehicles (Central) Rules, 1989 and The Motor
- Transport Workers Act, 1961;
- The Indian Explosives Act, 1884, The Explosives Rules, 1955 and The Static & Mobile Pressure Vessels (unfired) Rules, 1981 and The Gas Cylinders Rules, 1981;
- The Petroleum Act, 1934 and The Petroleum Rules, 1976;
- The Public Liability Insurance Act, 1991 and The Public Liability Insurance Rules, 1991;
- The Dangerous Machines (Regulation) Act, 1983;
- The Indian Electricity Act, 2003 and The Indian Electricity Rules, 1956;
- The Workmen's Compensation Act, 1923 and The Workmen's Compensation Rules, 1924;
- The Employees' State Insurance Act, 1948 and The Employees' State Insurance (Central) Rules, 1948;

9.8.2 Safety Guidelines

The major activities involved in the construction phase of hydro are presented below for which safety guidelines are detailed in subsequent sections:

- Excavation works
- Drilling and Blasting
- General Construction Works
- Use of Plant and Machinery
- Occupational Health and Safety Measures

Excavation works

Open earth and rock excavation

The identified hazards on excavation work are quicksand, effect of freezing and thaw, vibration from nearby sources, Surcharge imposed by adjacent buildings, piles and measures suggested for safety are as follows:

- All timbering and plant used in any excavation, shaft, and earthwork or tunnel shall be inspected by a competent person before work is started or laborers are allowed.
- All loose stones, projecting clumps of earth and unstable material that may come down on workers in trench shall be removed and the excavated sides shall be adequately braced and trench suitably guarded.
- Close continuous sheathing shall be used for holding quicksand whereas only bracing may be used to hold damp sand, as it is more stable and rocks shall be sealed to prevent falling of fragments.
- Additional bracing precautions shall be provided for sites having vibration due to adjacent machinery, vehicles, railroads, blasting and other sources.
- Excavation areas shall be adequately lighted for night work.
- During hours of darkness all public sidewalks shall be adequately illuminated and warning lights about the excavation shall be provided to ensure safety of pedestrians and vehicular traffic.
- At all approaches and exists of the sites of excavation; danger and warning signals shall be placed.
- Adequate measures shall be taken to prevent workers and spectators from approaching the dangerous areas. Visitors shall not be allowed on the scene of excavations unless a supervisor accompanies them.
- No material or load shall be placed or stacked near the edge of any excavation, shaft, pits or opening in the ground which may endanger persons working below.

Tunnel and Shaft Excavation

The common hazards perceived during tunnel and shaft excavation are cramped working space, wet and slippery floor, inadequate lighting and ventilation and accordingly measures to be taken to ascertain safety are:

- All operations inside the tunnel or shaft shall be carried out under the immediate charge of a competent engineer in-charge. The engineer in-charge shall also be responsible for the safety arrangement of the work.

- Workmen shall be thoroughly instructed in safety rules and shall be required to follow them at all times. They shall be required to report immediately if any unsafe conditions are observed.

- The engineer in-charge appointed to look after the tunneling work may also take the guidance about the bad reaches expected to be met in the tunnel from the geologists so that necessary safety measures can be adopted.

- The occurrence of any accident, involving personal injury or of any dangerous incident, such as serious break-down of or damage to any apparatus / equipment shall be reported to the supervisory staff / officers and adequate precautionary measures shall be taken by the engineer-in-charge to prevent recurrence. An accurate record of such accidents shall be properly maintained. Probable reasons of accidents shall be investigated and precautionary measures taken to avoid further recurrence.

- Emergency lights (battery operated) shall be installed at the working faces and at intervals along the tunnel to help escape of workmen in case of accidents. All supervisors and gang-mates shall be provided with cap lamps or hand torches. It shall be ensured that at least one cap lamp or hand torch is provided for every batch of 10 people.

- Mechanical ventilation shall be adopted where necessary to force the air in or exhaust the air out from the working face to the portal through a pipe to achieve the safety.

- The ventilation is required to remove polluted air, gases and smoke produced by explosives, dust formed by the disintegration of rock, exhaust gases from the diesel operated equipment like locomotives, dumpers, trucks, shovels, etc, and also to ensure temperatures of not more than 40^0 C dry 29° C wet at the working place.

Drilling and Blasting

Transportation and Storage of explosives

During this activity there are chances that explosives get spilled or an accidental explosion takes to avoid such a situation the following guidelines are recommended:

- Two Carbon Dioxide fire extinguishers each of more than 3 kg capacity shall be carried on all vehicles transporting explosives;

- Appropriate labeling shall be done to demarcate the explosives storage areas;

- Packages shall be stacked in magazine or store house in such a manner so as to facilitate inspection of the condition of all packages stored and to read the marking particulars of each package

Drilling and Loading

Accidental explosion or misfires may take place during this activity, which shall be avoided by adopting the following measures:

- The approach to the site shall be closed by the barriers at a distance around 400 m at least 10 minutes prior to firing;
- Loud wailing note of 1-minute duration shall be sounded on the sirens to warn the public before commencement of firing;
- The blaster shall not return to the blasting site before 5 minutes have elapsed from the time of firing. In case of misfiring, no person shall be allowed to approach the blasting site for at least 30 minutes;
- After allowing adequate time, not less than 30 minutes after firing of the shots, the shot-firer shall ensure that all the holes are fired. No other person shall be allowed to the site of blasting before this is checked by the shot-firer;
- The blasting operations shall be carried out only by a licensed blaster;
- Identification badges shall be provided to all personnel and appropriate employee records shall be maintained. The badge shall be worn at all times- off the job, as well as on the job.

Other activities during construction

During construction other hazardous conditions may occur from high noise from operating plant machinery, falls that may occur while working at height and any other electrical or fire hazard.

Noise hazard

- All machines to be used will conform to the relevant Indian Standards (IS) codes, will be kept in good working order, will be regularly inspected and properly maintained as per IS provisions and to the satisfaction of the site Engineer.
- No employee will be exposed to a noise level greater than 90 dB (A) for a duration of more than 8 hours per day as per the Factories Act, 1948, as amended. Provision of ear plugs, ear muffs etc and undertake rotation of workers operating near high noise generating areas.
- Training programs will be organized for the operational workforce regarding proper usage of PPEs, handling and storage of fuels and chemicals etc. Hard hat areas will be marked and informed to all workers.

Fall hazard

- Work permit system shall be implemented for working at height (typically when working over 2m above). Prior to undertaking work, integrity of structures shall be inspected. Only workers trained in

climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment shall be engaged for work at height.

- Appropriate fall-protection system will be provided as per the requirement. Safety belts will be mandatory and shall be monitored for wear and tear on regular basis. While operating power tools at height, workers will be provided with a second (backup) safety strap.
- Ensure use of safety belt and need for safety net as required
- All work at height to be undertaken during daytime with sufficient sunlight
- Work permit system shall be implemented for working at height (typically when working over 2 m above) and for hot jobs.
- Prior to undertaking work, integrity of structures shall be inspected.

Electrical/Fire Hazards

- A clear space of 15 meters around the outer boundary of saw mill and Lambar storage area may be provided. All Lambar should be stored in sections with fire breaks with a distance of 15 meters between consecutive section;
- Fire extinguishers and fire buckets, painted red shall be provided at all fire hazardous locations viz. Batching and Mixing Plant, Winch Houses, Workshops, Store yards, Saw-Mill, Switch Gear Room compressor Station, Office establishments etc. The extinguishers shall be inspected, serviced and maintained in accordance with manufacturer's instructions. The inspections shall be evidenced by notations on tag attached to the extinguisher.
- Workers handling electricity and related components will be provided with shock resistant gloves, shoes and other protective gears. Adequate training regarding health and safety will be provided to the workers.

9.8.3 Training

The description of the training modules, the frequency at which they are to be conducted and the responsible person for the training program have been provided in Table 9-5.

9.8.4 Safety Meetings

Weekly meetings shall be organized between the contractor's Safety Officer and NTPGPL's site safety officer to discuss the efficacy of the safety measures incorporated in the current operations, incidents, any other health and safety concerns and safety measures to be incorporated in further course of work.

Monthly meetings shall also be organized with the Head –EHS to update him on the health and safety aspects in site operations and to seek his guidance in developing safety measures.

Table 9-5: Training schedule

Training	Frequency	Description	Responsibility
Induction Training on SEHS		All NTPGPL staff and contractors at the time of joining/engagement	Head EHS
Tool Box Training	Daily	Held at each work location by foreman of contractor to discuss day's activities and specific hazards	Contractor
Foreman Safety Training	Fortnightly	Review safety performance for week Discuss safety for upcoming operations	Contractor
Mass Training	Monthly	Presentation of significant safety issues	Head EHS
Special Job Hazard Training	Half Yearly	Training about safety measures to be incorporated related to specific jobs	Contractor
Safety Bulletins	Weekly	Specific issues Visible through jobsite for constant awareness	Contractor
Fire Safety	Half Yearly	Presentation of fire safety measures	Contractor
Emergency Response Plan	Half Yearly	For emergency preparedness	Contractor
First Aid	Half Yearly		Contractor

9.8.5 Incident Reporting

Any incident or activity irrespective of its severity shall be reported and recorded. The Safety Officer shall thoroughly investigate the actual cause of the injury and the potential corrective actions to prevent future incidents. Proper documentation shall be maintained in timely and accurate manner to mitigate against similar situations which lead to the accident causing another accident.

9.8.6 Health and Safety Audits

NTPGPL shall conduct internal Health and safety audits once in a quarter to assess the health and safety aspects onsite. External Health and Safety Audits shall also be conducted every six months by a competent organization. The findings of the audit shall be discussed between the Head – EHS , NTPGPL's safety officer , contractor's safety officer and time bound corrective action plan shall be formulated and implemented. The Head – EHS shall supervise and monitor the implementation of the corrective actions.

9.8.7 Medical Facilities

A Pharmacist shall always be employed at the Primary Health Centre (PHC) facility at site. Medical reports shall be maintained for any onsite injury. Regular health checkups shall be carried out for the construction laborers every six month and health records shall be maintained.

9.9 Emergency Preparedness Plan

Emergency is an unexpected event due to sudden failure of the system, external threats, internal disturbances, earthquakes, fire & accidents.
Emergency Response Plan is suggested to identify and prevent the potential accidents and emergency situation. The objective of emergency response is to:

- Ensure safety of people; protect the environment and safeguard commercial considerations of the project and the community;
- Immediate response to emergency situation with effective communication network and defined procedures;
- Obtain early inputs of emergency conditions so as to prevent impact on personnel, community, assets and environment;
- Safeguard personnel to prevent injuries or loss of life by:
  - Protecting personnel from the hazard;
  - Evacuating personnel from the site when necessary;
  - Minimize the impact of the event on the project, community and the environment limiting the hazard or impact locally

The following subsections provide the details of the main aspects of the emergency plan:

- Identify emergencies that could affect the project site;
- Establish a chain of command with clear roles and responsibilities; and
- Develop emergency-response policy and procedures.

9.9.1 Identified Emergency Situations

The emergency situations identified for the Tidong I Hydro Power Project are:

- Fire and Explosion
- Structural Collapse, i.e., tunnel collapse;

- Natural Hazards like Earthquakes; Flash floods; Landslides and Forest fires
- Medical emergency

9.9.2 Emergency Management Interface

The details given in the subsections identify the interface among the following:

- Incident controller at the tunneling and other construction sites;
- Incident controller together with local support for the emergency management will be called Emergency Response Team i.e. at Project Site;
- Emergency Management Team (EMT) which includes top management (from NSL Hydro).

Incident Controller

The primary roles of Incident controller are to

- Respond to the on-site response plan in case of any emergency pertaining to the site;
- Immediately proceed to emergency control center and assume overall control, as soon as the emergency alert is made;
- Assess the magnitude of the situation and decide if evacuation is required from the affected areas;
- Maintain a continuous review of possible action plans and assess in consultation with incident controller and other key personnel as to whether shutting down of the plant and evacuation is required;
- Provide advice on possible effect on areas and outside the premises to the local & district administration about the incident and probable need for evacuation;
- Incident controller delegates their responsibilities to emergency response personnel;
- Direct all the operations within the affected areas with priorities for safety personnel minimize damage to the property and environment;
- Give instructions for the shutting down and evacuation of areas likely to be affected by the emergency;
- Ensure that the non-essential staff, workers of the areas affected are evacuated to the gathering areas and the area is searched for casualties;
- Incident controller directly consults with the technical resources;

- Direct the supervisor of the affected areas for the safe guarding of the personnel, minimize the damage to site and environment;
- Communicate all the things to Emergency Response Team till the affected area is cleared.

Emergency Response Team (ERT)

The role of ERT at the operating site is to control the emergency and render the facility safe by the application of local resources and support the local response effort by coordinating additional equipment, personnel, and other external resources for the direct response effort.

The ERT will comprise of the following persons and their roles are discussed in subsequent section:

- Safety Officer;
- Fire Officer;
- Evacuation Officer;
- Communication Officer;
- Liaison Officer; and
- Medical Officer.

Safety Officer

- Reports to incident controller and assist him in all matters;
- All the first aiders work under his supervision;
- He will arrange first aid to the casualties;
- He will arrange first aid items and other emergency equipments;
- In post accident condition he should gather information on the material / equipment involved in the accident and its danger potential, its effect on humans and environment;
- Assist site controller in maintaining the emergency equipment; and
- Assist the site controller in conducting / evaluating mock drills.

Fire Officer

- Proceed to the scene of emergency and report to incident controller;
- Consult site supervisor of the area regarding special precautions such as type of material involved in fire;

- Decide the line of action in consultation with the site controller;
- All the fire fighters shall work under his guidance.

Evacuation Officer

- Proceed to emergency area and report to incident controller;
- Act as per the instruction of the incident controller;
- Consult the affected area site supervisor for evacuation of the employees;
- Advice all the employees expect emergency response team to assemble at gathering area;
- If required nearby employees also to be evacuated;
- The nominated person at gathering area shall record names;
- Compare the names with the attendance list if any missing inform to safety or liaison officer after discussing with the site supervisor.

Communication Officer

- Proceed to the emergency area and report to the incident controller after getting the information from the incident controller regarding emergency through telephone or through messengers;
- He will reserve specified messengers to act as runners between the site controller and himself;
- He handles all the transmission to the emergency control center and dispatched from it, including those to outside agencies and technical information source;
- As per the incident controller's instructions, he will pass information to other members, if required.

Liaison Officer

- As soon as he receives the information he should proceed to the emergency control center and report to the site controller;
- He has to co-ordinate with all the outside agencies who offer assistance to an emergency response supporting team;
- He shall know who represents the various agencies and where and how to contact them;
- Some of the agencies liaised with are the law, enforcements, public fire services, red cross, rescue and emergency services, local government officials (Police), utility personnel (telephone, electrical, water), health officials, hospitals and ambulance services, lawyer for legal advice (if necessary).

- He is to ensure that casualties received adequate attention and the alternate transport, when in need;
- When emergency is prolonged he shall co-ordinate with supply officer to arrange for the relief of rescue or fire fighting personnel and organize refreshments or catering facilities;
- He is responsible for evacuation of the nearby village people, if situation warrants.

Medical Officer

- On receipt of information keep him ready and alert his staff to attend serious and urgent cases;
- The medical officer is responsible for providing first aid to those injured/ rescued and making that they are promptly transported for further treatment if required;
- Co-ordinate the supply officer for medical supplies;
- He should be familiar with antidotes for specified materials.

Emergency Management Team (EMT)

The EMT will comprise of higher level management operating from the regional corporate office. The EMT will be actively involved only when the emergency is moderate to very high in rating. The primary role of the EMT is to:

- Coordinate with district administration for support and resources;
- Delegate authorities to local office / site staff for onsite decision making on critical issues;
- Address the immediate public image aspects of the incident; and
- Minimize the financial impact on the company by consideration of the strategic, legal and public image aspects of the incident whilst supporting the local response effort.

9.9.3 Emergency Response Planning

In case of all emergencies, the controller/response team will swing into action without losing time. Immediate action is the most critical element for relief and rescue operations to save human life, to mitigate the impact on the environment and to safeguard commercial consideration of the project and the community. The same is true while dealing with any emergency during the proposed project construction. This ERP is conceptually based on the Trigger Mechanism which envisages that on receiving signals of an emergency situation/ disaster happening or likely to happen; all activities required for the mitigation process are energized and activated simultaneously without loss of any time.

The primary objective of this mechanism is to undertake immediate rescue and relief operations and stabilize the mitigation process as quickly as possible. The main parameters of such a response plan include:

- Signal/warning mechanism;
- Activities and their Levels;
- Command and control structure;
- Individual roles and responsibilities of each specified authority to achieve the activation as per response time;
- Response teams for each specified authority;
- Emergency procedures; and
- Alternate plans & contingency measures.

Alert Phase

It will be ensured that all site personnel at the site remain alert at all times for situations that have the potential to escalate into an emergency incident. All the members of the ERT and EMT remain fully prepared for all emergency situations and will be activated as required. All members of the response function will be well trained in the Project's Emergency Response Plan.

Initiation of emergencies on site can be undertaken in a number of ways depending upon the severity of the incident. Alert using fire alarm siren can be activated by any of personnel at the construction. The site siren will sound in an intermittent mode and all construction areas i.e., the head works, adit sites, power house and all campsites will have individual fire alarms, which will sound in the area of the incident.

The fire and evacuation officer will initiate the standard procedures to attend an incident as soon as the siren is sounded. This has the advantage of permitting the earliest possible action to be taken to control the immediate situation, which may avoid the development of a major emergency.

The site manager will assume the Incident Commander's role and the responsibility for initiating Emergency Response Plan measures. The Incident Commander will assess the situation and act according to procedures. Evacuation of employees to the nearest identified assembly area will be initiated as required (all personnel present on the site would make it a point to always move upwind in case of fire). The urgency will depend on the severity of the situation.

Depending upon the severity and escalation potential of the incident, the emergency will be communicated to the Project Manager, who in turn reports to Head Hydropower NSL. The safety officer at site will keep Head EHS informed of the development and seek advice as appropriate, to handle the Emergency.

Declaration of Emergency

In order to enable the appropriate level of response to be implemented, emergency incidents are categorized according to three levels as follows:

Level 1 (Minor Emergency)

All events with no escalation potential and which can be controlled and contained by the action of personnel at the site will be considered as level 1. In such cases of local alert, the ERT leader will be notified but the EMT is not called out. Also contact with EMT Leader is not required. Some typical incidents are:

- Vehicle collision (involving no loss of life);
- Equipment damage;
- Medical Evacuation (not very serious cases);
- Minor fires.

Level 2 (Serious Emergency)

All events with escalation potential, depending on the effectiveness of the local response will be considered as level 2. These incidents may impact the entire construction activity or have cascading effect. For such type of incidents the ERT is activated and the ERT leader notifies the EMT Leader of the site alert incident. Some typical incidents are:

- Substantial security incident / Vandalism;
- Structural collapse;
- Minor Flooding;
- Minor Landslides;
- Serious damage to structures;
- Substantial fire; and
- Cultural conflict.

Level 3 (Major Emergency)

All crises that require assistance from external resources in order to save lives, minimize damage and to bring the abnormal situation back under control. These incidents have the potential to impact beyond the project footprints and affect the community. In such cases EMT is to be activated immediately and the EMT leader has to notify the corporate office and appropriate Government / regulatory authorities. Some typical Level 3 incidents are:

- Major fire/explosion;
- Tunnel collapse;
- Fatality ;
- Severe flooding;
- Landslides.

Emergencies will initially be under the control of the Incident Commander together with the Fire and evacuation officer, whose main tasks are to locate the source and nature of the incident, to inform the ERT Leader, and activate the Site Security and Emergency Services. During normal working hours the incident commander will keep the ERT leader informed and jointly decide whether it's a Level 1, Level 2 or Level 3 emergency. For a major emergency appropriate Emergency Control Centers will be set up, the site Emergency Support Team summoned and the ERT and EMT activated as required. Personnel on site will know that a Major Emergency has been declared if the site fire alarm siren and /or the local fire alarm systems are activated. The Emergency Siren Modes will be demonstrated and shared with all workers to identify with them.

9.9.4 Emergency Response Procedures

All emergencies identified shall be handled as per the measures suggested in subsequent sections. The procedures not only deal with the emergency specific measures but also general guidelines on Securing the Accident Scene and also Emergency Checklists to be made by various people.

All supervisors and employees/ contractor will be responsible towards the emergency response procedures.

Procedure: Evacuation of Site

All supervisors and employees will anticipate the effect of a major emergency or disaster in the operation and plan a course of action that will minimize personal injury and property damage in the event of any fire, flood, landslide, or natural disaster.

The following actions are recommended as and where they are applicable to a particular situation.

- An evacuation signal (siren) will be initiated in case of evacuation order;
- Incident Commander will determine correct course of action going forward;
- All employees will follow the order without discussions after evacuation orders are made. Only information regarding the evacuation or status of personnel will be conveyed;
- If working underground, employees will either walk out using a dedicated travel path or be transported out of the tunnel. The last person out of the tunnel will account for all other individuals;
- Turn off and unplug all equipment and power tools. Stow tools in job box if close, otherwise place out of the path of egress;
- Gather at a pre-determined assembly point at site. Site supervisor to get head count at the assembly point and no worker shall leave the worksite till the head count is undertaken;
- Supervisor report to incident commander about the status of staff and departure from site;
- Supervisor to confirm when all site staff has safely left the site;
- Identify and inform in case there is shortage of count or possibility of any person being trapped;
- Site-in charge will coordinate with the contractors for the shutdown of major mechanical and electrical equipment, however all ventilation systems will remain operating along with site security systems;
- All employees will have their latest contact information documented so that they can be contacted by management as soon as it is known when work will re-commence;

Procedure: Vehicle Accident

The project is associated with movement of construction material, machinery man power and muck generated at site. The potential for accident on hilly tracts are always high.

- The drivers/observer will contact nearest office (site/project) immediately;
- The safety officer and medical officer will reach the site based on the assessment of information received. The medical officer will attend to any injury resulting from the accident;
- Arrange for ambulance and additional medical facilities, if required. Address any imminent medical emergencies. Administer First Aid until medical professionals arrive. Be ready to coherently communicate location and nature of injuries to civil emergency personnel;

- Make arrangements to clear the road and smooth flow of traffic in case of blockade caused by accidents;
- A thorough accident investigation of the accident scene will be conducted by the Safety Department and along with administrative staff:
    - Photographs of scene and vehicle will be taken and kept in the investigation file;
    - Safety Department will obtain all Police Reports and Insurance information generated from the accident, wherever applicable;
    - Damage to Project and or Contractors' equipment, materials and facilities will be documented and damage estimates obtained for reimbursement/claim.
- If a major accident occurs, involves chemical spills or fumes, or involves fire producing fumes or smoke then evaluate the risk of toxic fumes, smoke, or gas. Be prepared to temporarily evacuate the work area that might be affected. If evacuation is necessary, follow procedures outlined above.

Procedure: Tunnel Rescue

NTPGPL/Contractor will develop and implement a dedicated, trained Tunnel Rescue Team for the duration of this Project. The Tunnel Rescue Team will consist of both NSL and Contractor employees. Key points of contact will be established between NTPGPL's safety team to initiate a clear communication and coordination as detailed below during an emergency condition. The Tunnel Rescue Team will have full responsibility and authority of the area and for the safe conduct of the emergency response.

A detailed Plan that defines the role and responsibility of each member of the Tunnel Rescue Team will be prepared, reviewed and approved by all required individuals and entities in advance of shaft or tunnel construction. Basic elements of the Tunnel Rescue will include the following:

- The project team will tie with Local Fire Authorities and train their safety members for tunnel rescue works;
- Rescue team members must be trained and qualified in rescue procedures including the use of breathing apparatus and the use of firefighting equipment;
- Rescue teams members must be available at site or within a half-hour of the site, or within two hours travel time to the site;
- Prior to the Tunnel Rescue team's arrival at the work site, necessary preparations should be completed both at the surface and within the shaft or tunnel. These may include:

Surface / Top of Shaft

- Clear a path to the scene or shaft for access;
- Set out persons to direct ambulance/rescue personnel into site;
- Stop all equipment movement in area;
- Assist Tunnel Rescue personnel with equipment.

Tunnel or Shaft Area

- Ensure tunnel is clear of all obstructions for clear passage;
- Mobilize locomotive and train for Tunnel Rescue personnel and equipment;
- Assist Tunnel Rescue personnel with loading equipment and safe operations to enter tunnel and work area.

The Evacuation Plan and Emergency Response Procedures will be put into action during all such situations of tunnel emergency.

Procedure: Earthquake

If you are inside a building:

- Duck under the nearest sturdy object and hold onto it until the shaking stops. If you are not near a sturdy object, make yourself as small as possible and cover your head and neck;
- If you stand in a doorway, brace yourself against the frame and watch out for a swinging door or other people;
- Avoid windows, filing cabinets and other heavy objects that could fall or shatter;
- Stay under cover until the shaking stops, then exit the building;
- Wait for “all clear” message to be issue by the safety officer after inspection.

If you are outside:

- Move away from trees, signs, buildings, electrical poles and wires;
- Protect your head with your arms from falling bricks, glass, plaster and other debris;
- Move away from fire and smoke;
- Proceed to the assembly point or other safe area;
- Stay alert for further instructions.

Procedure: Floods

- Head direct towards the high/elevated level area instead low lying areas;
- If it's a single storied construction head to the tallest sturdy building in the vicinity immediately and take shelter in the top floors of the building;
- Avoid the metal risings such as cell towers/ hoardings etc. in case of lightning occurrence;
- Avoid taking shelter under trees/ hoardings and makeshift constructions;
- Avoid climbing trees/hoardings etc.;
- Stay under cover until rescued/further help is provided.
- Accidental flooding of tunnel due to flash floods shall be monitored through manual observers or installing water level rise detection device on the upstream during construction phase.

Procedure: Landslides

- Curl into a tight ball and protect your head if you can't get out of the landslide's path.
- Listen for any unusual sounds that may indicate moving debris, such as trees cracking or boulders knocking together;
- Stay away from landslide area as additional slides may occur;
- Listen to local radio or television stations for latest emergency information;
- Check for injured or trapped people near slide without entering the direct slide area;
- Show rescuers the location of any trapped;
- If inside the building, stay inside and cover yourself with/ under a sturdy material;
- Do not drive through;
- Look for and report broken utility line to appropriate authorities;
- Check the building foundation, walls and surrounding land for damage. The safety of the areas needs to be assured before reoccupation;
- If the rocks or other debris are approaching, run to the nearest shelter such as group of trees or a building;

- If you are near a stream or channel or river, be alert for any sudden change in water flow or for a change from clear to mud water. Such changes indicate debris or mud flow or landslide upstream. So move quickly to safer areas;

Procedure: Handling of Explosives

Transportation and storage of explosives may accidently lead to Spill of explosives or explosions.

- Two Carbon Dioxide fire extinguishers each of more than 3 kg capacity shall be carried on all vehicles transporting explosives;
- Appropriate labeling shall be done to demarcate the explosives storage areas;
- Packages shall be stacked in magazine or store house in such a manner so as to facilitate inspection of the condition of all packages stored and to read the marking particulars of each package

To avoid emergency situations during drilling and loading the following measures are suggested.

- Loud wailing note of 1-minute duration shall be sounded on the sirens to warn the public before commencement of firing;
- The blaster shall not return to the blasting site before 5 minutes have elapsed from the time of firing. In case of misfiring, no person shall be allowed to approach the blasting site for at least 30 minutes;
- After allowing adequate time, not less than 30 minutes after firing of the shots, the shot-firer shall ensure that all the holes are fired. No other person shall be allowed to the site of blasting before this is checked by the shot-firer;
- The blasting operations shall be carried out only by a licensed blaster;
- Identification badges shall be provided to all personnel and appropriate employee records shall be maintained. The badge shall be worn at all times- off the job, as well as on the job.

Procedure: Medical Emergencies

All situations that will require medical treatment will be assessed to determine if they are:

- Minor, or
- Serious injuries.

The following situations require action be taken depending on the type of medical emergency. These situations will be covered during the safety meetings, as well as general first aid, techniques for treating shock, and assisting in an emergency.

Serious Injury (Ambulance transport to nearest Hospital)

- Immediately provide first aid and simultaneously assess the injury to make a decision on the steps required to resolve the situation. In case of underground works, the shaft or service crew will be informed and instructed to the type of services required.
- An injured, non-ambulatory (not able to walk) individual should be moved immediately only if there is imminent danger for further injury (advancing fire, structural collapse, downed live wires, etc.);
- In case there is the possibility of a spinal or neck injury or the individual is unconscious, the person will not be moved unless there is a real and present danger to the life of the victim;
- After stabilizing, the individual may be placed on a stretcher and moved to a secure location to expedite medical services.

Minor Injury (normal transport to nearest Clinic)

- Verify that the victim is conscious and coherent and then provide for immediate treatment and stabilization at the worksite using first aid.
- Expedite the employee to the medical facilities and ensure that the transport in jobsite vehicle do not aggravate the injury.

First Aid (Provided On-Site)

- Use standard First Aid techniques for items such as minor scrapes or cuts not requiring stitches, minor sprains, etc. The employee should return to work after treatment.
- First Aid kits will be available throughout the site and in each company vehicle. The Superintendent is responsible for the upkeep of the First Aid kit(s) in his/her area.
- Supervisors will stress the importance of reporting all injuries, no matter how small, so that First Aid and/or medical treatment is provided and the injury is reported and recorded.
- If it is determined that the employee needs to go to a clinic (minor injury), or an emergency facility (major/serious injury), a NTPGPL supervisor or Medical Staff member will accompany the individual to the facility. During this time the supervisor or medic will:
    - Offer comfort to the employee;
    - Assist with the insurance paperwork;
    - Explain our Light-Duty Program to the treating doctor;
    - Make sure the doctor's orders are clearly understood by everyone;
    - Bring all paperwork from the doctor/hospital back to the project office

- Ensure that any required post-accident drug screen is completed

9.9.5 Securing the Accident Scene

After the immediate steps necessary on the scene to deal with the emergency have been accomplished, the next priority is to secure the scene. The accident scene must be preserved for the appropriate agencies to investigate.

Fencing, taping or blocking the access with "Entry Restricted to Authorized Persons Only" should isolate the area. In some cases this may include establishing or continuing emergency traffic control of the area to be investigated. As soon as possible after the scene has been secured, gathering of detailed information relating to the emergency will begin. This will be accomplished by an internal investigation of the event and by assisting other appropriate investigations made by outside agencies.

The information gathered by the company investigation of the emergency is to be treated as confidential, and will be released outside the company only after authorization is obtained. Any internal investigation shall include:

- Obtaining statements from employees and witnesses;
- Taking photographs or videos of the scene;
- Evaluating details of the project, including plans and specifications;
- Obtaining statements and reports from other investigation agencies;
- Compiling an accident/emergency investigation report.
- After the investigation is complete and the workers return to work, a Safety Stand Down
- Meeting will be held to present the findings of the incident.

9.9.6 Emergency Checklists

The response procedures must be flexible and to some degree reactive. The following checklists are intended as guidance for emergency responders to ensure that critical activities have been considered early in the incident.

Serious Injury or Fatality

Stabilization – All injuries and illnesses requiring transport and hospital treatment must, to the extent possible, first be stabilized such that transport does not worsen the medical condition of the casualty.

Alerting – when sufficient information is available, the following sequence of telephone contacts shall be made:

- Vice President Projects (Reckong Peo);
- General Manager will contact Head EHS at the Corporate Office.

Transport Actions – decision to transport shall be jointly made by medical staff and site manager based on the following considerations:

- Casualty condition;
- Casualty location;
- Time of day;
- Selection of the most appropriate receiving hospital.

First on Scene Checklist

- Stay calm and assess situation for imminent danger. Don't panic or overreact;
- If safe, secure the site and if not, wait for assistance;
- If there is need for police, fire or paramedic aid, call them immediately;
- Administer first aid if required until medical professionals arrive;
- Ask for help and call site in charge on radio or phone.

Supervisor's checklist

- Determine number and names of persons injured.
- With subcontractor site manager or representative as appropriate, account for all other on-site personnel.
- Do not release names, ages, residence or other information about injured personnel.

Site Manager's Checklist

- Verify status of all items in "First on Scene" checklist;
- Notify appropriate organizations and personnel, as per requirements;
- Assemble job personnel and count heads. Share basic information about incident with job personnel;
- Avoid speculation regarding cause of accident and commence the work with a Safety meeting;

- Direct media inquiries to be directed to the corporate spokesperson;
- Gather/verify available information - What happened? Where? Who was involved? How did it occur?
- Document incident in writing and with digital camera;
- E-Mail to Project and Corporate Office.

General Manager (Projects) Checklist

- Verify status of all items on prior checklists;
- Notify injured employees; family and arrange transportation to hospital;
- Arrange for department Head to visit employee's family in person;
- In consultation with EHS Head and Heads of Departments, determine if project should be shut-down;
- Establish command post in a conference room, with access to a speakerphone, computer, and fax machine;
- Designate job employee to screen, log and forward media inquiries to corporate spokesman, and monitor media coverage;
- If non-employee is injured or killed, contact legal department before advising family.
- Do not release names, ages, residence or other information about injured personnel until next of kin have been notified;
- Designate job employee to prepare and distribute Accident Report;
- Conduct Safety Meeting as appropriate.

9.9.7 Emergency Control Centre (ECC)

The Incident Commander would set up the incident control centre. There will be radio, telephone or messenger contact with the ECC. The incident area will be taped off and warning notices posted. The in-house Fire Team will cordon off the incident area (Inner Cordon). Route markings from ECC to the incident to aid the emergency services will be arranged.

The Safety officer Room is designated as ECC. Safety officer will be responsible for ensuring that ECC has all required information, infrastructure and emergency lighting. The Emergency Control Centre contains:

- Adequate number of external telephones with at least one ex-directory or capable of use for outgoing calls only. This will avoid the telephone switchboard being overloaded with calls from anxious relatives, the press etc.;
- Adequate number of internal telephones;
- Radio equipment;
- Plan or plans of the works to show:
    - areas where there are large inventories of hazardous materials, including oil storage;
    - sources of safety equipment;
    - area where sources of water can be tapped;
    - assembly points, casualty treatment centers;
    - location of the works in relation to the surrounding community;
    - HAZCHEM sheets for the various hazardous materials used on-site;
    - Note-pads, pens, pencils to record all messages received and sent by whatever means;
    - Nominal roll of employees or access to this information; and
    - List of key personnel, addresses and telephone numbers (Table 9-6 and 9-7).

Emergency Control Centre is located, designed and equipped to remain operational in an emergency.

9.10 EHS Organization Structure

Besides having an Environmental Management Plan, it is also imperative to have a permanent organizational set up which is responsible of ensuring its effective implementation and conduct regular monitoring of social, health and safety parameters along with environmental aspects. The major duties and responsibilities of Environmental Management Cell shall be as given below:

- To implement the environmental, health, safety and social management plan by setting and maintaining appropriate institutional arrangements at the project site.

Table 9-6: List of Key persons at Tidong

S.No.	Key Person	Name	Telephone no.
1	Site controller	A.K. Gupta	9805005552
2	Incident Controller	R.K. Aggrawal (At Intake) Sandeep Singh Chauhan (At Power house)	9805005553 9805005554
3	Manager EHS	Satyabrat	9805005563
4	Safety Officer	Ghanshyam Thakur Arun Dhiman	9805005562 9805005578
5	Fire officer	Ghanshyam Thakur Arun Dhiman	9805005562 9805005578
6	Evacuation Office	Yasam Nagaraju	9805005572
7	Communication Officer	V.V. Shamanthak	9805005599
8	Liaison Officer	V.V. Shamanthak	9805005599
9	Medical Officer	Shashipal Chauhan	9805005580

Table 9-7: Important telephone numbers

Facilities	Telephone no.
Police station	100
Fire Station	108
Ambulance at Reckong Peo	240030/ 222219
Reckong Peo Government Hospital (About 38 km form intake site)	222319 / 222922
Moorang Primary Health Centre (15 km form intake site)	981663179

- To assure regulatory compliance with all relevant rules and regulations by way of independent Monitoring and Evaluation agency for a third party assessment
- To ensure regular operation and maintenance of pollution control devices,
- Helping the utilization of village development funds in each of the villages and implementation of Community development plan.
- Monitoring the management plan and implementation activities as per approved schedule. Review and interpretation of monitored results and corrective measures in case monitored results are above the specified limit.
- Maintain documentation of good environmental practices and applicable environmental laws as ready reference.

- Maintain environmental related records.
- Address grievances received from the project stakeholders.
- Ensure that the Management plans are implemented in accordance to the guiding policies of NTPGPL, ABD and IFC.
- Arrange training programs for officers to be involved in the management plans.
- Develop corporate linkages with financial institutions and banks to facilitate financing of income generating schemes for the project affected families.
- Compliance of stipulated conditions by the regulatory agencies and reporting of the same as per the specified period.

To achieve above objectives, the adopted EHS organization structure for Tidong I is discussed in this section along with their roles and responsibilities (Figure 9-2).

9.10.1 Chief Executive Officer (CEO)

Overall responsibility of implementation for the protection of Environment, Occupational Health, Safety of workman & employees and maintaining social harmony lies with the CEO of the company.

9.10.2 Head- Hydro Projects

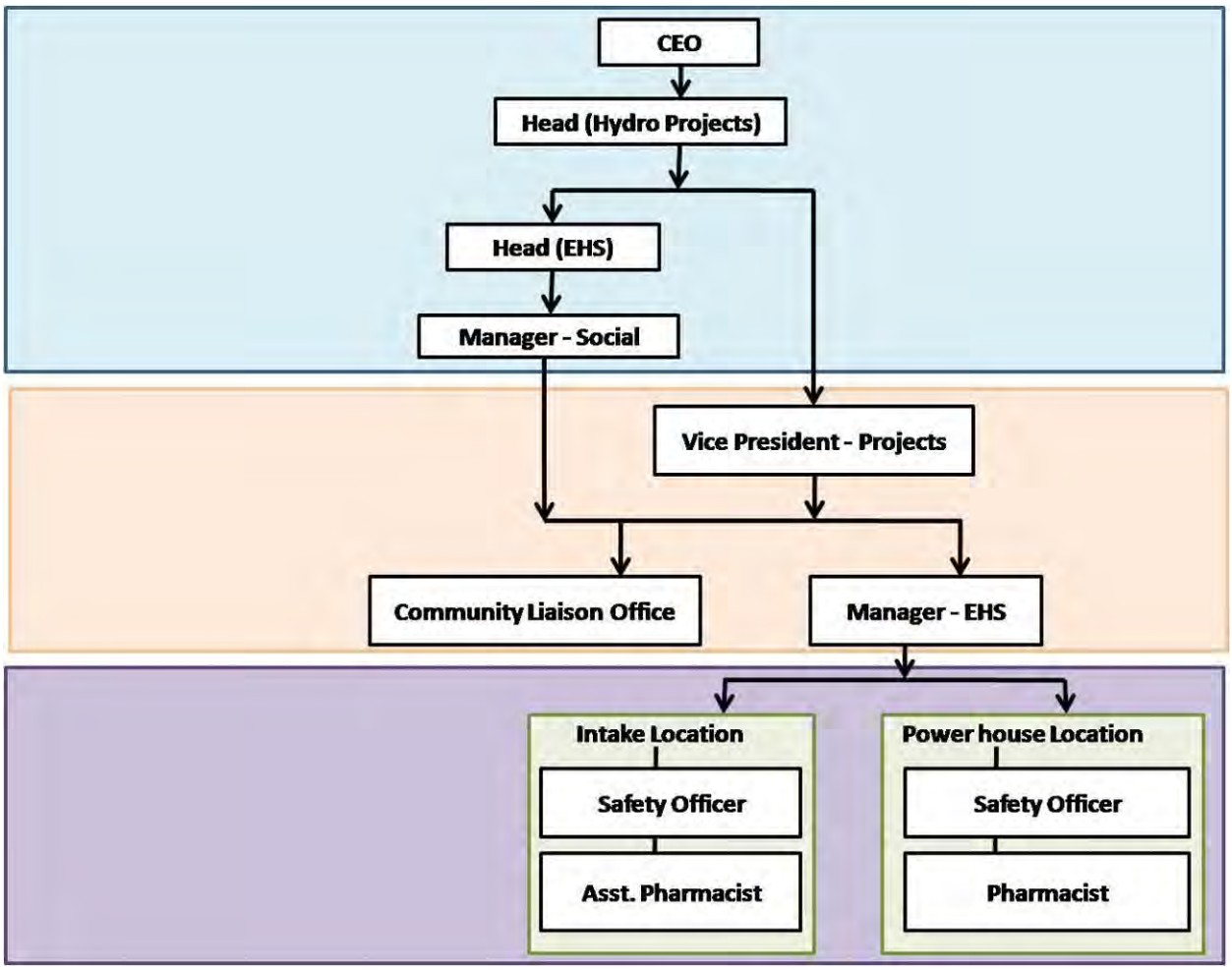
The Head - Hydro Projects is over all in charge of all the hydro projects. He is functionally reporting to CEO . The unit head (Vice President of Tidong Project) is reporting to him on technical issues including Environment, Health, Safety and Social.

9.10.3 Head - Environment, Health and Safety

The Head (EHS) is stationed at Hyderabad and is responsible for overall implementation of the EHS & S Management plans. He is functionally reporting to the CEO and also is in coordination with Vice President - Projects or Project In-charge (at Reckong Peo) so that commitment and focus on EHS&S matters is maintained throughout the organization. His prime responsibilities are as follows:

- Looking after the issues related to EHS
- Co-ordination with statutory agencies
- Implementation and review of EHS policies
- Scheduling the training programs

Figure 9-2: Organization Structure for EHS of NTPGPL at Tidong-1 HEP



9.10.4 Manager – Social

The social expert is stationed at Hyderabad but he travels extensively to site as and when required. He reports to Head EHS and interacts with team at site regularly. His responsibilities are listed below:

- Overall responsible for R&R, LADA, CSR and other community development activity
- Addressing grievance of the project affected families and surrounding population
- Preparation and review of social and community development programs
- Conducting community meetings
- Planning and coordinating the community awareness program on health, education, women empowerment etc.

- Training the staff to prevent social conflicts with local population
- Take regular updates form site on their daily activities

9.10.5 Vice President - Projects

He is overall in-charge of the Tidong project and stationed at Reckong Peo. He directly reports to CEO. He deals with day to day progress of the project at site. Thus, he is the highest authority to take action in case of grievance redress, emergency and accidents.

9.10.6 Community Liaison Officer (CLO)

The CLO is stationed at Reckong Peo and reports to Head EHS and Vice President –Projects and work in close coordination with Manager -Social. His responsibilities are:

- Liaisons with government departments
- Following up with Panchayats and regulatory authorities over LADA grants and their utilization
- Reviewing the implementation and progress of R&R plan
- Regular interactions with Panchayats and affected families
- Facilitation of the project team on community grievance redress
- Establishes rapport with the community and hold public consultation and disclosure sessions as required by the PCDP.

9.10.7 Manager –EHS

He is an overall in-charge of all EHS activity at site and is located at Reckong Peo office. He reports to Vice President and Head EHS. His responsibilities include:

- Managing all EHS activities and programs
- Close coordination and communication with HPSPCB
- Applying for NOC with HPSPCB
- Reviewing records of all EHS activities
- Ensures EHS compliance at sites
- Ensures timely monitoring and analyses of environmental parameter

9.10.8 Safety Officer

There are two Safety officers at site and they are responsible for safety functions of the project both during construction and operation phases. Their direct reporting is to Manager EHS at Reckong Peo. The responsibilities of safety officer include:

- Checking the status of PPE
- Encouraging the workers to use PPE
- Preparing and display of warning posters
- Inspecting the work environment with respect to hazardous machinery/ tools
- Conducting tool talks with workers
- Conducting mock drills
- Conducting safety meetings
- Reporting the accidents/ identifying the cause of accidents and preparation of action reports

9.10.9 Pharmacist

There are two pharmacists; each one is placed at Power house site and Intake site. He will be responsible for following activities:

- Drug distribution and dispensing,
- Patient Safety,
- Clinical program development,
- Communications with patients and doctor,
- Visiting the project sites on a fixed schedule to extend the facilities.

9.11 Record Keeping Requirements

Record keeping and reporting of performance is an important management tool for ensuring implementation of the abovementioned plans and activities. Thus, this section summarizes the records and report to be managed for effective implementation of various plans in Table 9-8.

Table 9-8: Record Keeping Requirement

Plan/Procedures	Documents to be maintained
Regulatory permits	• Environmental Permits / Consents from HPSPCB/ MOEF and their compliance status • Hazardous Waste disposal manifests as per requirement • Labour license • BOCW Registration
Pollution Abatement Plan	• Site specific Environment and Social management System • Register of EHS regulations and commitments • Internal/ Audit E&S Audit report on Pollution Abatement • Six Monthly Reports to MoEF on Environmental Clearance • Annual Reporting to State Pollution Control Board for respective consents • Ambient air quality monitoring register and reports, • Surface water quality monitoring register and reports, • Noise level monitoring register and reports, • Daily / weekly / monthly inspection checklists, • Daily quantity of waste received and recycled • Daily quantity of raw and treated sewage • Quantity and point of usage of treated wastewater • Treated wastewater quality
Solid Waste and Muck Management Plan	• Register of solid waste produced, collected, recycled and disposed from labor camps, offices and colony • Resister of hazardous waste storage, transport and disposal • Register of waste receipt at disposal point • Register of biomedical waste generated and sent to Hospital for disposal • Muck register at every excavation site showing reutilization and dumping, • Register of every muck disposal site showing daily receipt of muck and capacity of the site remaining • Monitoring report from Forest Department on Muck disposal and compliance
Biodiversity Conservation and Management	• Re-vegetation plan for muck dumping site • Correspondences with Department of Fisheries, regarding status of implementation fisheries development plan, • Correspondence with govt. regarding implementation of CAT Plan and Compensatory afforestation, • Documentation of ecological flow records i.e. discharge data in the downstream of diversion structure, river water quality records as suggested in monitoring plan • Documented procedure in case of wildlife invasion at site
Construction Labour Management Plan	• Signed Contract document • Appointment order of all workers • Register of employees/ labor with details • Register of muster- roll, wages, deductions, over- time, fines and advances

	• HR Policy • EHS Policy • Leave Policy • Record of Induction training • Record of all trainings • Details of contractors and labors at site • Details of Fire Drill • Grievance Record for Labor Camp • Documented list of visitors and residents of labor camp • Records on the fire wood purchase and distributions • Records on grievances reported and action taken
Traffic Management Plan	• Traffic Management Plan • Record of vehicles entering and leaving the site • PUC certificate, vehicle insurance, driver's license, daily / weekly / monthly inspection checklist & driver's training register etc
Health and Safety Plan	• Standard Operating Procedures to be prepared and kept for easy reference for the following activities: - Storage and handling of Explosives - Gas cutting/ welding in field/shop spray painting - Ladder safety - Scaffolding safety - Noise prevention /reduction during excavation - Safe handling of all lifting tools - Handling of various hand tools - Working at height - Prevention of mechanical / electrical hazards during grinding operation - Electrical safety - Safety on high tension installations • Record of Work Permits for all required activities like - For Civil Work - Working in Confine areas / tunnel - Working at Height - Hot works - Electrical works - Other Hazard Prone works • Record of people engaged in different types of activities • List of PPE available at site • Trainings imparted for PPE • Monitoring record of occupational noise and indoor air • Documentation of Explosives available and issued • Documentation of Handling procedure • Documentation of Storage procedure • Equipment Safety Record • Jobsite Inspection Reports

	• First Aid Log • All PPE Training Records • All Safety Meetings and Logs • Quarterly Internal Audit Report • Employee Accident Reports • Pre employment medical checkup record • Post accident fitness check up record • Record of illness and injuries reported • Record of medicines prescribed and diagnosis • Records of patients attended at medical facility • List of fires safety equipments with locations
Emergency Preparedness Plan	• Safety and Emergency response Plan • Record of Mock drills and schedules • Accident Investigation and action taken Reports

9.12 Budget for the EMP and Monitoring activities

In order to carry out various works suggested as mitigation measures, budget has already been earmarked as detailed in Table 9-9.

Table 9-9: Provisionary budget for implementation of various activities towards EMP

Sl. No.	Particulars	Amount Estimated (INR Million)	Amount Disbursed/ Spent till Dec, 2012 (INR Million)	Responsible Agency
A	**Environment**			
1	Catchment Area Treatment Plan	72.50	72.50	Forest Department, Government of Himachal Pradesh
2	Compensatory Afforestation Plan	26.68	26.68	Forest Department, Government of Himachal Pradesh
3	Fisheries Development Plan	11.10	11.10	Fisheries Department, Government of Himachal Pradesh

Sl. No.	Particulars	Amount Estimated (INR Million)	Amount Disbursed/ Spent till Dec, 2012 (INR Million)	Responsible Agency
4	Environmental Monitoring	4.01	2.00	Himachal Pradesh Pollution Control Board, Government of Himachal Pradesh
5	Compensation towards Net Present Value of the affected trees on Forest Land	27.29	27.29	Forest Department, Government of Himachal Pradesh
6	Compensation towards trees damaged during construction activity	8.39	8.39	Forest Department, Government of Himachal Pradesh
7	Cost of automatic flow measurement instruments	0.25	0.00	NTPGPL
8	Cost for Solid Waste Disposal generated	0.10	0.05	NTPGPL
	Sub Total	**150.31**	**148.01**	
B	**Health**			
1	Cost of 2 Ambulances	1.00	1.00	NTPGPL
2	Cost towards Setting up of Health Centers	0.30	0.30	NTPGPL
3	Cost towards medicines and equipments	0.10	0.05	NTPGPL
4	Cost towards Health camps	0.10	0.05	NTPGPL
	Sub Total	**1.50**	**1.40**	
C	**Safety**			
1	Cost towards Fire Protection System	0.30	0.26	NTPGPL
2	Cost towards Personnel Protection	0.30	0.18	NTPGPL

Sl. No.	Particulars	Amount Estimated (INR Million)	Amount Disbursed/ Spent till Dec, 2012 (INR Million)	Responsible Agency
	Equipment			
	Sub Total	**0.60**	**0.44**	
D	**Resettlement and Rehabilitation**			
1	Cost of Compensation for private land and other attachment	25.83	25.83	DC, Kinnaur, Village Panchayats and NTPGPL
2	Compensation towards loss of Chilgoza trees	34.42	Will be spent upon approval of all stakeholders.	DC, Kinnaur, Village Panchayats and NTPGPL
3	Cost of Rehabilitation and Resettlement Measures	4.35	Will be spent upon approval of R&R Scheme for the project.	DC, Kinnaur and NTPGPL
4	Implementation Costs	1.00		DC, Kinnaur and NTPGPL
	Sub Total	**65.59**	**25.83**	
E	**Community Development and Social Responsibility**			
1	Cost towards Local Area Development Activity (LADA) taken up prior to commissioning of the Project and executed by State Government @ 1.5 % of project cost	80.30	54.60	LADC, Village Panchayats and NTPGPL
2	Cost towards infrastructure development works by NTPGPL under its CSR that benefit the local population in affected villages during project	4.10	1.78	Village Panchayats and NTPGPL

Sl. No.	Particulars	Amount Estimated (INR Million)	Amount Disbursed/ Spent till Dec, 2012 (INR Million)	Responsible Agency
	construction activity			
3	Cost towards social responsibility activity by NTPGPL under its CSR during project construction activity	7.10	2.40	NTPGPL
4	Cost towards direct financial support to affected panchayats for community development and welfare activity	51.80	51.80	Village Panchayats and NTPGPL
5	Cost towards community development and social responsibility activity after commissioning of the project	108.00	Will be spent after commissioning of the project.	DC, Kinnaur, Village Panchayats and NTPGPL
	Sub Total	**251.30**	**110.58**	
F	**Technical Studies**			
1	Cost of technical studies such as ESIA, Gender Assessment, Fish Study and Others	1.80	1.80	NTPGPL
2	Cost of EHS, Social Audits & other studies	8.00	2.50	NTPGPL
	Sub Total	**9.80**	**4.30**	
	Grand Total (A+B+C+D+E+F)	**479.10**	**290.56**	

In order to execute the proposed environmental and social management plans out of the total budget of INR 479.10 Million proposed in Table 9-9 above NTPGPL has already spent about INR 290.56 million till end of December 2012. As the mitigation measures are in progress and most of the activity is already in place NTPGPL will commit the remaining funds as required and committed to implement the EMP.

10. CONCLUSION AND RECOMMENDATION

10.1 General

This section based on the detailed analysis presented in the previous sections concludes the report by way of categorization of the project as per the ADB SPS, 2009. It also summarizes in form of recommendations reiterating the various management plan, the institutional arrangements and other consultation and grievance redress mechanisms in place for the project.

10.2 Conclusions

The proposed Tidong-I HEP is identified as Category 'A' for environmental aspects and Category 'B' for Involuntary Resettlement and Category 'C" for Indigenous People under ADB's SPS, 2009. The categorization has been considered in the light of following facts:

- During construction, the project involves the diversion of forest land and felling of some of the trees. The muck dumps and waste generated in workers colony may have impact on the river. However, adequate mitigation measures as proposed in EMP will minimize the intensity of the impacts. The vegetation will be developed on the muck dump at the end of the construction may reverse the adverse impacts on the forest.
- The population of whole district has been categorized as Scheduled Tribe under The Constitution (Scheduled Tribe) Order, 1950 and can be considered as Indigenous. Hence, any environmental and social measures taken in this project will benefit the indigenous population.
- Total number of households affected is 28 and affected population is about 120. The affected families have lost part of their agricultural land and none of them have lost any house/shop or anybody is physically displaced.
- There were 14 marginal farmers within affected families, which in post project increased to 17 after land acquisition.
- Of the total affected families there is only one women headed project affected family which is identified as vulnerable family.
- The affected population is not poor and apart from agriculture have other source of income/livelihood from apple orchards along with vegetables and dry fruits.

- The local people have access to roads, schools and hospitals and other basic amenities.
- The local people are educated and most of them have studied beyond Higher Secondary.

Though the project has significant environmental impacts during the construction stage and limited impacts during operation phase, these can be mitigated through appropriate measures suggested. Moreover, once the project is completed it has several benefits to the immediate affected community and society at large. As electricity is a key input for socioeconomic development process once the project is operational, it ensures efficient provision of electricity which not only contributes to poverty reduction indirectly through economic growth, but also central to the basic human needs of health and education.

The other direct positive economic and social benefits that result from the proposed project include generating local employment, provide good access roads and health facility at site during emergencies. In addition, the local community will be benefited from several grants being given to State Government, Panchayats under Local Area Development Fund (LADF) scheme and the Corporate Social Responsibility (CSR) initiatives by NTPGPL. The efforts proposed under the Rehabilitation and Resettlement (R&R) scheme for both direct affected families and to the local panchayats such as self-employment schemes, merit scholarship scheme, empowering women will substantially contribute to the overall development of the project area. The initiatives on afforestation, catchment area treatment, fisheries development etc in the project area will largely help in conserving the local ecology and benefit the local population.

10.3 Recommendations

To mitigate the Environmental and Social impacts, several mitigation measures have been recommended under several plans, i.e., Pollution Abatement Plan, Solid Waste and Muck Management Plan, Biodiversity Conservation and Management Plan, Construction Labor Management Plan, Traffic Management Plan, Health and Safety Plan, Emergency Preparedness Plan, Rehabilitation Action Plan and Community Development Plan.

To carry out the implementation of the suggested measures an EHS structure has been suggested and which is already in place. In order to execute the above plans, a budget of INR 479.10 million has already been earmarked.

To ensure proper implementation of the Public Consultation and Disclosure process it is strongly recommended that project representative must maintain close coordination with affected people, panchayats and government bodies.

To effectively manage the Grievance Redress process and maintain the record of the grievances and find mutually acceptable solutions for problems like employment, disputes with project activities, damages to private property, community development needs, socio-economic development of villages etc.

Finally it is to be noted that several mitigation measures are already in place but there are certain gaps which are to be addressed. Once the corrective actions for the identified gaps are in place the project will comply with stipulations of the Government of India at the national level and also the safeguard policies and guidelines of the IFC and the ADB at the international level.

Annexure

Environmental and Social Impact Assessment Report for 100 MW Tidong-I Hydro Electric Project in Kinnaur, Himachal Pradesh, India

March, 2013

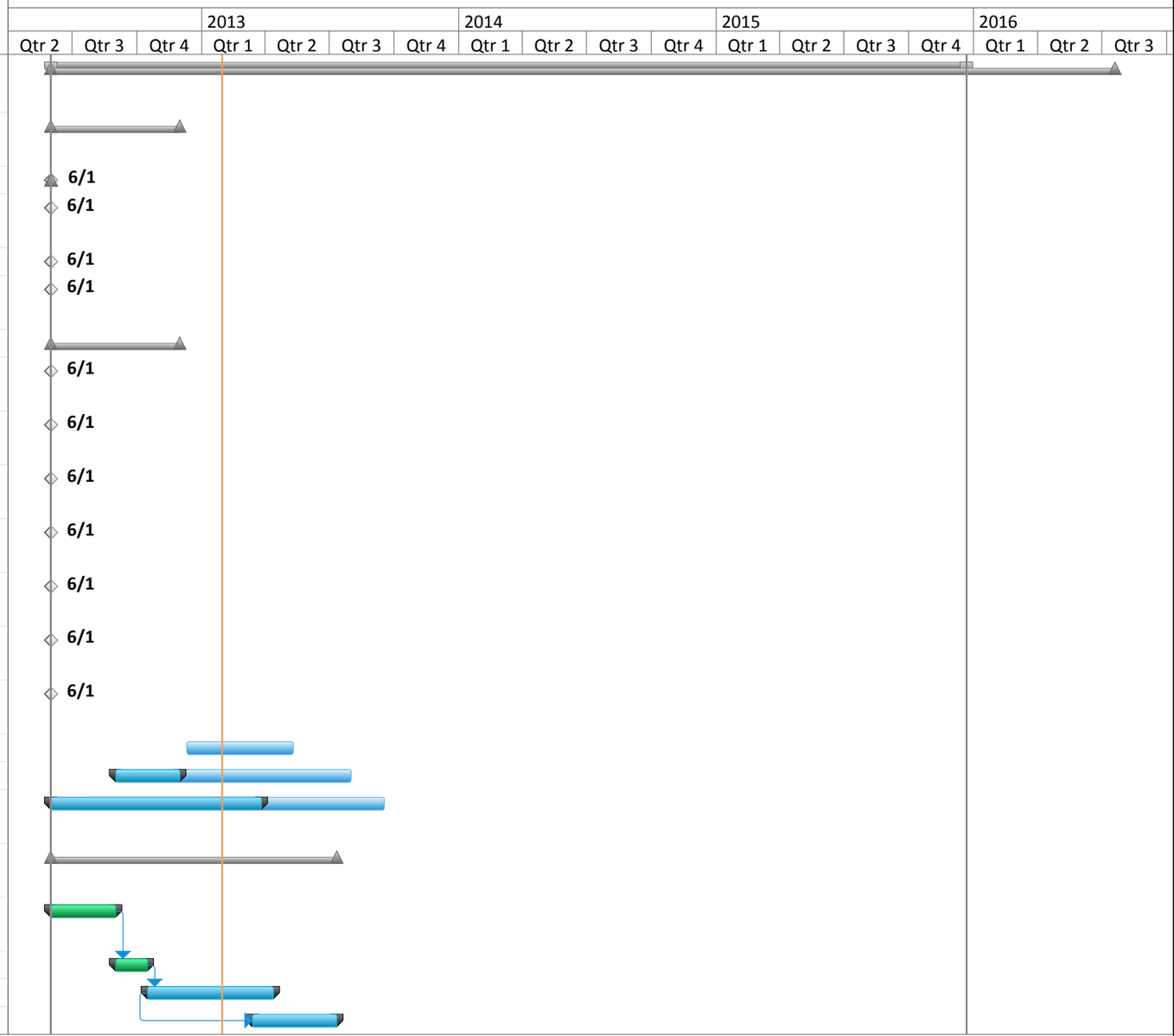
Submitted to:	Prepared by:
NSL Renewable Power Pvt. Ltd. 4th Floor, NSL ICON D.No. 8-2-648/2/A, Road No. 12 Banjara Hills, Hyderabad - 5000034	**AECOM India Pvt. Ltd.** 9th Floor, Infinity Tower-C, Cyber city, DLF Phase-II, Gurgaon -122002

Annexure 1.1

Project Completion Schedule

Tidong-I HEP (100 MW): Progress Status as on Jan 25, 2013.

ID		Task Name	Total Estimated Qty	Cumulative Progress till Jan 25, 2013	Balance Qty as on Jan 25, 2013	Baseline Duration	Baseline Start	Baseline Finish
0		**Tidong-I HEP 100 MW- Balance Works**				1273 days	Jun 1 '12	Jul 19 '16
1		**Pre-Construction Activities**				183 days	Jun 1 '12	Nov 30 '12
2	✓	**Land Acquisitions**				0 days	Jun 1 '12	Jun 1 '12
3	✓	Land Acquisition- Pvt Land	3.2011 ha	Completed	-	0 days	Jun 1 '12	Jun 1 '12
4	✓	Clearances	Job	Completed	-	0 days	Jun 1 '12	Jun 1 '12
5	✓	Land Acquisition- Forest Land	39.0546 ha	Completed	-	0 days	Jun 1 '12	Jun 1 '12
6		**Roads & Bridges**				183 days	Jun 1 '12	Nov 30 '12
7	✓	Road to Adit-I (Right Bank)	565 m	Completed	-	0 days	Jun 1 '12	Jun 1 '12
8	✓	Road to Adit-I (Left Bank)	2080 m	Completed	-	0 days	Jun 1 '12	Jun 1 '12
9	✓	Link Road to Adit-I	600 m	Completed	-	0 days	Jun 1 '12	Jun 1 '12
10	✓	Steel Bridge 20m span near Intake Site	Job	Completed	-	0 days	Jun 1 '12	Jun 1 '12
11	✓	Approach Road to Power House	2920 m	Completed	-	0 days	Jun 1 '12	Jun 1 '12
12	✓	Steel Bridge 20m span near Power	Job	Completed	-	0 days	Jun 1 '12	Jun 1 '12
13	✓	Approach Road to Adit-2	5156 m	Completed	-	0 days	Jun 1 '12	Jun 1 '12
14		Bridge at Intake Site	Job			0 days	NA	NA
15		Ropeway to Surgesha	200 m	200 m		91 days	Sep 1 '12	Nov 30 '12
16		**Additional Construction Power**	Job			240 days	Jun 1 '12	Mar 26 '13
17		**Residential & Non-residential buildings**				347 days	Jun 1 '12	Jul 11 '13
18	✓	Invitation of Tenders & opening	Job	Completed	-	92 days	Jun 1 '12	Aug 31 '12
19	✓	Approvals & Award	Job	Completed	-	45 days	Sep 1 '12	Oct 15 '12
20		Construction of Building	Job	Job		120 days	Oct 16 '12	Apr 12 '13
21		External W/S & S/F	Job	Job		120 days	Mar 14 '13	Jul 11 '13

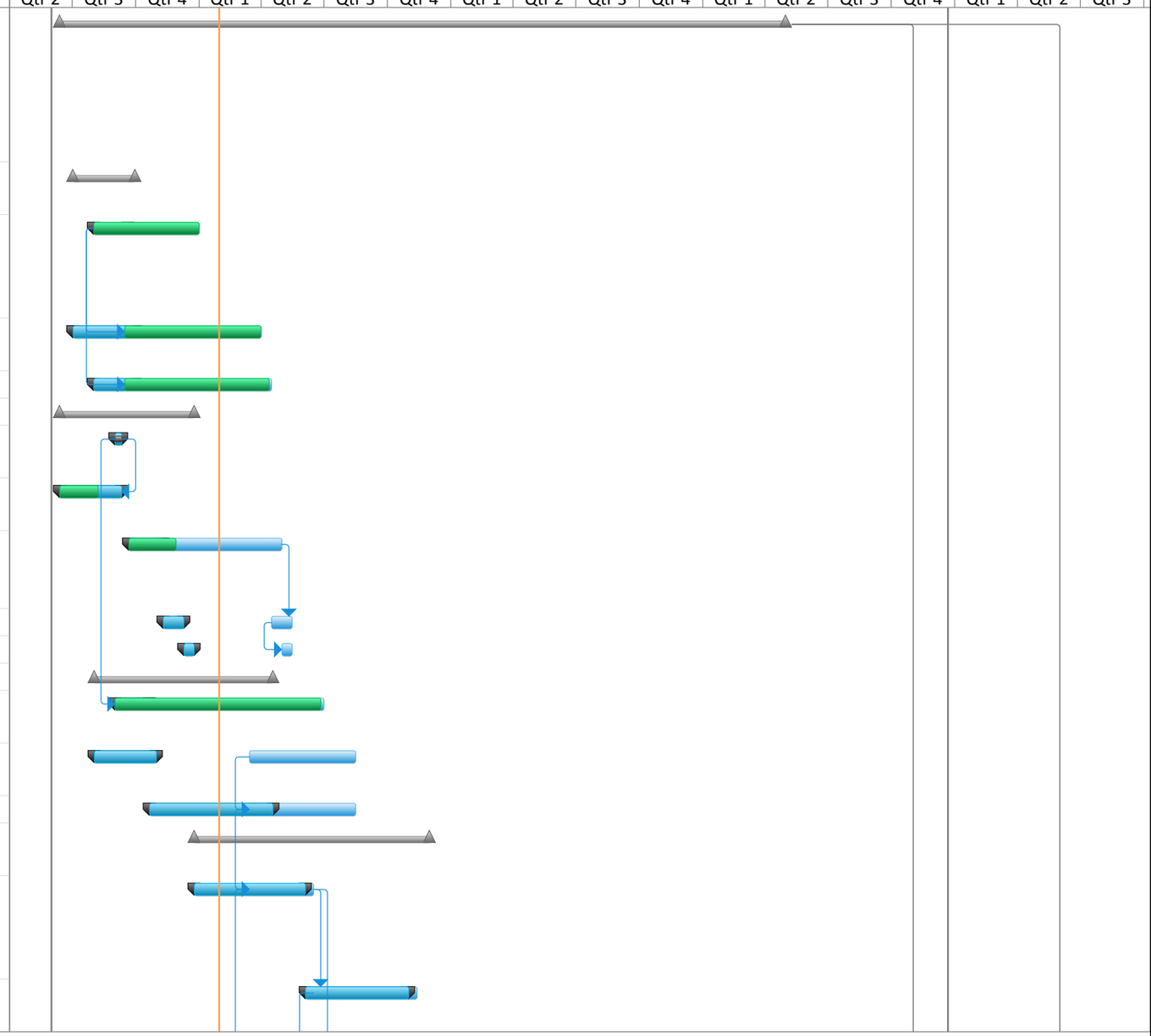


Project: Tidong-I HEP 100 MW- Ba
Date: Jan 30 '13

Task	External Tasks	Manual Task	Finish-only	Baseline Milestone	
Split	External Milestone	Duration-only	Deadline	Baseline Summary	
Milestone	Inactive Task	Manual Summary Rollup	Critical	Progress	
Summary	Inactive Milestone	Manual Summary	Critical Split		
Project Summary	Inactive Summary	Start-only	Baseline		

Tidong-I HEP (100 MW): Progress Status as on Jan 25, 2013.

ID	Task Name	Total Estimated Qty	Cumulative Progress till Jan 25, 2013	Balance Qty as on Jan 25, 2013	Baseline Duration	Baseline Start	Baseline Finish
22	**Intake Works**				**875 days**	**Jun 13 '12**	**Apr 30 '15**
23	**Diversion Channel**				**90 days**	**Jul 2 '12**	**Sep 29 '12**
24	Excavation	84500 cum	Completed	-	50 days	Aug 1 '12	Sep 19 '12
25	Reinforcement & Shuttering	460 MT	Completed	-	90 days	Jul 2 '12	Sep 29 '12
26	Concreting	4440 cum	4395 cum	45 cum	60 days	Aug 1 '12	Sep 29 '12
27	**Spillway**				**195 days**	**Jun 13 '12**	**Dec 24 '12**
28	Excavation	62000 cum	Completed	-	10 days	Sep 1 '12	Sep 10 '12
29	Reinforcement & Shuttering	400 MT	246 MT	154 MT	90 days	Jun 13 '12	Sep 10 '12
30	Concreting	12000 cum	5005 cum	6995 cum	50 days	Sep 21 '12	Nov 9 '12
31	Coffer dam	Job	-		30 days	Nov 10 '12	Dec 9 '12
32	River Diversion	Job	-		15 days	Dec 10 '12	Dec 24 '12
33	**Under-Sluice**				**200 days**	**Aug 2 '12**	**Apr 17 '13**
34	Excavation	41000 cum	40450 cum	550 cum	50 days	Sep 1 '12	Oct 20 '12
35	Reinforcement & Shuttering	400 MT	-	400 MT	90 days	Aug 2 '12	Oct 30 '12
36	Concreting	9500 cum	-	9500 cum	120 days	Oct 21 '12	Apr 17 '13
37	**Head Regulator & Desilting Arrangement**				**282 days**	**Dec 25 '12**	**Nov 30 '13**
38	Excavation	20500 cum	-	20500 cum	102 days	Dec 25 '12	Jun 3 '13
39	Reinforcement & Shuttering	500 MT	-	500 MT	150 days	Jun 4 '13	Oct 31 '13

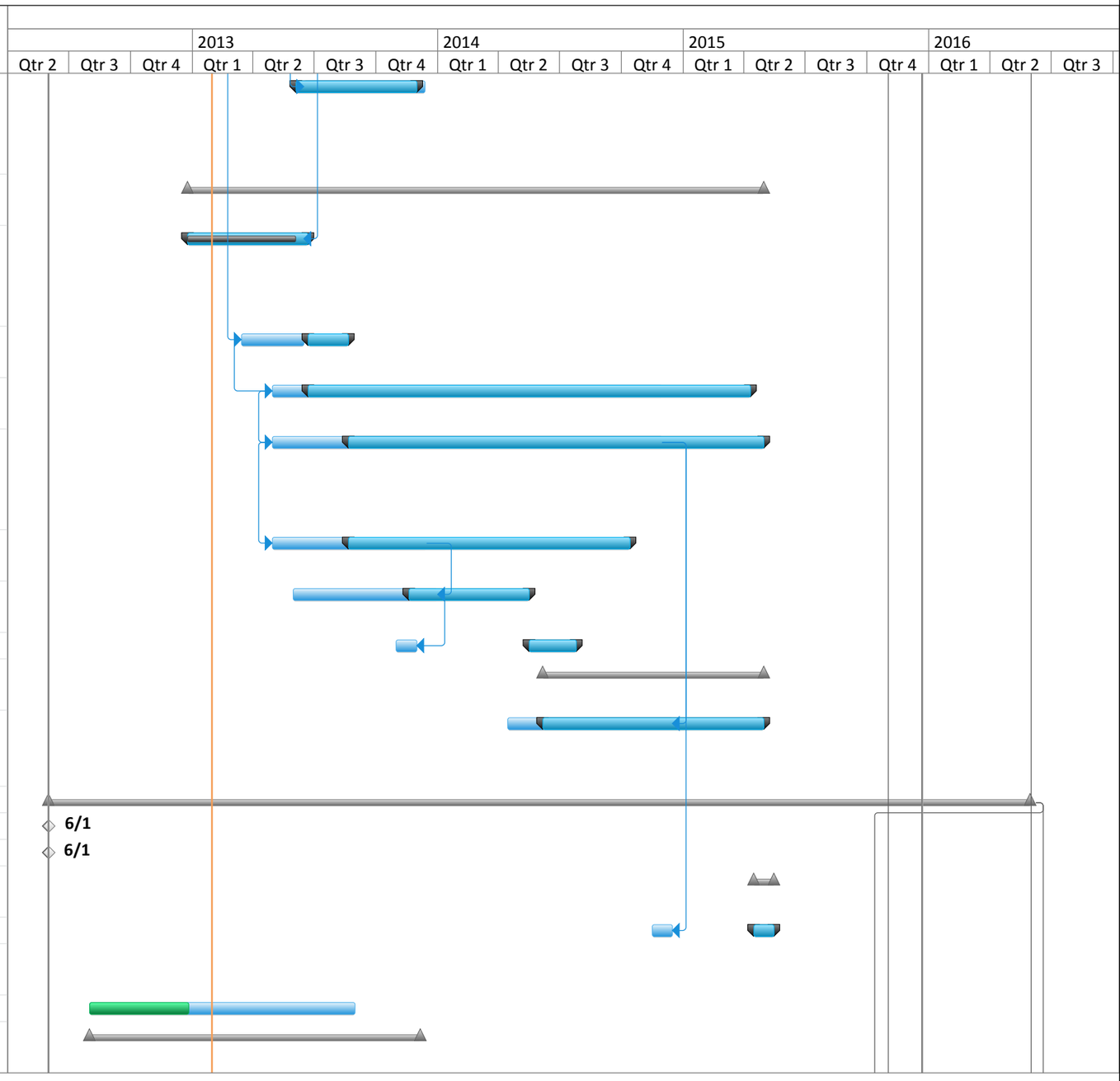


Project: Tidong-I HEP 100 MW- Ba
Date: Jan 30 '13

Task	External Tasks	Manual Task	Finish-only	Baseline Milestone
Split	External Milestone	Duration-only	Deadline	Baseline Summary
Milestone	Inactive Task	Manual Summary Rollup	Critical	Progress
Summary	Inactive Milestone	Manual Summary	Critical Split	
Project Summary	Inactive Summary	Start-only	Baseline	

Tidong-I HEP (100 MW): Progress Status as on Jan 25, 2013.

ID	Task Name	Total Estimated Qty	Cumulative Progress till Jan 25, 2013	Balance Qty as on Jan 25, 2013	Baseline Duration	Baseline Start	Baseline Finish
40	Concreting	17350 cum	-	17350 cum	180 days	Jun 4 '13	Nov 30 '13
41	**Storage Reservoir**				**680 days**	**Dec 25 '12**	**Apr 30 '15**
42	Excavation	65000 cum	58117 cum	6883 cum	120 days	Dec 25 '12	Jun 21 '13
43	Gravity Wall Excavation				60 days	Jun 22 '13	Aug 20 '13
44	Reinforcement & Shuttering	5000 MT	-	5000 MT	540 days	Jun 22 '13	Apr 10 '15
45	Gravity Wall Concreting	75000 cum	-	75000 cum	500 days	Aug 21 '13	Apr 30 '15
46	Subsurface Treatment of	20000 cum	-	20000 cum	360 days	Aug 21 '13	Oct 13 '14
47	RCC Base Slab of Reservoir Floor	8500 cum	-	8500 cum	120 days	Nov 19 '13	May 16 '14
48	Concreting	5000 cum	-	5000 cum	70 days	May 17 '14	Jul 25 '14
49	**H&M Works for entire Intake Site**				**270 days**	**Jun 6 '14**	**Apr 30 '15**
50	Supply & Erection of Gates, Hoisting arrangement etc.	Job	-		270 days	Jun 6 '14	Apr 30 '15
51	**Head Race Tunnel Works**				**1223 days**	**Jun 1 '12**	**May 30 '16**
52	Adit-5 Excavation	243.41 m	Completed	-	0 days	Jun 1 '12	Jun 1 '12
53	Adit-1 Excavation	116.28 m	Completed	-	0 days	Jun 1 '12	Jun 1 '12
54	**HRT From Adit-5 junction to U/S**				**30 days**	**Apr 16 '15**	**May 15 '15**
55	Excavation	242.29 m	195.90 m	46.39 m	30 days	Apr 16 '15	May 15 '15
56	**HRT From Adit-5 junction to D/S**				**0 days**	**NA**	**NA**
57	Excavation	725 m	318.5 m	406.5 m	0 days	NA	NA
58	**HRT From Adit-1 junction to U/S**				**433 days**	**Aug 1 '12**	**Dec 5 '13**

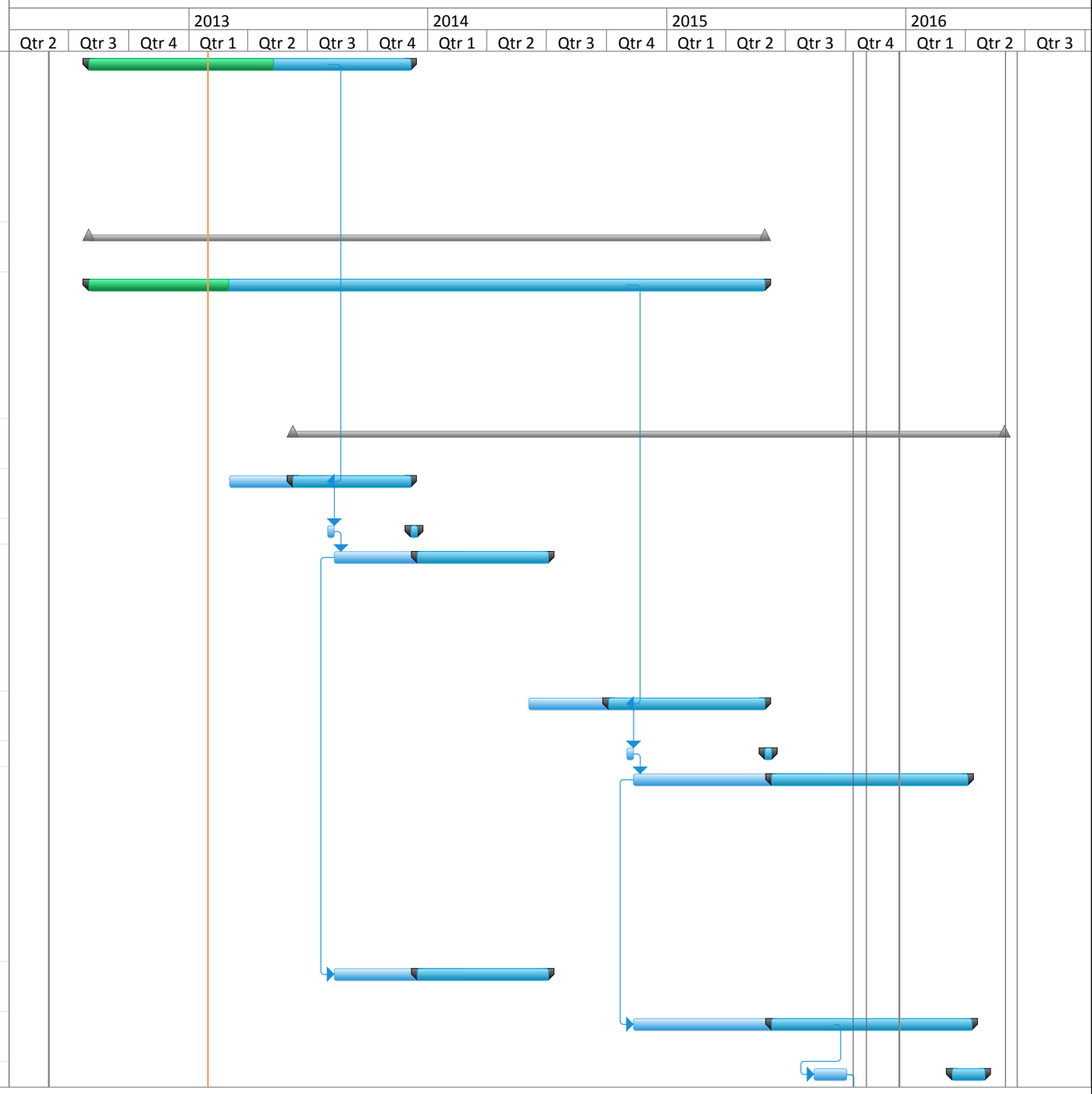


Project: Tidong-I HEP 100 MW- Ba
Date: Jan 30 '13

Task	External Tasks	Manual Task	Finish-only	Baseline Milestone	
Split	External Milestone	Duration-only	Deadline	Baseline Summary	
Milestone	Inactive Task	Manual Summary Rollup	Critical	Progress	
Summary	Inactive Milestone	Manual Summary	Critical Split		
Project Summary	Inactive Summary	Start-only	Baseline		

Tidong-I HEP (100 MW): Progress Status as on Jan 25, 2013.

ID	Task Name	Total Estimated Qty	Cumulative Progress till Jan 25, 2013	Balance Qty as on Jan 25, 2013	Baseline Duration	Baseline Start	Baseline Finish
59	Excavation	1173.56 m	857.59 m	315.97 m	433 days	Aug 1 '12	Dec 5 '13
60	**HRT From Adit-1 junction to D/S**				**856 days**	**Aug 1 '12**	**May 30 '15**
61	Excavation	3396.71 m	734.25 m	2662.46 m	856 days	Aug 1 '12	May 30 '15
62	**Concrete Lining of HRT**				**909 days**	**Jun 9 '13**	**May 30 '16**
63	Fabrication, Supply & Delivery of Gantry	Job	-		180 days	Jun 9 '13	Dec 5 '13
64	Erection of Gantry	Job	-		10 days	Dec 6 '13	Dec 15 '13
65	Concreting From Adit-1 junction to RD-0 (U/S)	2140 m	-	2140 m	200 days	Dec 16 '13	Jul 3 '14
66	Fabrication, Supply & Delivery of Gantry	Job	-		180 days	Oct 4 '14	May 30 '15
67	Erection of Gantry	Job	-		10 days	May 31 '15	Jun 9 '15
68	Concreting From RD-5537.56 to junction of Adit-1 (U/S)	3198 m	-	3198 m	240 days	Jun 10 '15	Apr 4 '16
69	Grouting from Adit-1 junction to RD-0	Job	-		200 days	Dec 16 '13	Jul 3 '14
70	Grouting from RD-5537 to junction	job	-		306 days	Jun 10 '15	Apr 10 '16
71	Cleaning of Tunnel	job	-		50 days	Mar 12 '16	Apr 30 '16

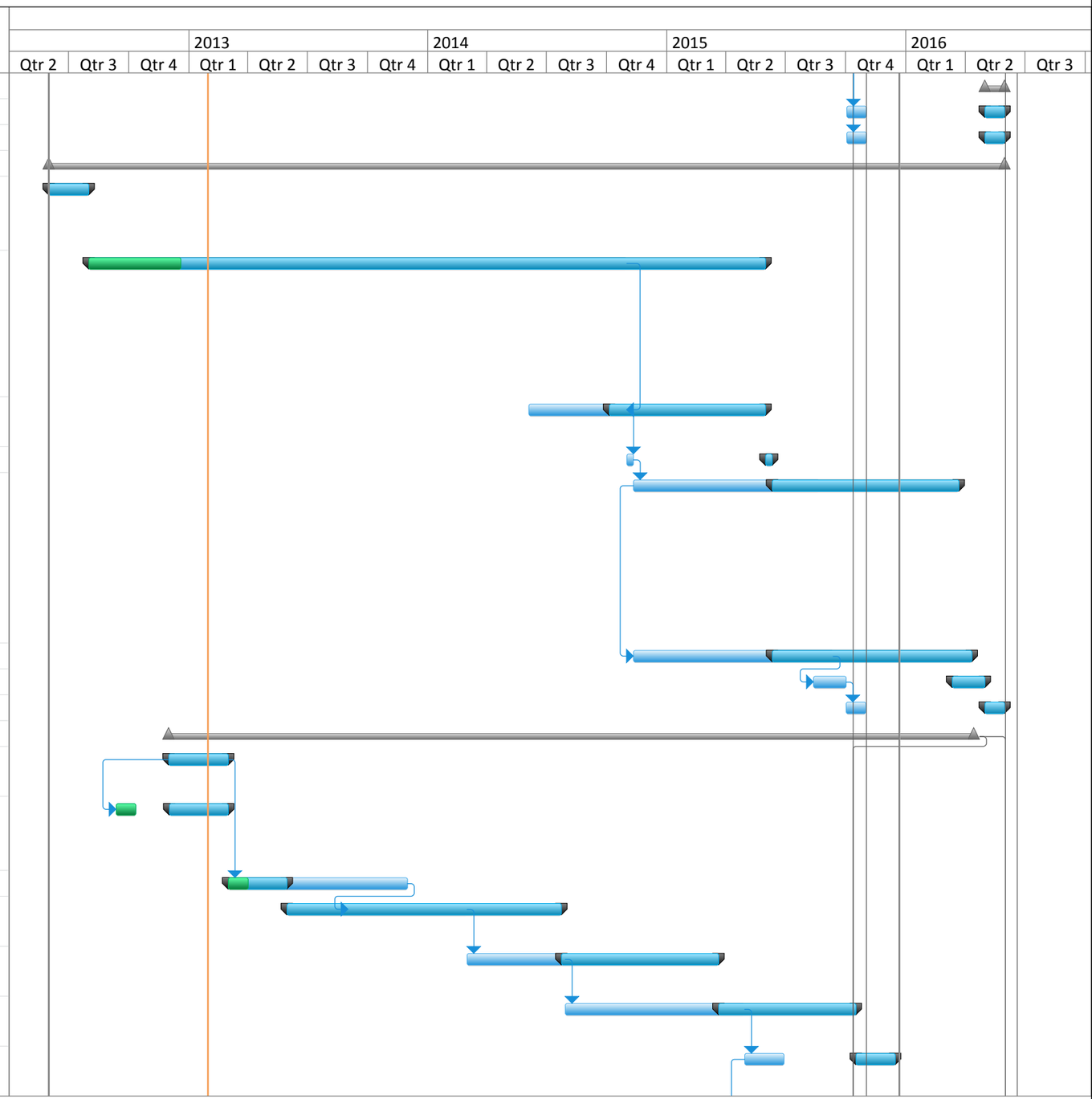


Project: Tidong-I HEP 100 MW- Ba
Date: Jan 30 '13

Task	External Tasks	Manual Task	Finish-only	Baseline Milestone
Split	External Milestone	Duration-only	Deadline	Baseline Summary
Milestone	Inactive Task	Manual Summary Rollup	Critical	Progress
Summary	Inactive Milestone	Manual Summary	Critical Split	
Project Summary	Inactive Summary	Start-only	Baseline	

Tidong-I HEP (100 MW): Progress Status as on Jan 25, 2013.

ID	Task Name	Total Estimated Qty	Cumulative Progress till Jan 25, 2013	Balance Qty as on Jan 25, 2013	Baseline Duration	Baseline Start	Baseline Finish
72	**Plugging of Adits**				**30 days**	**May 1 '16**	**May 30 '16**
73	Adit-5	Job	-		30 days	May 1 '16	May 30 '16
74	Adit-1	Job	-		30 days	May 1 '16	May 30 '16
75	**HRT Face-5 (U/S)**				**1223 days**	**Jun 1 '12**	**May 30 '16**
76	Bench Development in front of Adit-2 & Excavation of Adit-2				61 days	Jun 1 '12	Jul 31 '12
77	Excavation	3000 m	609.60 m	2390.40 m	857 days	Aug 1 '12	May 31 '15
78	Fabrication, Supply & Delivery of Gantry	Job	-		180 days	Oct 5 '14	May 31 '15
79	Erection of Gantry	Job	-		10 days	Jun 1 '15	Jun 10 '15
80	Concreting	3000 m	-	3000 m	225 days	Jun 11 '15	Mar 21 '16
81	Grouting	Job	-		305 days	Jun 11 '15	Apr 10 '16
82	Cleaning of Tunnel	Job	-		50 days	Mar 12 '16	Apr 30 '16
83	Plugging of Adit	Job	-		30 days	May 1 '16	May 30 '16
84	**Surge-Shaft**				**993 days**	**Dec 1 '12**	**Apr 13 '16**
85	Creating of Platform at EL2922	2000 cum	-	2000 cum	32 days	Dec 1 '12	Mar 1 '13
86	Underground Excavation of HRT to Surge-shaft Bottom	11.05 m	Completed	-	90 days	Dec 2 '12	Mar 1 '13
87	Excavation of Pilot Hole	110 m	12.60 m	97.40 m	90 days	Mar 2 '13	May 30 '13
88	Open Excavation Top	38500 cum	-	38500 cum	360 days	May 31 '13	Jul 23 '14
89	Enlargement of Full Section	8300 cum	-	8300 cum	240 days	Jul 24 '14	Mar 20 '15
90	Reinforcement & Concreting	4000 cum	-	4000 cum	210 days	Mar 21 '15	Oct 16 '15
91	Grouting & Cleaning	Job	-		60 days	Oct 17 '15	Dec 15 '15



Project: Tidong-I HEP 100 MW- Ba
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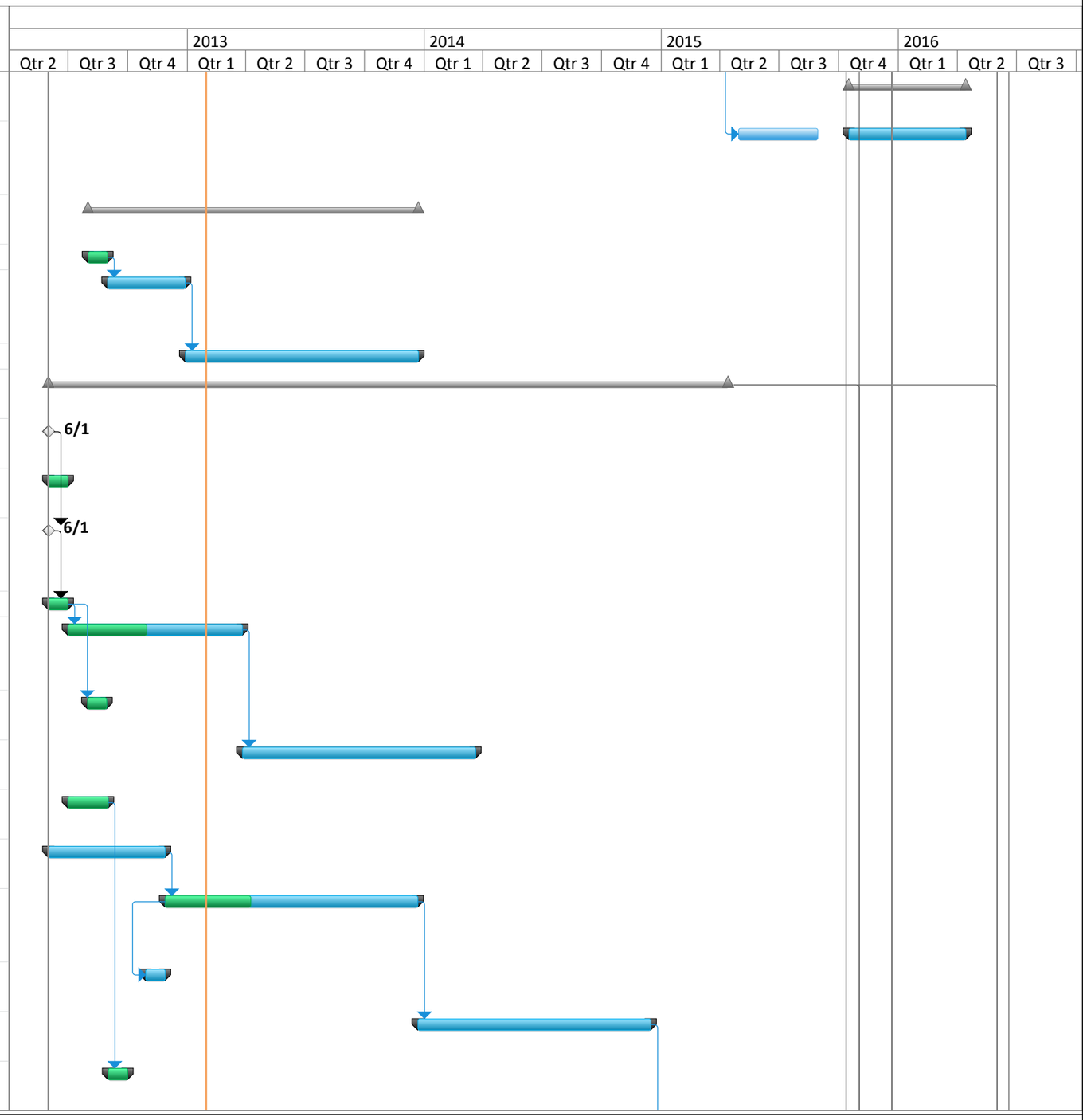
Task	External Tasks	Manual Task	Finish-only	Baseline Milestone
Split	External Milestone	Duration-only	Deadline	Baseline Summary
Milestone	Inactive Task	Manual Summary Rollup	Critical	Progress
Summary	Inactive Milestone	Manual Summary	Critical Split	
Project Summary	Inactive Summary	Start-only	Baseline	

Tidong-I HEP (100 MW): Progress Status as on Jan 25, 2013.

ID	Task Name	Total Estimated Qty	Cumulative Progress till Jan 25, 2013	Balance Qty as on Jan 25, 2013	Baseline Duration	Baseline Start	Baseline Finish
92	**H&M Works for Surge-Shaft**				**180 days**	**Oct 17 '15**	**Apr 13 '16**
93	Supply & Erection of Gates, Hoisting arrangement etc.	Job	-		120 days	Oct 17 '15	Apr 13 '16
94	**Procurement & Supply of Steel for Steel Liner in PS**				**450 days**	**Aug 1 '12**	**Dec 22 '13**
95	Floating of Tenders	Job	Completed	-	30 days	Aug 1 '12	Aug 30 '12
96	Opening & Evaluation of Tenders and Award of work	Job	In progress		120 days	Aug 31 '12	Dec 28 '12
97	Supply of Steel Plates	Job	-		300 days	Dec 29 '12	Dec 22 '13
98	**Pressure Shaft (PS)**				**870 days**	**Jun 1 '12**	**Apr 13 '15**
99	Excavation & Supporting of Adit-4	84.6 m	Completed	-	0 days	Jun 1 '12	Jun 1 '12
100	Excavation & Supporting of Adit-3	186 m	Completed	-	30 days	Jun 1 '12	Jun 30 '12
101	Excavation of PS Horizontal Portion through Adit-4	273.6 m	Completed	-	0 days	Jun 1 '12	Jun 1 '12
102	Fixing of Raise Climber	Job	Completed	-	30 days	Jun 1 '12	Jun 30 '12
103	Excavation of Inclined Portion between Adit-3 & 4	291.82 m	170.50 m	121.32 m	210 days	Jul 1 '12	Mar 26 '13
104	Installation of winch through Adit-3	Job	Completed	-	30 days	Jul 31 '12	Aug 29 '12
105	Erection of steel Liners & Backfill Concrete	Job	-		300 days	Mar 27 '13	Mar 20 '14
106	Intermediate PS horizontal reach	189.4 m	Completed	-	62 days	Jul 1 '12	Aug 31 '12
107	Supply & Erection of 2nd raise climber	Job	-		180 days	Jun 1 '12	Nov 27 '12
108	Excavation of Inclined Portion between Adit-2 & 3	327.91	71.82 m	256.09 m	330 days	Nov 28 '12	Dec 21 '13
109	Installation of winch through Adit-2	Job	-		30 days	Oct 29 '12	Nov 27 '12
110	Erection of steel Liners & Backfill Concrete	Job	-		300 days	Dec 22 '13	Dec 15 '14
111	Top PS horizontal reach through Adit-2	32 m	Completed	-	30 days	Sep 1 '12	Sep 30 '12

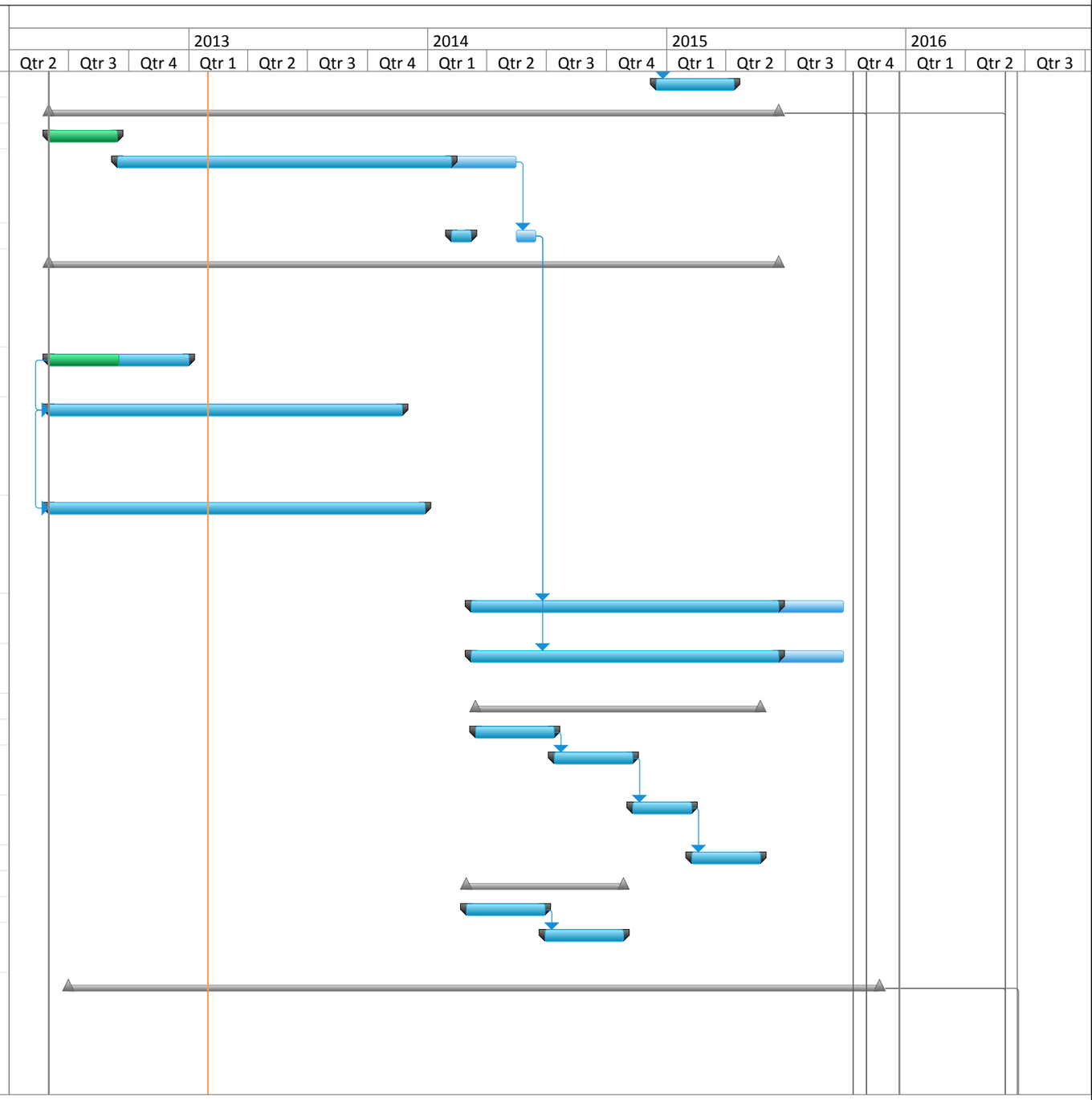


Project: Tidong-I HEP 100 MW- Ba
Date: Jan 30 '13

Task	External Tasks	Manual Task	Finish-only	Baseline Milestone
Split	External Milestone	Duration-only	Deadline	Baseline Summary
Milestone	Inactive Task	Manual Summary Rollup	Critical	Progress
Summary	Inactive Milestone	Manual Summary	Critical Split	
Project Summary	Inactive Summary	Start-only	Baseline	

Tidong-I HEP (100 MW): Progress Status as on Jan 25, 2013.

ID	Task Name	Total Estimated Qty	Cumulative Progress till Jan 25, 2013	Balance Qty as on Jan 25, 2013	Baseline Duration	Baseline Start	Baseline Finish
112	Grouting & Cleaning	Job	-		60 days	Dec 16 '14	Apr 13 '15
113	**Power House**				**938 days**	**Jun 1 '12**	**Jun 20 '15**
114	Excavation	95000 cum	Completed	-	105 days	Jun 1 '12	Sep 13 '12
115	Construction of Sub-structure & Superstructure	9600 cum	-	9600 cum	510 days	Sep 14 '12	Feb 5 '14
116	Erection of EOT	Job	-		30 days	Feb 6 '14	Mar 7 '14
117	**Supply, Erection & Testing of E&M Equipment (Unit-1 & Unit-2)**				**1115 days**	**Jun 1 '12**	**Jun 20 '15**
118	Submission & Approval of all Design Drawings	Job	50% Completed		214 days	Jun 1 '12	Dec 31 '12
119	Procurement, Manufacturing & Transportation of Unit-1 to Site	Job	-		481 days	Jun 1 '12	Nov 22 '13
120	Procurement, Manufacturing & Transportation of Unit-2 to site	Job	-		516 days	Jun 1 '12	Dec 27 '13
121	Erection & Testing (dry run) of Unit-1	Job	-		470 days	Mar 8 '14	Jun 20 '15
122	Erection & Testing (dry run) of Unit-2	Job	-		470 days	Mar 8 '14	Jun 20 '15
123	**Switch-Yard**				**376 days**	**Mar 15 '14**	**May 23 '15**
124	Development of Benche	Job	-		120 days	Mar 15 '14	Jul 12 '14
125	Excavation of Foundations	Job	-		120 days	Jul 13 '14	Nov 9 '14
126	Concreting of Foundations	Job	-		90 days	Nov 10 '14	Feb 7 '15
127	Erection of Equipment	Job	-		105 days	Feb 8 '15	May 23 '15
128	**Tail Race Channel**				**240 days**	**Mar 1 '14**	**Oct 26 '14**
129	Excavation	Job	-		120 days	Mar 1 '14	Jun 28 '14
130	Concreting & Grouting of Tail Race Channel	Job	-		120 days	Jun 29 '14	Oct 26 '14
131	**Transmission Line- 220 KV D/C (From Power House to Kashang- 19.5 Km)**				**1062 days**	**Jul 1 '12**	**Nov 21 '15**

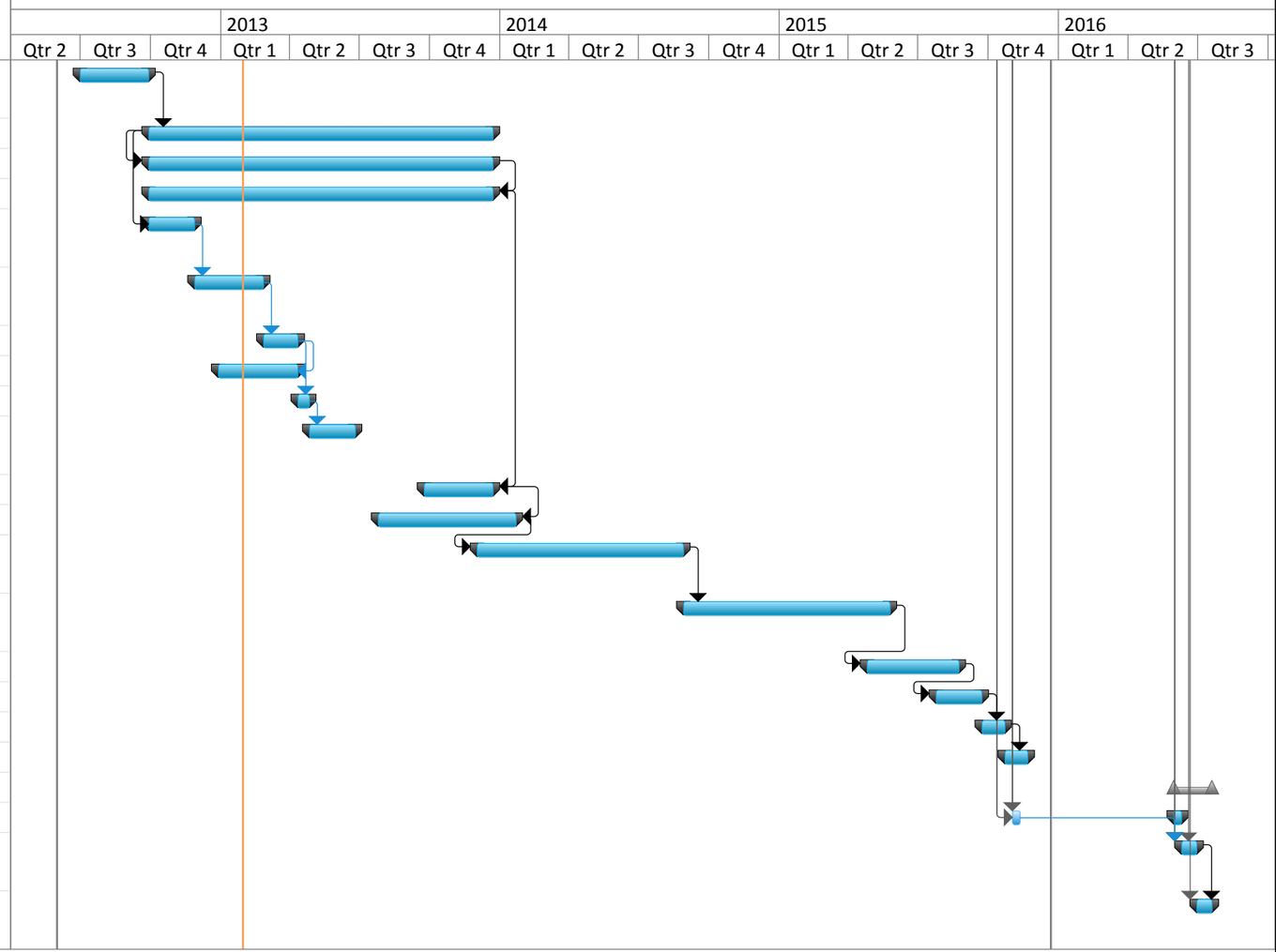


Project: Tidong-I HEP 100 MW- Ba
Date: Jan 30 '13

Task	External Tasks	Manual Task	Finish-only	Baseline Milestone
Split	External Milestone	Duration-only	Deadline	Baseline Summary
Milestone	Inactive Task	Manual Summary Rollup	Critical	Progress
Summary	Inactive Milestone	Manual Summary	Critical Split	
Project Summary	Inactive Summary	Start-only	Baseline	

Tidong-I HEP (100 MW): Progress Status as on Jan 25, 2013.

ID	Task Name	Total Estimated Qty	Cumulative Progress till Jan 25, 2013	Balance Qty as on Jan 25, 2013	Baseline Duration	Baseline Start	Baseline Finish
132	Preliminary Survey & Detailed Survey	Job	-		90 days	Jul 1 '12	Sep 28 '12
133	Land Acquisition	Job	-		450 days	Sep 29 '12	Dec 22 '13
134	Forest Clearance	Job	-		450 days	Sep 29 '12	Dec 22 '13
135	PTCC Clearance	Job	-		450 days	Sep 29 '12	Dec 22 '13
136	NIT for Construction of Transmission Lines	Job	-		60 days	Sep 29 '12	Nov 27 '12
137	Evaluation of Bids & Awards.	Job	-		90 days	Nov 28 '12	Feb 25 '13
138	Detailed Check Survey	Job	-		45 days	Feb 26 '13	Apr 11 '13
139	Soil Testing	Job	-		45 days	Dec 29 '12	Apr 11 '13
140	Approval of Check Surve	Job	-		15 days	Apr 12 '13	Apr 26 '13
141	Approval of Tower Designs	Job	-		60 days	Apr 27 '13	Jun 25 '13
142	Testing of Towers	Job	-		90 days	Sep 24 '13	Dec 22 '13
143	Supply of Materials	Job	-		180 days	Jul 26 '13	Jan 21 '14
144	Stub Setting & Foundation Works	Job	-		180 days	Dec 2 '13	Aug 28 '14
145	Tower Erection (approx 50 nos)	Job	-		180 days	Aug 29 '14	May 25 '15
146	Stringing & Sagging	Job	-		120 days	Apr 26 '15	Aug 23 '15
147	Misc Protection Works	Job	-		60 days	Jul 25 '15	Sep 22 '15
148	Earthing of Towers	Job	-		30 days	Sep 23 '15	Oct 22 '15
149	Testing & Commissionir	Job	-		30 days	Oct 23 '15	Nov 21 '15
150	**Testing & COD**				**50 days**	**May 31 '16**	**Jul 19 '16**
151	Filling of HRT	Job	-		10 days	May 31 '16	Jun 9 '16
152	Testing & Wet Commissioning of	Job	-		20 days	Jun 10 '16	Jun 29 '16
153	Testing & Wet Commissioning of	Job	-		20 days	Jun 30 '16	Jul 19 '16



Project: Tidong-I HEP 100 MW- Ba
Date: Jan 30 '13

Task	External Tasks	Manual Task	Finish-only	Baseline Milestone
Split	External Milestone	Duration-only	Deadline	Baseline Summary
Milestone	Inactive Task	Manual Summary Rollup	Critical	Progress
Summary	Inactive Milestone	Manual Summary	Critical Split	
Project Summary	Inactive Summary	Start-only	Baseline	

Annexure 4.1

Hydrology Chapter of DPR

CHAPTER-VI

HYDROLOGY

6.1 GENERAL

6.1.1 Introduction

Tidong-1 HEP proposes to utilize the hydropower potential available in lower reach of Tidong khad, a tributary of Sutlej River in Kinnaur District of Himachal Pradesh. Available gross head of 608m and discharge of 19.2 m^3/sec will be utilized to generate 100 MW of power.

A gauge site has been installed for discharge measurement on Tidong khad. The Gauge site is located near the proposed intake, down stream of the confluence of Lamber khad and Tidong khad.

6.1.2 Project Location

The project has been contemplated as a run-of-the river scheme. The river bed level at diversion site is EL 2880.00m. The catchment area of Tidong khad up to intake point and the project components are located between the latitude 31° 20’ 30” N to 31° 33’ 30” N and longitude 78° 22’ 10”E to 78° 47’ 50”E.

6.2 BASIN CHARACTERISTICS

6.2.1 Major river Basin: Sutlej River Basin

Sutlej rises from beyond Indian borders in the Southern slopes of the Kailash mountain near Mansarover lake from Rakas lake, as Longcchen Khabab river (in Tibet). It is the largest among the five rivers of Himachal Pradesh. It enters

Himachal at Shipki (EL 6,608 metres) and flows in the South-Westerly direction through Kinnaur, Shimla, Kullu, Solan, Mandi and Bilaspur districts. Its course in Himachal Pradesh is 320 km long from Rakastal, with famous tributaries viz. Spiti, Ropa, Taiti, Kashang, Mulgaon, Yula, Wanger, Throng and Rupi as right bank tributaries, whereas the Tirung, the Gayathing, the Baspa, the Duling and the Soldang khad are left bank tributaries. Its total catchment area in Himachal Pradesh is 20,000 sq. km.

6.2.2 Tidong khad basin

The Tidong khad is a left bank tributary of Sutlej river. It originates in the North Western slopes of Great Himalayas ranges at an altitude of 6740 m. It mostly flows in South-Easterly to North-Westerly direction. A number of Nallas join Tidong khad up to its confluence with Sutlej river, just upstream of Tirung village in District Kinnaur of Himachal Pradesh.

The total catchment area of Tidong khad at diversion site is 497.86 km^2 out of which 418.36 km^2 lies under permanent snow line (EL 4200m).

6.3 CLIMATE

In general, Tidong catchment is cold desert and being a dry zone, the precipitation during monsoon is low. In winter, the temperature can drop below freezing point and in summer, the weather remains pleasant.

The study region is upstream of the dividing line between climatic zone-I and III of northern India. Zone-I, the tropical Monsoon climate, extends from the Indian ocean north as far as Wangtoo, with its effects modified by the elevation and topography. The tropical monsoon climate involves an annual rainfall in excess of 1000mm, occurring mostly in the month of June to October. The study region, however, experience little rainfall as the mountains between plains and the study region captures most of the precipitation.

Climatic zone III, the arid mountain climate affects the Tibetan and western China Plateau. Due to effect of Tibetan and western China plateau, the winters are cold and dry where as summers are hot and dry. From November to May, the region experiences a generally north-easterly flow of cold continental air moving out from across the Tibetan plateau. The effect of this flow is somewhat modified by the mountains but it can result in high winds.

There is no temperature recording station inside the catchment. Measurements of maximum daily temperature are being made by different agencies at following sites. Also the temperature observations have been recently started at Kalpa and Jeori from 1984.

Available significant data of the temperature is given in table 6.1 (a):

Table 6.1 (a)

Station	**Maximum Temperature (^{o}c)**	**Minimum Temperature (^{o}c)**	**Period**
Shimla	30	-7.2	1956-70
Bilaspur	45.5	-2.0	1956-70
Kalpa	27	-9.5	1984-85
Jeori	40	-3.0	1984-85

Monthly mean temperature (maximum and minimum) and relative humidity at 8:30 AM and 5:30 PM for Kalpa metrological station have been given in table 6.1 (b)

Table 6.1 (B)

Station	MONTHLY MEAN TEMPERATURE (^{o}C)		MONTHLY MEAN RELATIVE HUMIDITY	
	Maximum Temperature	**Minimum Temperature**	**8:30 AM**	**5:30 PM**
January	6.1	-2.9	61	56
February	9.2	-1.6	50	44
Mach	17.5	3.5	32	23
April	19.6	5.3	47	40
May	21.4	7.2	45	38
June	22.7	9.2	61	50
July	24.5	12.1	72	52
August	22.0	11.8	85	75
September	22.9	9.6	69	55
October	16.3	2.9	59	56
November	15.2	0.7	38	41
December	11.5	-0.7	44	31

6.4 PRECIPITATION

Precipitation in the Tidong khad catchment area occurs mostly in the form of snow, which can be described as moderate to heavy depending upon the altitude.

Average annual precipitation is of the order of 630 to 700 mm, most of which is received in the form of snow during winter months. Though snow measurement has not been done however some records are available for rainfall and water equivalent of snow.

There are at present five rain gauge stations in the catchments around the project site. Long term records are available at these stations and is being regularly published by Indian Meteorological department. The relevant details of these stations are given in the following table:

Table 6.2 (a)

Station	District	Altitude (in metre)	Year of Commencement
Purbani	Kinnaur	2285	1951
Kalpa	Kinnaur	2530	1951
Sangla	Kinnaur	2590	1951
Kilba	Kinnaur	2200	1882
Nichar	Kinnaur	1830	1930

There is no regular and systematic record of snowfall at any station in the catchment. Although snow observations have been started at some stations i.e. Purbani, Kalpa, Kilba and Nichar from 1984.

The Rainfall and snowfall observations are being conducted in a conventional manner. There is no self recording rain gauge/snow gauge station in the catchment up to weir site.
Rainfall recorded at Morang Tehsil for 2001 to 2004 and at Kalpa metrological station for year 2004 are given in Table 6.2 (b)

Table 6.2 (b)

Months	Station				
	Morang				Kalpa
	2001	2002	2003	2004	2004
January	3.60	35.20	33.3	149.7	117.50
February	34.10	149.10	209.9	16.3	53.90
Mach	69.40	22.60	38.2	0.00	5.70
April	7.10	108.60	126.7	46.9	46.00
May	10.10	24.34	33.7	18.3	40.10
June	12.50	0.00	13.7	1.4	4.80
July	6.50	0.00	25.3	14.2	25.90
August	33.50	23.60	11.2	28.4	53.00
September	2.40	34.40	0	0.00	5.90
October	0.00	2.40	0	32.3	185.50
November	8.80	0.00	0	0.00	0.00
December	34.6	0.00	60.1	7.80	31.80
Total	**222.6**	**400.24**	**552.1**	**315.3**	**570.10**

Snowfall data for the years 2000-2005 recorded at Kalpa, which is the nearest observatory, is given in the following table.

Table 6.2 (C)

Sl No.	Months	Snowfall in mm					
		2000	**2001**	**2002**	**2003**	**2004**	**2005**
1.	January	49.1	20.6	87.2	45.5	115	140
2.	February	90.4	28.0	165.6	139.9	52.3	155.2
3.	March	82.0	24.2	140.4	85.6	0.0	46.6
4.	April	0.0	0.0	10.0	16.0	0.0	3.3
5.	May	0.0	0.0	0.0	0.0	0.0	0.0
6.	June	0.0	0.0	0.0	0.0	0.0	0.0
7.	July	0.0	0.0	0.0	0.0	0.0	0.0
8.	August	0.0	0.0	0.0	0.0	0.0	0.0
9.	September	0.0	0.0	0.0	0.0	0.0	0.0
10.	October	0.0	0.0	0.0	0.0	18.0	0.0
11.	November	0.0	4.0	0.0	6.4	0.0	0.0
12.	December	30.8	48.5	1.8	75.1	16.2	2.2
	Total	**252.3**	**125.3**	**405.0**	**368.5**	**201.5**	**347.3**

6.5 SOURCE OF RUNOFF

The flow regime of the stream in this region is complex. Mostly runoff is contributed by rainfall/snowfall melting, ground water and springs. However, contribution from snowmelt is significant.

The discharge of Tidong khad is lowest in winter months of November to February and starts increasing from March due to melting of snow. The snowmelt generally occurs in the period from March to June. The rainfall occurs during the monsoon period, from July to September. The bulk of discharge is contributed in months from May to August.

6.6 SEDIMENT LOAD

This stream carries small sediment load in summer and monsoon. During winter, water is quite clear and free from all kind of impurities. The streambed is characterized by accumulation of boulders of different sizes along the course of the stream. The sizes of such boulders vary from small pebbles to big boulders of size up to 3m in diameter.

6.7 WATER QUALITY

The water in the stream is free from any kind of pollution during winter. It is also suitable for drinking purposes as well as for construction activities in this period. However, it is muddy during monsoon months.

6.8 GAUGE & DISCHARGE (G&D) SITE

A discharge measurement site setup in December 2004 near the proposed diversion site. A straight reach of Tidong khad is available at this location with uniform flow conditions. The waterway width is kept as 12 m for discharge measurements guided by Gabion wall on both the banks.

At site, following arrangements have been set up for establishing G&D site:

- The total width of 12m at gauging site is divided into 6 sections of equal width.
- The depth is being measured in each section at 7AM, 12 noon and 5 PM on daily basis.
- For velocity measurement, Float method is used.
- Ropeway of adequate capacity along with pulley, Wire & Cradle arrangement for movement across the River for facilitating measurement of depth of flow by sounding and velocity by float method.

6.9 DISCHARGE MEASUREMENTS

Methodology:

The flow in the mountainous river changes seasonally and from year to year, due to temporal and spatial variation in precipitation. The flow pattern of Tidong khad is no exception to this and it follows the trend of Himalayan rivers in which most of the runoff is available during monsoon months of July to September. Winter rains swell the river flow to some extent for a short duration during the months of December to February. During these winter months, the river runoff is usually minimum. Tidong khad receives perennial flow.

Discharges of Tidong khad at Lumber village gauging sites is measured by surface float method. Surface floats are made up of well seasoned heavier type wood available locally. Heavier floats are generally preferred so that its greater part would be submerged in water thus reducing influence of the wind. Cableways have been installed across the river for the purpose of taking observations. Two wire ropes have been stretched across the river section, one at the beginning and other at the end of the selected river reach for conducting observations. The distance between two ropes known as float run has been kept as 12 m at Lumber village discharge sites. The ropes have been marked at 2 m intervals to divide the river cross-section into different segments. The centerline of the segment defines the path or track of the float. A third rope has been stretched 12 m upstream of test reach. The gauge reader rides in a jhulla attached with the cable with a pulley arrangement and drops floats in different segments 12m upstream of the float race so that floats acquires uniform velocity by the time they reach float race. Three floats are dropped in each segments and mean of the time taken to traverse the float race is considered. The time of travel of test reach of only those floats which follows there correct track is recorded.

The cross section area has been divided into segments, each of 2m width. Cross-section is checked before and after monsoon and after every major flood in the river.

Discharge in each vertical is arrived at after multiplying corresponding average velocity and cross-sectional area of each vertical. Total discharge is calculated by adding discharge values of each vertical. Discharge is being measured three times a day the discharge calculations at 7:00 AM, 12:00 PM and 5:00 PM from 1st December, 04 onwards.

Measurement of velocity = (Float Run / Time taken by float to cover float run.)

Mean velocity is generally determined by taking average of the velocities measured at depths, 0.2 and 0.8 times the total depth from the surface. Float measurements represent surface velocity, thus velocities measured by float are multiplied by 0.80 to determine mean velocity of flow.

Mean velocity of flow= 0.80 X Surface velocity.

Mean velocity V_1,V_2,-------- in each segment is obtained after multiplying the surface velocities by 0.89. The velocities are multiplied by area of cross-section of corresponding segment to obtain discharges in each segment. Summation of discharges in each segment gives discharges in the river.

$Q = A_1V_1 + A_2V_2 + A_3V_3 + \text{--------}$

$Q = Q_1 + Q_2 + Q_3 \text{----------}$

6.10 DESIGN FLOOD DISCHARGE

Flood discharge is calculated using the Dicken's empirical formula as well as by method based on unit hydrograph principle in Central Water Commission Report no-1/73.

The total catchment area at gauging site is worked out as 497.86 km^2. This is further bifurcated as rain fed area of 79.50 km^2 and snow fed area of 418.36 km^2.

6.10.1 Dicken's Empirical Formula

The flood estimation has been done by the use of Dicken's empirical formula

$Q_F = C \times A^{3/4}$

Where C is the constant = 12 and

A is the rain fed Catchment area.

At diversion site A= 79.50 km^2

$Q_F = 12 \times (79.50)^{3/4}$

$= 319.49\ m^3/sec$

6.10.2 Unit Hydrograph Method

CWC Report No. WH/22/1994 & 1/73

In this approach, the design storm after converting it into effective rainfall is applied to the unit hydrograph to obtain the design flood. Detail steps have been followed referring report no. WH/22/1994.

Total area of catchment (C.A)= 497.86sqkm
= 192.2Sqmile
Area of catchment below contour 4200m (A)= 79.5sqkm
= 30.687Sqmile
Length of the longest stream (L)= 24.975Km
= 15.4845mile
Length of the longest stream from a point opposite to C.G of the catchment to the pt. of study (Lc)=
10.2Km
= 6.32miles

Weighted mean slope (SLc)=

RL(m)	RL(ft)	Li(Km)	Li(ft)	Di (ft)	Si	Li/sqrt(Si)
4200	13482					
4000	12840	1.04	3338.4	642	19.23	0.24
3900	12519	9.35	30013.5	321	1.07	9.04
3700	11877	0.32	1027.2	642	62.50	0.04
3500	11235	2.35	7543.5	642	8.51	0.81
3300	10593	7.625	24476.25	642	2.62	4.71
3100	9951	4.05	13000.5	642	4.94	1.82
3000	9630	0.24	770.4	321	41.67	0.04
		24.975			Total	16.69

S_{Lc}= 0.14%
= 0.0014
Since S_{Lc} is less than 0.0028
Peak value ($QTp=16000A^{3/4}S_{lc}^{2/3}$) = 10508.40Cusec
Duration of rainfall excess ($t_c=255/(Q_{tp}/A)^{0.9}$) = 6.96 hrs

The point rainfall values corresponding to a 50-yr return period storm and for various durations have been read from the isopulvial maps of India Meteorological departments, Aerial to point reduction factor is taken from table-A chapter-6 of report 1/73 of CWC and the aerial rainfall corresponding to different durations as below:-

Duration		Point rainfall vol (mm) of 50 yr return period		Areal to point R/fall ratio (%)	Areal R/fall	Hourly areal R/fall of Design storm
		Read from IMD maps	Read depth duration curve Fig-3.10			
0.25	hr	30	29		-	-
0.5	hr	40	49	57.53	28.17	-
0.75	hr	58	61		-	-
1	hr	70	69	67.63	46.79	46.79
2	hr		89	75.84	67.79	21.00
3	hr	60	101	79.79	80.75	12.96
4	hr		110	82.24	90.13	9.38
5	hr		116	83.95	97.46	7.33
6	hr	80	121	85.25	103.50	6.04
7	hr		126	86.09	108.39	4.89
8	hr		130	86.94	112.84	4.45
9	hr	100	133	87.78	116.95	4.11
10	hr		136	88.29	120.34	3.40
11	hr		139	88.81	123.51	3.17
12	hr	100	142	89.32	126.49	2.98
13	hr		144	89.68	129.09	2.60
14	hr		146	90.04	131.55	2.46
15	hr	100	148	90.40	133.89	2.34
16	hr		150	90.66	135.99	2.10
17	hr		152	90.93	137.99	2.00
18	hr		153	91.19	139.92	1.92
19	hr		155	91.40	141.67	1.76
20	hr		156	91.61	143.37	1.69
21	hr		158	91.82	145.00	1.63
22	hr		159	91.99	146.52	1.52
23	hr		161	92.16	147.98	1.47
24	hr	115	162	92.33	149.40	1.42

Runoff for a long duration storm (24 hrs) for hilly region is given by

$R=0.6 H^{1.2}$ where, R= Runoff in inches
H= Aerial rainfall in inches

For aerial rainfall of 24 hr duration and 50 year return period,

H=149.40 mm
=5.89 inches
R=5.03 inches
=127.88 mm

Average loss rate 0.897mm per hr

per hour=

Aerial rainfall of 50-yr return period and 6.96hr duration= 30.03 mm
= 1.18 inches

Maximum runoff excess of 6.96hr duration is given by

Q_{tc}= 10508.40 Cusec

Peak flood hydrograph due to rainfall excess of 1.18 inches and duration of 6.96 hrs= 12433.3 Cusec

Taking adjustment factor for the effect of temporal distribution of rainfall excess of 1.075

Peak flood hydrograph excluding base flow = 13365.9 cusec
= 378.21cumec

Adding base flow @ 5.0 cusecs per sq mile with entire catchment contributing,

Design peak flood
= 14326.72694cusec
= 405.40cumec
= 405.00cumec

6.10.3 Ryve's Formula

Ryve's Formula :-

$$Q_P = C_1 A^{2/3}$$

where,

Q_P, C_1 and A have the same meaning as in Dicken's formula.

C_1 for areas near hills = 10.1

Q_P = 186.738cumecs

Flood estimation was also worked out based on Gumble's and Ven-Te-Chow method also but the same found to give very low values which are not comparable with the actual expected flood in Tidong khad. Therefore, these values have been discarded.

6.10.4 Design flood proposed to be adopted

On the basis of above methods following results are obtained:-

Table 6.3

S.No	Method	Flood Discharge
1	Dicken's formula	319.49 m^3/sec
2	CWCReportNo.H/2/1994 & 1/73	405.00 m^3/sec
3	Ryve's Formula	186.74 m^3/sec

To be on safer side, it is proposed to adopt design flood of 405 m^3/sec computed by unit hydrograph approach which is based on physical as well as climatic parameters of the Tidong catchment.

Highest Flood Levels (HFL) is calculated at barrage site and powerhouse site.

The calculations for flood levels are as follows:

A *Calculation of HFL at Weir Site*

Case-1

Before construction of barrage

Average river bed level at weir site		=	2881.75	m
Flood Discharge	Q_f	=	405	m^3/s
Slope of river		=	1 in	20
Manning's coefficient	n	=	0.06	
The water depth		=	2.9	m
Wetted area (from c/s at weir)	A	=	80	m^2
Wetted perimeter (from c/s at weir)	P	=	50	m
Hydraulic mean depth	R	=	A/P	
		=	1.60	
Velocity	V	=	$R^{2/3} S^{1/2} /n$	
		=	5.10	m/sec
Therefore,	Q	=	A V	
		=	407.8531	m^3/s
			>405, Hence Safe	

Hence water depth of 2.9m can be adopted

HFL at weir site = **2884.65 m**

Case-2

After construction of barrage

Spillway (Refer IS 4997 - 1968)

Water Level at Upstream during discharge of flood.		=	2887.90	m
Spillway Bottom sill level (Crest Level)		=	2881.75	m
H		=	6.15	m
Refer Fig.1 Page 5 of IS 6966 (Part 1):1989				
C_d		=	0.65	
Refer 4.3.1 Page 3 of IS 6934:1998				
Number of Bays			1	
Clear Length of One Bay			16.00	
Thickness of Divide Wall			2.00	
L' = Clear Length of Crest		=	16.00	m
$L = L'-2H(NK_p + K_a)$		=	14.77	m
$Q = 2/3 x C_d x L' x (2g)^{1/2} x H^{3/2}$		=	432.38	m^3/s
			> 405	

Adopted HFL = 2888 m

B ***Calculation of HFL at Power house site Site***

Average river bed level at weir site		=	2241.6	m
Flood Discharge	Q_f	=	405	m^3/s
Slope of river		=	1 in	60
Manning's coefficient	n	=	0.06	
The water depth		=	4.9	m
Wetted area (from c/s at powerhouse site)	A	=	137.86	m^2
Wetted perimeter (from cross-section at powerhouse site)	P	=	84	m
Hydraulic mean depth	R	=	A/P	
		=	1.64	
Velocity	V	=	$R^{2/3} S^{1/2} /n$	
		=	2.99	m/sec
Therefore,	Q	=	A V	
		=	412.7154	m^3/s

Hence water depth of 4.9m can be adopted

HFL at PH site		=	**2246.5**	**m**
Adopted HFL at PH site			**2250**	**m**

6.11 DISCHARGE DATA

6.11.1 Available Discharge Data

The available data for carrying out the Hydrological analysis are listed below.

- The long term ten daily discharge data for Baspa River at Sangla gauging site from January 1965 to December 2002 (available in the HPSEB Pre-Feasibility Report).

  The actual available data for Baspa at Sangla is available from 1965 to 1972 and then from 1977 to 2003. The gap in the data was filled by developing correlations between ten daily flow at Sangla and ten daily flow at Wangtoo on river Sutlej.
- Discharge data of Baspa at Sangla from Jan 2002 to April 2005, excluding the period of Dec 2002 to May 2003. Ten daily discharge measurements for this period collected from Jai Prakash Hydro power Ltd. is attached in Annexure-6.1).
- Discharge data of Tidong khad near Lamber from 23rd June 95 to Dec 95, Feb 96 to Mar 96, March 1997 to December 1998 and January 2003 to December 2004 (Measured by HPSEB). This data is given in Annexure-6.2
- Discharge data measured by Nuziveedu Seeds Ltd near diversion site of Tidong-1 HEP from 1st Dec 04 onwards. (This data is given in Annexure-6.3).

6.11.2 Analysis of available data

From the above available data set, consistency checks are carried out and long term data of Tidong khad derived from the Long term measured discharge data of Baspa at Sangla and discharge data of Tidong near Lamber.

The following alternative studies have been made:

Method I. Regression analysis for discharge measurement of Baspa at Sangla and Tidong discharge at diversion site from Dec04 to May05. Dependable year calculation based on total annual flow.

Method II. Regression analysis for discharge Baspa at Sangla and Tidong discharge from Dec04 to May05. Calculation of dependable pattern of annual

discharge values in each ten daily based on each ten daily discharge values.

Method III. Regression analysis for discharge of Baspa at Sangla with Tidong discharge (two regression equations, first for June to Nov Tidong discharge measured by HPSEB and second for Dec to May with the Tidong discharge for year 2004-2005).

Method IV. Long term discharge data generated by catchment area proportionate method by dividing total area in to Snow fed catchment and Rainfed catchment. Tidong discharge = Baspa discharge at Sangla X [(Rain-fed catchment area of Tidong khad / Rain-fed catchment area of Baspa at Sangla site)$^{0.75}$ + (Ratio of Snow fed catchment of Tidong and Baspa)]

Method V. Long term discharge data generated by catchment area proportionate method. Tidong discharge = Baspa discharge at Sangla X (Total catchment area of Tidong khad / Total catchment area of Baspa at Sangla site)$^{0.75}$

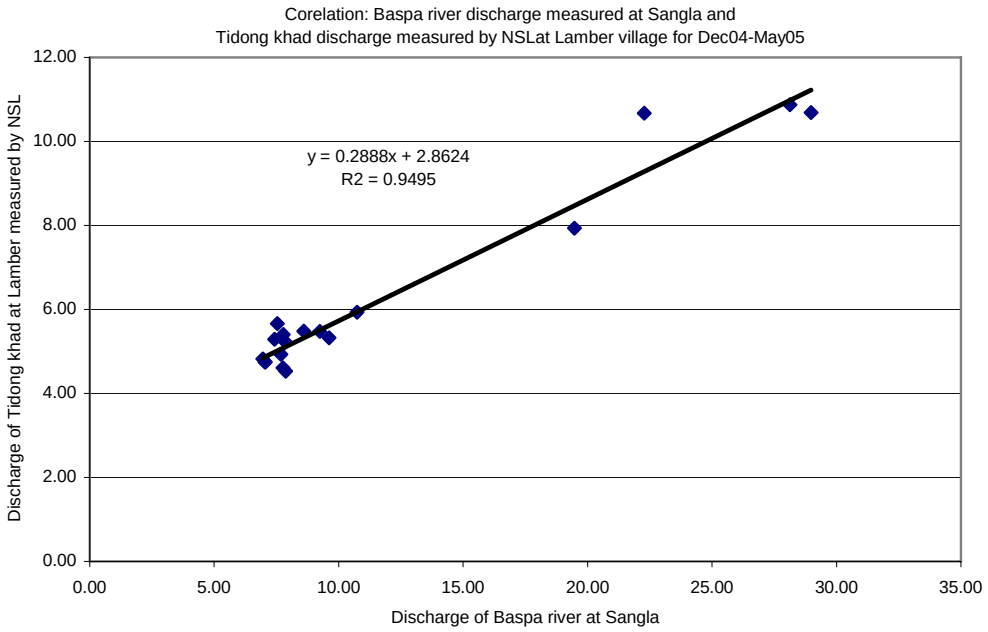
A comparative study of the discharge data derived from the above five methods and the actual discharge measured by NSL and HPSEB at the Tidong-1 HEP barrage site has been done.

Discharge series derived by regression analysis between discharges of Baspa river (at Sanlga) and Tidong discharge measured from December 2004 to May 2005 and dependable year calculation gives realistic results for long term discharge series. It is observed that results obtained by use of method –1 are comparable with the actual discharge measurement, therefore long term discharge series as obtained by Method-1 have been adopted for further power potential studies. The discharge of Baspa river have also been verified with the actual energy generation in Baspa HEP. Further, it has been recommended in DPR that discharge series shall be updated upon availability of further measured discharge values of Tidong khad to confirm the data series obtained by regression analysis.

Discharge measured by HPSEB is available for the period from July 1995 to March 1996 and from March 1997 to Dec1998 and partly for year 2004. In order to work out discharge series in 50%, 75% and 90 % dependable years, long term (about 20 to

25 years) measured discharge data is required. Based on regression analysis between Baspa discharge and Tidong khad discharge measured by HPSEB and NSL, coefficient of correlation works out as 0.77 and 0.97 respectively. The coefficient of correlation is with in acceptable range in case of discharge measured by NSL and hence the long term discharge data has been generated using regression analysis between Baspa discharge data at Sangla and NSL discharge data at Lamber village site. This data has been utilized to capture 50%, 75% and 90% dependable discharge.

Fig-6.1 (Regression Curve)



The Adopted linear regression equation for deriving the long term discharge data is:

y = 0.2888 X + 2.8624

R = 0.9745

Where y is the discharge value for Tidong at Lamber measured by NSL and X is the Baspa River discharge at Sangla.

On the basis of Regression coefficient (R), it is concluded that above data set is showing good correlation for discharge values. Hence the above equation has been used for deriving the long term discharge data for Tidong.

Long term discharge data for Tidong-1, derived form Baspa Long Term discharge data is listed in Annexure- 6.4, 6.6, 6.7, 6.9 and 6.11.

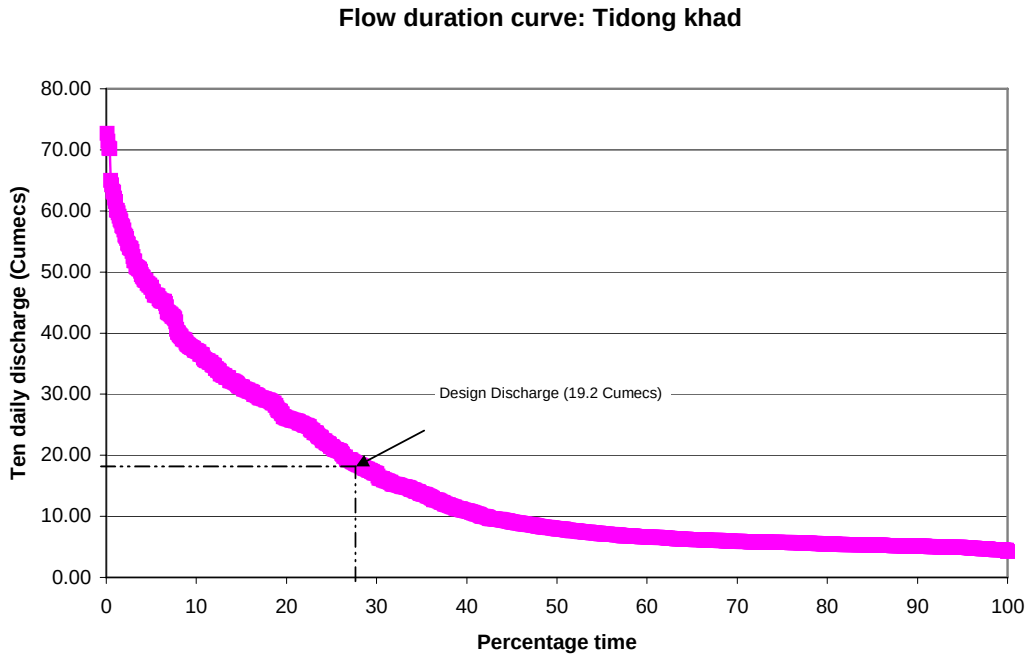
By considering the annual inflows and applying Weibul's distribution formula, the 90%, 75% and 50% dependable years have been worked out, the computations are as per Annexure 6.5, 6.8, 6.10 and 6.12.

50%, 75% and 90% dependable derived discharge and actual discharge measured by NSL and HPSEB in the Tidong-1 HEP barrage site, are presented in Annexure 6.13. It is observed that results obtained with the use of method I are comparable with the actual discharge measurement.

6.12 FLOW DURATION CURVE

Variability of stream flow is studied using flow duration curves. Discharge is plotted against the % of time the flow exceeded.

Fig-6.2



Flow duration curve for Tidong khad shows the following results:

- Design Discharge of 19.2 cumecs is available for 27.2 % of time i.e. 100 days.

- For 50% of time i.e. 183 days, minimum discharge of 7.97 cumecs is available.
- For 75% of time i.e. 274 days, minimum discharge of 5.74 cumecs is available.
- For 90% of time i.e. 329 days, minimum discharge of 5.12 cumecs is available.

In the lower reach of flow duration curve, major discharge is contributed by base flow, which is available throughout the year and hence, the curve in this portion is almost flat.

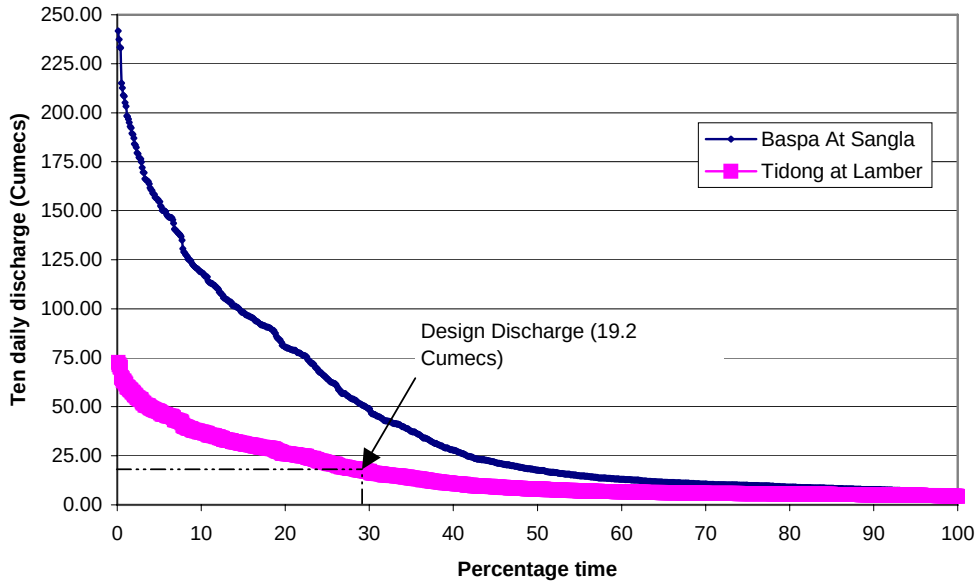
The middle reach of flow duration curve has mild slope. Discharge in this portion is contributed by snowmelt having low variations compared to rainfall.

The upper reach of flow duration curve has steep slope compared to middle portion because major discharge is contributed by rainfall.

The above results also compared with actual discharge data of Baspa River at Sangla gauging site.

Fig-6.3

Flow duration curve Baspa and Tidong khad



Results from Baspa River flow duration curve:

- For 50% of time i.e. 183 days, minimum discharge of 17.67 cumecs is available.
- For 75% of time i.e. 274 days, minimum discharge of 9.95 cumecs is available.
- For 90% of time i.e. 329 days, minimum discharge of 7.83 cumecs is available.

The flow duration curve of Tidong khad and Baspa river shows the same trend. Flow duration shows that design discharge of 19.2 cumecs is available for 27.2% of the time of the year i.e. for 100 days a year. Hence plant will run at 100MW generation capacity for 100 days in a year. (Flow duration curve data is appended in annexure 6.14).

6.13 FURTHER STUDY

Hydrology for the Tidong-1 HEP shall be updated based on further availability of discharge measurements near discharge site. These measurements will continue till the completion of the project construction to firm up discharge available for power generation.

DISCHARGE DATA OF BASPA RIVER AT SANGLA

Annexure-6.1

MONTH PERIOD		1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
JAN	I	12.00	12.60	8.70	8.70	10.10	9.39	9.83	8.60	8.18	8.11	7.90	6.18	6.04
	II	4.80	11.10	9.10	8.50	10.20	8.66	9.83	8.61	8.14	7.87	8.28	6.00	5.89
	III	18.40	9.80	9.20	8.40	9.70	8.62	9.98	8.77	8.84	7.78	7.90	5.87	5.92
FEB	I	18.40	8.40	8.70	8.20	9.40	8.36	9.04	8.46	7.90	7.86	7.90	5.80	5.79
	II	19.10	7.40	9.00	8.70	9.40	8.14	8.70	8.32	7.88	7.90	7.90	5.86	5.85
	III	17.40	7.50	9.00	8.80	9.90	7.82	8.53	8.36	6.30	7.10	8.44	5.94	5.89
MAR	I	13.10	8.00	9.00	8.80	9.90	7.37	9.00	8.30	7.98	6.93	7.48	5.77	5.49
	II	10.60	8.00	9.00	8.60	9.90	7.91	10.02	8.42	7.83	6.75	7.90	5.73	5.46
	III	15.70	8.00	6.70	8.20	10.10	8.09	12.85	8.62	7.82	7.04	8.18	5.63	5.37
APR	I	14.70	10.90	7.50	8.50	10.00	8.64	11.00	8.91	7.90	8.05	8.86	5.82	5.74
	II	21.90	12.60	9.20	18.50	10.40	8.81	12.59	12.86	9.63	7.38	14.55	7.23	6.86
	III	20.50	18.80	14.30	24.70	13.70	12.43	16.59	12.93	11.41	11.56	20.78	7.56	11.97
MAY	I	24.60	21.90	34.20	31.40	16.00	23.60	35.03	18.24	14.53	12.66	26.16	11.12	16.61
	II	38.50	23.30	36.80	30.95	15.60	40.37	51.50	49.28	28.27	11.90	37.68	20.98	56.70
	III	71.80	19.00	39.90	41.50	24.80	41.50	81.27	46.18	20.36	21.30	41.28	46.02	53.96
JUN	I	103.30	26.90	65.90	42.70	42.40	59.82	119.92	56.85	23.36	50.22	41.51	89.77	69.03
	II	97.90	69.70	80.00	46.46	100.00	53.24	98.09	92.12	50.87	42.91	45.40	54.66	72.12
	III	160.30	143.60	116.70	76.20	76.20	87.72	96.28	105.43	78.86	51.75	95.57	48.96	138.05
JUL	I	209.00	123.40	118.50	72.10	112.80	92.80	95.82	107.43	84.35	76.03	82.73	67.41	138.88
	II	155.90	126.50	111.90	90.70	139.40	65.82	81.25	120.52	91.80	77.69	76.79	112.96	129.01
	III	150.10	84.40	104.60	140.30	140.70	127.58	101.38	120.84	103.34	99.34	107.57	121.66	122.50
AUG	I	150.20	91.80	104.60	116.50	130.70	121.24	98.66	112.95	101.46	87.57	86.13	103.61	96.27
	II	155.90	80.00	7.06	77.20	91.30	116.37	90.57	134.98	95.65	80.44	75.83	90.07	91.87
	III	146.90	62.80	64.30	49.70	44.10	113.37	91.29	111.93	67.41	79.26	73.62	90.67	88.86
SEP	I	118.80	58.30	53.70	42.80	27.00	89.15	50.24	79.10	58.29	58.70	42.90	67.92	75.55
	II	93.84	39.70	37.10	34.10	27.80	64.41	43.97	61.92	33.96	44.94	35.14	44.63	53.91
	III	78.71	23.20	29.90	27.80	19.70	39.96	19.59	41.13	28.95	38.92	23.35	29.28	45.27
OCT	I	69.75	16.60	23.10	20.50	15.10	30.08	16.31	31.74	20.03	26.25	9.85	20.00	33.79
	II	63.50	15.60	17.50	18.30	16.80	25.47	16.01	24.82	16.04	18.65	8.33	16.50	24.02
	III	55.90	12.20	15.40	16.00	16.40	21.24	14.75	21.02	13.35	15.74	8.48	13.21	20.35
NOV	I	24.20	10.20	11.50	14.80	15.20	18.15	13.17	17.53	11.66	13.62	7.57	10.34	18.78
	II	22.40	10.20	10.30	13.30	13.00	16.50	11.75	15.37	11.08	12.27	7.25	8.66	17.51
	III	21.20	10.50	10.10	12.80	12.10	14.89	10.72	14.45	10.40	10.69	6.69	7.88	17.67
DEC	I	20.60	10.40	9.40	11.50	11.60	12.69	11.90	13.11	9.97	9.99	6.52	7.14	9.00
	II	20.80	10.60	9.20	10.70	10.90	11.39	11.70	11.54	9.27	9.66	6.33	6.61	8.92
	III	14.30	9.00	8.80	10.20	11.00	11.38	11.00	11.63	8.60	9.43	6.25	6.45	8.75
Annual Flow (MCM)		22988.3	12419.2	12538.5	12027.8	12770	14345.94	14315.29	15624.97	11133.82	10768.29	10994.84	11976.63	15130.43

Annexure-6.1

MONTH PERIOD		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
JAN	I	8.62	7.21	13.72	7.69	11.94	11.57	12.03	10.52	10.35	10.62	11.25	11.02		8.99	7.88
	II	7.62	7.17	10.42	7.41	11.38	10.20	11.22	9.95	9.61	10.26	10.28	10.20		8.28	7.77
	III	6.45	7.19	9.56	7.25	10.84	8.75	10.49	9.68	9.55	10.09	9.89	9.69		7.39	7.77
FEB	I	6.37	7.18	9.08	6.61	10.18	10.04	10.18	9.76	10.00	9.89	9.60	9.04		7.38	7.05
	II	6.31	7.18	8.61	6.55	10.26	10.47	10.19	9.86	10.59	9.72	9.66	8.47		7.42	7.68
	III	6.31	7.14	7.95	6.55	10.57	10.41	10.24	10.02	12.15	9.95	10.01	8.26		7.80	7.04
MAR	I	6.31	7.18	8.15	6.55	10.89	10.61	11.32	11.08	13.33	10.35	10.52	9.32		8.35	6.96
	II	6.34	7.14	8.08	6.61	11.14	11.16	11.68	11.41	13.56	11.03	11.20	9.96		9.62	7.54
	III	6.83	7.19	8.28	6.99	12.85	13.58	12.34	11.44	15.29	11.89	13.66	13.17		10.20	7.43
APR	I	7.79	7.18	8.55	7.12	12.84	13.44	13.07	12.38	17.59	13.81	16.79	19.22		11.05	7.86
	II	7.63	7.83	9.80	7.12	13.65	19.17	14.80	14.27	22.26	20.53	19.73	24.43		12.89	10.74
	III	8.98	9.61	26.53	7.47	17.23	29.02	17.03	22.69	36.37	30.52	28.06	30.71		15.24	19.47
MAY	I	11.21	10.77	51.30	9.58	35.57	37.37	23.60	26.62	37.17	45.43	50.68	56.95		14.65	28.98
	II	17.69	13.70	34.04	13.68	93.22	38.97	31.28	40.89	55.45	80.45	77.41	165.47		29.03	28.13
	III	22.67	13.16	42.73	32.23	80.81	79.33	46.01	108.47	77.55	117.90	83.19	154.60		38.82	22.28
JUN	I	51.93	32.81	29.29	90.30	127.09	110.00	77.73	119.00	56.85	139.88	112.08	166.32	116.20	33.31	
	II	70.16	36.31	43.15	100.68	152.45	154.67	118.16	93.92	136.77	161.75	146.55	183.44	124.70	62.57	
	III	84.67	62.66	35.87	104.40	96.69	182.21	152.05	163.68	174.93	169.61	156.43	192.23	101.30	56.74	
JUL	I	95.15	53.28	62.10	114.46	146.71	90.76	150.14	196.79	233.09	184.13	187.05	198.40	122.10	76.41	
	II	96.87	98.31	73.77	125.06	194.97	125.26	176.40	165.07	241.76	212.64	198.17	189.54	137.40	70.85	
	III	93.49	106.98	46.49	147.40	179.11	148.05	158.34	156.82	233.46	208.40	203.29	165.85	149.64	66.62	
AUG	I	78.79	108.42	54.25	110.50	149.83	110.50	138.14	172.00	237.42	193.10	177.15	159.01	128.60	79.83	
	II	56.79	91.40	42.44	94.90	145.39	96.49	120.34	158.51	205.21	176.74	164.93	179.46	97.00	78.53	
	III	47.62	88.93	41.59	66.23	118.73	64.03	101.56	110.99	215.13	169.45	146.68	160.72	93.73	55.06	
SEP	I	28.66	79.71	36.02	79.00	101.65	60.44	71.96	103.46	188.94	146.63	113.60	124.68	65.30	37.66	
	II	23.14	55.58	31.26	61.35	54.39	39.55	67.63	85.18	105.30	98.32	61.75	105.49	52.90	40.79	
	III	14.75	44.32	18.00	42.96	34.02	33.48	42.23	100.79	100.37	73.29	41.78	74.23	44.89	20.95	
OCT	I	10.31	41.09	12.56	32.52	27.35	27.49	30.07	62.32	52.42	49.17	37.13	50.82	23.46	17.96	
	II	9.47	32.51	11.65	23.01	24.62	23.09	22.50	49.32	25.99	27.61	31.70	37.97	16.85	14.94	
	III	9.04	28.39	10.24	17.49	22.05	22.95	18.38	39.26	22.52	20.10	25.08	27.96	13.59	12.89	
NOV	I	8.59	26.17	9.43	15.36	19.79	21.20	15.66	30.35	18.90	17.86	19.90	21.46	11.82	11.83	
	II	8.51	23.05	9.14	14.52	18.30	19.42	14.16	22.17	16.61	16.65	17.50	18.55	10.69	10.88	
	III	8.08	21.49	8.53	12.99	15.63	16.15	25.72	15.80	15.18	15.77	14.20	14.23	10.22	9.55	
DEC	I	7.71	20.09	8.15	12.99	14.67	16.17	12.15	13.26	13.60	14.88	13.90	13.30	10.56	9.62	
	II	7.51	17.53	8.05	10.92	13.63	14.45	13.99	12.18	12.03	14.10	12.57	11.55	10.29	9.24	
	III	7.32	16.90	7.93	8.36	12.58	13.28	13.55	11.15	11.38	12.76	11.73	10.11	9.71	8.60	
Annual Flow (MCM)		9737.7	12389.2	8718.02	14520.95	20646.03	17376.86	18203.59	22438.37	27247.38	26678.99	23124.5	26984.02	13776.01	10011.12	

10 Daily discharge measured by HPSEB

Annexure-6.2
Page 1 of 1

MONTH	PERIOD	1995	1996	1997	1998	2003	2004
JAN	I	NA	NA	NA	3.25	4.35	3.58
	II	NA	NA	NA	3.09	4.25	3.56
	III	NA	NA	NA	3.09	3.99	3.77
FEB	I	NA	2.51	NA	2.75	3.40	3.51
	II	NA	2.47	NA	2.60	3.47	3.45
	III	NA	2.30	NA	2.67	3.51	3.55
MAR	I	NA	2.32	2.03	2.70	3.76	3.58
	II	NA	2.48	2.34	2.85	4.19	3.84
	III	NA	2.95	2.66	2.80	5.28	3.63
APR	I	NA	NA	2.95	2.87	5.22	4.70
	II	NA	NA	2.86	3.19	9.06	4.62
	III	NA	NA	3.06	3.80	16.65	6.21
MAY	I	NA	NA	3.50	9.37	20.11	5.02
	II	NA	NA	3.57	15.17	30.73	10.67
	III	NA	NA	5.09	28.29	53.01	9.04
JUN	I	NA	NA	6.39	26.49	40.33	10.70
	II	NA	NA	10.65	18.86	31.32	18.56
	III	NA	NA	16.88	34.39	36.89	17.03
JUL	I	15.90	NA	26.53	36.03	51.72	13.16
	II	18.05	NA	33.33	37.83	42.17	8.42
	III	21.91	NA	36.45	30.95	42.05	9.59
AUG	I	19.18	NA	31.67	30.80	39.61	10.90
	II	16.42	NA	22.89	29.55	25.51	11.25
	III	15.30	NA	19.05	24.82	16.70	7.80
SEP	I	14.73	NA	16.41	24.47	14.19	4.97
	II	8.30	NA	15.92	14.53	10.54	5.04
	III	5.70	NA	11.93	12.85	7.60	3.74
OCT	I	5.22	NA	8.82	7.56	6.88	3.64
	II	4.19	NA	7.07	5.44	6.59	3.43
	III	3.39	NA	6.11	5.51	5.64	3.24
NOV	I	2.95	NA	5.35	4.55	5.20	3.17
	II	2.69	NA	4.30	4.29	4.91	3.08
	III	2.35	NA	3.69	4.04	4.61	3.26
DEC	I	2.72	NA	3.46	3.78	4.30	
	II	2.74	NA	3.60	3.50	3.90	
	III	2.55	NA	3.31	NA	3.70	

Measured Daily Discharge Values

Annexure-6.3
Sheet 1 of 2

(Average of 3 daily readings measured at G&D site of Tidong khad)

By Nuziveedu Seeds Ltd

	Discharge in Cumecs											Year (2004-2005)	
Date	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	3.89	4.71	4.92	4.55	5.67	9.26	10.12	65.44	63.29	36.19	15.65		4.90
2	6.41	5.19	4.97	4.45	5.09	9.74	10.47	61.75	67.19	38.61	14.62		4.82
3	6.30	4.55	4.67	4.62	5.40	9.75	11.71	58.35	65.28	38.26	13.44		
4	6.53	4.57	4.83	4.92	4.82	9.70	11.68	64.22	64.61	33.78	13.18		
5	5.06	4.34	4.54	4.90	5.76	9.83	12.08	53.30	60.91	35.81	12.07		
6	4.94	4.34	4.82	5.00	5.04	10.81	12.13	49.87	57.87	35.35	10.76		
7	4.81	4.54	4.85	4.89	5.27	11.22	13.71	55.44	51.03	28.94	10.14		
8	4.77	4.54	4.82	5.11	5.02	11.66	11.61	53.69	57.49	23.92	8.94		
9	5.21	4.32	4.80	4.72	5.39	13.43	13.88	60.06	38.30	23.02	8.52		5.53
10	5.33	4.18	4.69	5.09	4.60	11.90	14.16	58.64	55.02	20.65	8.65		5.28
11	5.52	4.44	4.53	5.02	5.23	11.23	15.62	61.62	58.72	21.64			5.58
12	5.71	5.32	4.92	4.95	4.74	10.87	16.84	60.56	50.79	20.55			5.42
13	5.57	5.85	4.91	5.22	5.58	11.01	18.59	56.81	50.48	19.57			5.89
14	6.12	5.46	4.82	5.59	6.59	11.00	22.72	58.86	53.32	20.36			5.59
15	5.24	5.58	5.04	5.60	6.45	10.56	23.30	65.87	54.46	19.27		6.45	5.86
16	4.87	5.78	5.13	6.66	6.35	10.78	26.75	65.77	51.72	19.69		6.55	
17	5.15	5.86	4.91	6.47	6.16	10.51	25.73	63.35	50.07	26.81		6.67	
18	5.40	5.42	4.94	6.30	5.89	10.08	27.89	60.43	52.47	19.44		6.13	
19	5.60	5.59	5.13	5.50	5.86	11.70	27.48	67.61	50.69	19.70		6.15	
20	5.60	4.79	4.98	5.37	6.62	11.04	34.42	61.09	52.17	18.41		6.16	
21	5.97	4.50	4.72	5.89	8.21	9.94	29.91	63.46	51.72	17.08		5.98	6.54
22	5.79	4.51	4.85	5.86	8.51	8.96	33.93	63.59	54.06	20.51		5.58	6.30
23	5.94	4.74	4.81	5.22	7.51	10.14	33.86	58.03	46.84	20.18		5.78	5.90
24	6.06	4.60	4.99	5.37	7.87	10.12	39.55	61.69	50.94	19.95		5.21	6.01
25	5.35	4.63	4.93	5.10	6.51	10.29	43.97	62.44	53.91	20.16		4.90	6.13
26	5.09	4.69	4.86	5.40	8.08	11.07	45.10	54.41	50.31	19.84		5.09	6.70
27	5.39	4.54	4.36	4.96	8.40	11.90	44.19	56.00	48.00	17.35		4.97	6.57
28	5.46	4.48	4.49	5.13	7.08	12.24	47.31	59.78	41.93	17.73		5.07	6.60
29	4.91	4.69		5.07	7.86	11.96	51.88	67.00	39.10	15.06		4.90	6.75
30	4.97	4.69		4.78	9.34	11.73	62.50	62.52	37.28	15.84		4.96	7.10
31	5.42	4.59		5.38		9.46		61.74	39.88				6.95

Measured Daily Discharge Values

Annexure-6.3
Sheet 2 of 2

(Average of 10 daily discharge measured at G&D site of Tidong khad)

By Nuziveedu Seeds Ltd

MONTH/PERIOD		2004	2005
JAN	**I**	-	4.53
	II	-	5.41
	III	-	4.61
FEB	**I**	-	4.79
	II	-	4.93
	III	-	4.75
MAR	**I**	-	4.82
	II	-	5.67
	III	-	5.29
APR	**I**	-	5.21
	II	-	5.95
	III	-	7.94
MAY	**I**	-	10.73
	II	-	10.88
	III	-	10.71
JUN	**I**	-	12.15
	II	-	23.93
	III	-	43.22
JUL	**I**	-	58.08
	II	-	62.20
	III	-	60.97
AUG	**I**	-	58.10
	II	-	52.49
	III	-	46.73
SEP	**I**	-	31.45
	II	-	20.54
	III	-	18.37
OCT	**I**	-	11.60
	II	-	NA
	III	-	NA
NOV	**I**	-	NA
	II	-	NA
	III	-	5.24
DEC	**I**	5.33	NA
	II	5.48	NA
	III	5.49	6.51

Methodology-1

Equation **Y=** 0.2888 X + 2.8624

10 DAILY DISCHARGE DATA OF TIDONG DERIVED FROM
LONG TERM DATA OF BASPA AT SANGLA

Annexure-6.4

MONTH	PERIOD	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
JAN	I	6.33	6.50	5.37	5.37	5.78	5.57	5.70	5.35	5.22	5.20	5.14	4.65	4.61	5.35
	II	4.25	6.07	5.49	5.32	5.81	5.36	5.70	5.35	5.21	5.14	5.25	4.60	4.56	5.06
	III	8.18	5.69	5.52	5.29	5.66	5.35	5.74	5.40	5.42	5.11	5.14	4.56	4.57	4.73
FEB	I	8.18	5.29	5.37	5.23	5.58	5.28	5.47	5.31	5.14	5.13	5.14	4.54	4.53	4.70
	II	8.38	5.00	5.46	5.37	5.58	5.21	5.37	5.27	5.14	5.14	5.14	4.55	4.55	4.68
	III	7.89	5.03	5.46	5.40	5.72	5.12	5.33	5.28	4.68	4.91	5.30	4.58	4.56	4.68
MAR	I	6.65	5.17	5.46	5.40	5.72	4.99	5.46	5.26	5.17	4.86	5.02	4.53	4.45	4.68
	II	5.92	5.17	5.46	5.35	5.72	5.15	5.76	5.29	5.12	4.81	5.14	4.52	4.44	4.69
	III	7.40	5.17	4.80	5.23	5.78	5.20	6.57	5.35	5.12	4.90	5.22	4.49	4.41	4.83
APR	I	7.11	6.01	5.03	5.32	5.75	5.36	6.04	5.44	5.14	5.19	5.42	4.54	4.52	5.11
	II	9.19	6.50	5.52	8.21	5.87	5.41	6.50	6.58	5.64	4.99	7.06	4.95	4.84	5.07
	III	8.78	8.29	6.99	10.00	6.82	6.45	7.65	6.60	6.16	6.20	8.86	5.05	6.32	5.46
MAY	I	9.97	9.19	12.74	11.93	7.48	9.68	12.98	8.13	7.06	6.52	10.42	6.07	7.66	6.10
	II	13.98	9.59	13.49	11.80	7.37	14.52	17.74	17.09	11.03	6.30	13.74	8.92	19.24	7.97
	III	23.60	8.35	14.39	14.85	10.02	14.85	26.33	16.20	8.74	9.01	14.78	16.15	18.45	9.41
JUN	I	32.70	10.63	21.89	15.19	15.11	20.14	37.50	19.28	9.61	17.37	14.85	28.79	22.80	17.86
	II	31.14	22.99	25.97	16.28	31.74	18.24	31.19	29.47	17.55	15.25	15.97	18.65	23.69	23.12
	III	49.16	44.33	36.57	24.87	24.87	28.20	30.67	33.31	25.64	17.81	30.46	17.00	42.73	27.32
JUL	I	63.22	38.50	37.09	23.68	35.44	29.66	30.54	33.89	27.22	24.82	26.75	22.33	42.97	30.34
	II	47.89	39.40	35.18	29.06	43.12	21.87	26.33	37.67	29.37	25.30	25.04	35.49	40.12	30.84
	III	46.21	27.24	33.07	43.38	43.50	39.71	32.14	37.76	32.71	31.55	33.93	38.00	38.24	29.86
AUG	I	46.24	29.37	33.07	36.51	40.61	37.88	31.36	35.48	32.16	28.15	27.74	32.78	30.67	25.62
	II	47.89	25.97	4.90	25.16	29.23	36.47	29.02	41.84	30.49	26.09	24.76	28.87	29.39	19.26
	III	45.29	21.00	21.43	17.22	15.60	35.60	29.23	35.19	22.33	25.75	24.12	29.05	28.53	16.62
SEP	I	37.17	19.70	18.37	15.22	10.66	28.61	17.37	25.71	19.70	19.81	15.25	22.48	24.68	11.14
	II	29.96	14.33	13.58	12.71	10.89	21.46	15.56	20.74	12.67	15.84	13.01	15.75	18.43	9.55
	III	25.59	9.56	11.50	10.89	8.55	14.40	8.52	14.74	11.22	14.10	9.61	11.32	15.94	7.12
OCT	I	23.01	7.66	9.53	8.78	7.22	11.55	7.57	12.03	8.65	10.44	5.71	8.64	12.62	5.84
	II	21.20	7.37	7.92	8.15	7.71	10.22	7.49	10.03	7.49	8.25	5.27	7.63	9.80	5.60
	III	19.01	6.39	7.31	7.48	7.60	9.00	7.12	8.93	6.72	7.41	5.31	6.68	8.74	5.47
NOV	I	9.85	5.81	6.18	7.14	7.25	8.10	6.67	7.93	6.23	6.80	5.05	5.85	8.29	5.34
	II	9.33	5.81	5.84	6.70	6.62	7.63	6.26	7.30	6.06	6.41	4.96	5.36	7.92	5.32
	III	8.98	5.89	5.78	6.56	6.36	7.16	5.96	7.04	5.87	5.95	4.79	5.14	7.97	5.20
DEC	I	8.81	5.87	5.58	6.18	6.21	6.53	6.30	6.65	5.74	5.75	4.75	4.92	5.46	5.09
	II	8.87	5.92	5.52	5.95	6.01	6.15	6.24	6.20	5.54	5.65	4.69	4.77	5.44	5.03
	III	6.99	5.46	5.40	5.81	6.04	6.15	6.04	6.22	5.35	5.59	4.67	4.73	5.39	4.98
Annual Run-off		754.29	456.22	458.23	443.00	465.00	508.23	507.40	545.28	418.32	407.52	413.51	440.91	531.52	379.05
Average Flow		20.95	12.67	12.73	12.31	12.92	14.12	14.09	15.15	11.62	11.32	11.49	12.25	14.76	10.53

Annexure-6.4

MONTH	PERIOD	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
JAN	I	4.94	6.82	5.08	6.31	6.20	6.34	5.90	5.85	5.93	6.11	6.05		5.46	5.14
	II	4.93	5.87	5.00	6.15	5.81	6.10	5.74	5.64	5.83	5.83	5.81		5.25	5.11
	III	4.94	5.62	4.96	5.99	5.39	5.89	5.66	5.62	5.78	5.72	5.66		5.00	5.11
FEB	I	4.94	5.48	4.77	5.80	5.76	5.80	5.68	5.75	5.72	5.63	5.47		4.99	4.90
	II	4.94	5.35	4.75	5.83	5.89	5.81	5.71	5.92	5.67	5.65	5.31		5.00	5.08
	III	4.92	5.16	4.75	5.92	5.87	5.82	5.76	6.37	5.74	5.75	5.25		5.11	4.90
MAR	I	4.94	5.22	4.75	6.01	5.93	6.13	6.06	6.71	5.85	5.90	5.55		5.27	4.87
	II	4.92	5.20	4.77	6.08	6.09	6.24	6.16	6.78	6.05	6.10	5.74		5.64	5.04
	III	4.94	5.25	4.88	6.57	6.78	6.43	6.17	7.28	6.30	6.81	6.66		5.81	5.01
APR	I	4.94	5.33	4.92	6.57	6.74	6.64	6.44	7.94	6.85	7.71	8.41		6.05	5.13
	II	5.12	5.69	4.92	6.80	8.40	7.14	6.98	9.29	8.79	8.56	9.92		6.59	5.96
	III	5.64	10.52	5.02	7.84	11.24	7.78	9.42	13.37	11.68	10.97	11.73		7.27	8.48
MAY	I	5.97	17.68	5.63	13.14	13.65	9.68	10.55	13.60	15.98	17.50	19.31		7.09	11.23
	II	6.82	12.69	6.81	29.78	14.12	11.90	14.67	18.88	26.10	25.22	50.65		11.25	10.99
	III	6.66	15.20	12.17	26.20	25.77	16.15	34.19	25.26	36.91	26.89	47.51		14.07	9.30
JUN	I	12.34	11.32	28.94	39.57	34.63	25.31	37.23	19.28	43.26	35.23	50.90	36.42	12.48	
	II	13.35	15.32	31.94	46.89	47.53	36.99	29.99	42.36	49.58	45.19	55.84	38.88	20.93	
	III	20.96	13.22	33.01	30.79	55.48	46.77	50.13	53.38	51.85	48.04	58.38	32.12	19.25	
JUL	I	18.25	20.80	35.92	45.23	29.07	46.22	59.70	70.18	56.04	56.88	60.16	38.12	24.93	
	II	31.25	24.17	38.98	59.17	39.04	53.81	50.53	72.68	64.27	60.09	57.60	42.54	23.32	
	III	33.76	16.29	45.43	54.59	45.62	48.59	48.15	70.29	63.05	61.57	50.76	46.08	22.10	
AUG	I	34.17	18.53	34.77	46.13	34.77	42.76	52.54	71.43	58.63	54.02	48.78	40.00	25.92	
	II	29.26	15.12	30.27	44.85	30.73	37.62	48.64	62.13	53.90	50.49	54.69	30.88	25.54	
	III	28.55	14.87	21.99	37.15	21.35	32.19	34.92	64.99	51.80	45.22	49.28	29.93	18.77	
SEP	I	25.88	13.26	25.68	32.22	20.32	23.64	32.74	57.43	45.21	35.67	38.87	21.72	13.74	
	II	18.91	11.89	20.58	18.57	14.28	22.39	27.46	33.27	31.26	20.70	33.33	18.14	14.64	
	III	15.66	8.06	15.27	12.69	12.53	15.06	31.97	31.85	24.03	14.93	24.30	15.83	8.91	
OCT	I	14.73	6.49	12.25	10.76	10.80	11.55	20.86	18.00	17.06	13.59	17.54	9.64	8.05	
	II	12.25	6.23	9.51	9.97	9.53	9.36	17.11	10.37	10.84	12.02	13.83	7.73	7.18	
	III	11.06	5.82	7.91	9.23	9.49	8.17	14.20	9.37	8.67	10.11	10.94	6.79	6.59	
NOV	I	10.42	5.59	7.30	8.58	8.98	7.39	11.63	8.32	8.02	8.61	9.06	6.28	6.28	
	II	9.52	5.50	7.06	8.15	8.47	6.95	9.27	7.66	7.67	7.92	8.22	5.95	6.01	
	III	9.07	5.33	6.61	7.38	7.53	10.29	7.43	7.25	7.42	6.96	6.97	5.81	5.62	
DEC	I	8.66	5.22	6.61	7.10	7.53	6.37	6.69	6.79	7.16	6.88	6.70	5.91	5.64	
	II	7.93	5.19	6.02	6.80	7.04	6.90	6.38	6.34	6.93	6.49	6.20	5.83	5.53	
	III	7.74	5.15	5.28	6.50	6.70	6.78	6.08	6.15	6.55	6.25	5.78	5.67	5.35	
Annual Run-off		453.29	350.46	514.53	687.29	595.08	618.94	738.71	873.76	832.35	757.21	867.17	450.26	386.63	96.24
Average Flow		12.59	9.74	14.29	19.09	16.53	17.19	20.52	24.27	23.12	21.03	24.09	21.44	10.74	6.42

Annexure-6.5
Page 1 of 1

Year	Annual inflow (MCM)	Rank	% Dependability
1999	873.761	1	4%
2002	867.166	2	7%
2000	832.347	3	11%
2001	757.207	4	15%
1978	754.290	5	19%
1998	738.713	6	22%
1995	687.295	7	26%
1997	618.941	8	30%
1996	595.084	9	33%
1985	545.277	10	37%
1990	531.525	11	41%
1994	514.532	12	44%
1983	508.227	13	48%
1984	507.404	14	52%
1982	464.999	15	56%
1980	458.230	16	59%
1979	456.220	17	63%
1992	453.291	18	67%
1981	442.996	19	70%
1989	440.914	20	74%
1986	418.321	21	78%
1988	413.506	22	81%
1987	407.517	23	85%
2004	386.630	24	89%
1991	379.050	25	93%
1993	350.464	26	96%

Methodology-2

Regression analysis of Baspa at Sangla and Tidong discharge measured by NSL From Dec04 to May05. **Annexure-6.6**
Dependable year calculation based on 10 daily discharge values. Page 1 of 3

		January			February			March			April		
n	Dependability	I	II	III	I	II	III	I	II	III	I	II	III
1	4%	6.31	6.15	8.18	8.18	8.38	7.89	6.71	6.78	7.40	8.41	9.92	13.37
2	7%	6.82	6.10	5.99	5.80	5.92	6.37	6.65	6.24	7.28	7.94	9.29	11.73
3	11%	6.50	6.07	5.89	5.80	5.89	5.92	6.13	6.16	6.81	7.71	9.19	11.68
4	15%	6.34	5.87	5.78	5.76	5.83	5.87	6.06	6.10	6.78	7.11	8.79	11.24
5	19%	6.33	5.83	5.74	5.75	5.81	5.82	6.01	6.09	6.66	6.85	8.56	10.97
6	22%	6.20	5.83	5.72	5.72	5.71	5.76	5.93	6.08	6.57	6.74	8.40	10.52
7	26%	6.11	5.81	5.69	5.68	5.67	5.75	5.90	6.05	6.57	6.64	8.21	10.00
8	30%	6.05	5.81	5.66	5.63	5.65	5.74	5.85	5.92	6.43	6.57	7.14	9.42
9	33%	5.93	5.81	5.66	5.58	5.58	5.72	5.72	5.76	6.30	6.44	7.06	8.86
10	37%	5.90	5.74	5.66	5.48	5.46	5.46	5.55	5.74	6.17	6.05	6.98	8.78
11	41%	5.85	5.70	5.62	5.47	5.37	5.40	5.46	5.72	5.81	6.04	6.80	8.29
12	44%	5.78	5.64	5.62	5.47	5.37	5.33	5.46	5.64	5.78	6.01	6.59	7.84
13	48%	5.70	5.49	5.52	5.37	5.35	5.30	5.40	5.46	5.35	5.75	6.58	7.78
14	52%	5.57	5.36	5.42	5.31	5.31	5.28	5.27	5.35	5.25	5.44	6.50	7.65
15	56%	5.46	5.35	5.40	5.29	5.27	5.25	5.26	5.29	5.23	5.42	6.50	7.27
16	59%	5.37	5.32	5.39	5.28	5.21	5.16	5.22	5.20	5.22	5.36	5.87	6.99
17	63%	5.37	5.25	5.35	5.23	5.14	5.12	5.17	5.17	5.20	5.33	5.69	6.82
18	67%	5.35	5.25	5.29	5.14	5.14	5.11	5.17	5.15	5.17	5.32	5.64	6.60
19	70%	5.35	5.21	5.14	5.14	5.14	5.03	5.02	5.14	5.12	5.19	5.52	6.45
20	74%	5.22	5.14	5.11	5.13	5.00	4.92	4.99	5.12	4.94	5.14	5.41	6.32
21	78%	5.20	5.06	5.00	4.99	5.00	4.91	4.94	4.92	4.90	5.11	5.12	6.20
22	81%	5.14	5.00	4.96	4.94	4.94	4.75	4.86	4.81	4.88	5.03	5.07	6.16
23	85%	5.08	4.93	4.94	4.77	4.75	4.68	4.75	4.77	4.83	4.94	4.99	5.64
24	89%	4.94	4.60	4.73	4.70	4.68	4.68	4.68	4.69	4.80	4.92	4.95	5.46
25	93%	4.65	4.56	4.57	4.54	4.55	4.58	4.53	4.52	4.49	4.54	4.92	5.05
26	96%	4.61	4.25	4.56	4.53	4.55	4.56	4.45	4.44	4.41	4.52	4.84	5.02

Annexure-6.6

n	Dependability	May			June			July			August		
		I	II	III	I	II	III	I	II	III	I	II	III
1	4%	19.31	50.65	47.51	50.90	55.84	58.38	70.18	72.68	70.29	71.43	62.13	64.99
2	7%	17.68	29.78	36.91	43.26	49.58	55.48	63.22	64.27	63.05	58.63	54.69	51.80
3	11%	17.50	26.10	34.19	39.57	47.53	53.38	60.16	60.09	61.57	54.02	53.90	49.28
4	15%	15.98	25.22	26.89	37.50	46.89	51.85	59.70	59.17	54.59	52.54	50.49	45.29
5	19%	13.65	19.24	26.33	37.23	45.19	50.13	56.88	57.60	50.76	48.78	48.64	45.22
6	22%	13.60	18.88	26.20	35.23	42.36	49.16	56.04	53.81	48.59	46.24	47.89	37.15
7	26%	13.14	17.74	25.77	34.63	36.99	48.04	46.22	50.53	48.15	46.13	44.85	35.60
8	30%	12.98	17.09	25.26	32.70	31.94	46.77	45.23	47.89	46.21	42.76	41.84	35.19
9	33%	12.74	14.67	23.60	28.94	31.74	44.33	42.97	43.12	45.62	40.61	37.62	34.92
10	37%	11.93	14.52	18.45	28.79	31.19	42.73	38.50	40.12	45.43	37.88	36.47	32.19
11	41%	10.55	14.12	16.20	25.31	31.14	36.57	37.09	39.40	43.50	36.51	30.73	29.23
12	44%	10.42	13.98	16.15	22.80	29.99	33.31	35.92	39.04	43.38	35.48	30.49	29.05
13	48%	9.97	13.74	16.15	21.89	29.47	33.01	35.44	38.98	39.71	34.77	30.27	28.55
14	52%	9.68	13.49	15.20	20.14	25.97	30.79	33.89	37.67	38.24	34.77	29.39	28.53
15	56%	9.68	12.69	14.85	19.28	23.69	30.67	30.54	35.49	38.00	34.17	29.26	25.75
16	59%	9.19	11.90	14.85	19.28	23.12	30.46	30.34	35.18	37.76	33.07	29.23	24.12
17	63%	8.13	11.80	14.78	17.86	22.99	28.20	29.66	31.25	33.93	32.78	29.02	22.33
18	67%	7.66	11.25	14.39	17.37	20.93	27.32	29.07	30.84	33.76	32.16	28.87	21.99
19	70%	7.48	11.03	14.07	15.19	18.65	25.64	27.22	29.37	33.07	31.36	26.09	21.43
20	74%	7.09	9.59	12.17	15.11	18.24	24.87	26.75	29.06	32.71	30.67	25.97	21.35
21	78%	7.06	8.92	10.02	14.85	17.55	24.87	24.93	26.33	32.14	29.37	25.54	21.00
22	81%	6.52	7.97	9.41	12.48	16.28	20.96	24.82	25.30	31.55	28.15	25.16	18.77
23	85%	6.10	7.37	9.01	12.34	15.97	19.25	23.68	25.04	29.86	27.74	24.76	17.22
24	89%	6.07	6.82	8.74	11.32	15.32	17.81	22.33	24.17	27.24	25.92	19.26	16.62
25	93%	5.97	6.81	8.35	10.63	15.25	17.00	20.80	23.32	22.10	25.62	15.12	15.60
26	96%	5.63	6.30	6.66	9.61	13.35	13.22	18.25	21.87	16.29	18.53	4.90	14.87

Annexure-6.6
Page 3 of 3

n	Dependability	September			October			November			December		
		I	II	III	I	II	III	I	II	III	I	II	III
1	4%	57.43	33.33	31.97	23.01	21.20	19.01	11.63	9.52	10.29	8.81	8.87	7.74
2	7%	45.21	33.27	31.85	20.86	17.11	14.20	10.42	9.33	9.07	8.66	7.93	6.99
3	11%	38.87	31.26	25.59	18.00	13.83	11.06	9.85	9.27	8.98	7.53	7.04	6.78
4	15%	37.17	29.96	24.30	17.54	12.25	10.94	9.06	8.47	7.97	7.16	6.93	6.70
5	19%	35.67	27.46	24.03	17.06	12.02	10.11	8.98	8.22	7.53	7.10	6.90	6.55
6	22%	32.74	22.39	15.94	14.73	10.84	9.49	8.61	8.15	7.43	6.88	6.80	6.50
7	26%	32.22	21.46	15.66	13.59	10.37	9.37	8.58	7.92	7.42	6.79	6.49	6.25
8	30%	28.61	20.74	15.27	12.62	10.22	9.23	8.32	7.92	7.38	6.70	6.38	6.22
9	33%	25.88	20.70	15.06	12.25	10.03	9.00	8.29	7.67	7.25	6.69	6.34	6.15
10	37%	25.71	20.58	14.93	12.03	9.97	8.93	8.10	7.66	7.16	6.65	6.24	6.15
11	41%	25.68	18.91	14.74	11.55	9.80	8.74	8.02	7.63	7.04	6.61	6.20	6.08
12	44%	24.68	18.57	14.40	11.55	9.53	8.67	7.93	7.30	6.97	6.53	6.20	6.04
13	48%	23.64	18.43	14.10	10.80	9.51	8.17	7.39	7.06	6.96	6.37	6.15	6.04
14	52%	22.48	15.84	12.69	10.76	9.36	7.91	7.30	6.95	6.61	6.30	6.02	5.81
15	56%	20.32	15.75	12.53	10.44	8.25	7.60	7.25	6.70	6.56	6.21	6.01	5.78
16	59%	19.81	15.56	11.50	9.53	8.15	7.48	7.14	6.62	6.36	6.18	5.95	5.59
17	63%	19.70	14.64	11.32	8.78	7.92	7.41	6.80	6.41	5.96	5.87	5.92	5.46
18	67%	19.70	14.33	11.22	8.65	7.71	7.31	6.67	6.26	5.95	5.75	5.65	5.40
19	70%	18.37	14.28	10.89	8.64	7.63	7.12	6.28	6.06	5.89	5.74	5.54	5.39
20	74%	17.37	13.58	9.61	8.05	7.49	6.72	6.23	6.01	5.87	5.64	5.53	5.35
21	78%	15.25	13.01	9.56	7.66	7.49	6.68	6.18	5.84	5.78	5.58	5.52	5.35
22	81%	15.22	12.71	8.91	7.57	7.37	6.59	5.85	5.81	5.62	5.46	5.44	5.28
23	85%	13.74	12.67	8.55	7.22	7.18	6.39	5.81	5.50	5.33	5.22	5.19	5.15
24	89%	13.26	11.89	8.52	6.49	6.23	5.82	5.59	5.36	5.20	5.09	5.03	4.98
25	93%	11.14	10.89	8.06	5.84	5.60	5.47	5.34	5.32	5.14	4.92	4.77	4.73
26	96%	10.66	9.55	7.12	5.71	5.27	5.31	5.05	4.96	4.79	4.75	4.69	4.67

Methodology-3

	Dec to May	0.2888 X + 2.8624
Equation	June to Nov	**Y=** 0.208 X -1.7204

10 DAILY DISCHARGE DATA OF TIDONG DERIVED FROM LONG TERM DATA OF BASPA AT SANGLA

Annexure-6.7

MONTH	PERIOD	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
JAN	I	6.33	6.50	5.37	5.37	5.78	5.57	5.70	5.35	5.22	5.20	5.14	4.65	4.61	5.35	4.94
	II	4.25	6.07	5.49	5.32	5.81	5.36	5.70	5.35	5.21	5.14	5.25	4.60	4.56	5.06	4.93
	III	8.18	5.69	5.52	5.29	5.66	5.35	5.74	5.40	5.42	5.11	5.14	4.56	4.57	4.73	4.94
FEB	I	8.18	5.29	5.37	5.23	5.58	5.28	5.47	5.31	5.14	5.13	5.14	4.54	4.53	4.70	4.94
	II	8.38	5.00	5.46	5.37	5.58	5.21	5.37	5.27	5.14	5.14	5.14	4.55	4.55	4.68	4.94
	III	7.89	5.03	5.46	5.40	5.72	5.12	5.33	5.28	4.68	4.91	5.30	4.58	4.56	4.68	4.92
MAR	I	6.65	5.17	5.46	5.40	5.72	4.99	5.46	5.26	5.17	4.86	5.02	4.53	4.45	4.68	4.94
	II	5.92	5.17	5.46	5.35	5.72	5.15	5.76	5.29	5.12	4.81	5.14	4.52	4.44	4.69	4.92
	III	7.40	5.17	4.80	5.23	5.78	5.20	6.57	5.35	5.12	4.90	5.22	4.49	4.41	4.83	4.94
APR	I	7.11	6.01	5.03	5.32	5.75	5.36	6.04	5.44	5.14	5.19	5.42	4.54	4.52	5.11	4.94
	II	9.19	6.50	5.52	8.21	5.87	5.41	6.50	6.58	5.64	4.99	7.06	4.95	4.84	5.07	5.12
	III	8.78	8.29	6.99	10.00	6.82	6.45	7.65	6.60	6.16	6.20	8.86	5.05	6.32	5.46	5.64
MAY	I	9.97	9.19	12.74	11.93	7.48	9.68	12.98	8.13	7.06	6.52	10.42	6.07	7.66	6.10	5.97
	II	13.98	9.59	13.49	11.80	7.37	14.52	17.74	17.09	11.03	6.30	13.74	8.92	19.24	7.97	6.82
	III	23.60	8.35	14.39	14.85	10.02	14.85	26.33	16.20	8.74	9.01	14.78	16.15	18.45	9.41	6.66
JUN	I	19.77	3.87	11.99	7.16	7.10	10.72	23.22	10.10	3.14	8.73	6.91	16.95	12.64	9.08	5.10
	II	18.64	12.78	14.92	7.94	19.08	9.35	18.68	17.44	8.86	7.20	7.72	9.65	13.28	12.87	5.83
	III	31.62	28.15	22.55	14.13	14.13	16.53	18.31	20.21	14.68	9.04	18.16	8.46	26.99	15.89	11.31
JUL	I	41.75	23.95	22.93	13.28	21.74	17.58	18.21	20.63	15.82	14.09	15.49	12.30	27.17	18.07	9.36
	II	30.71	24.59	21.55	17.15	27.27	11.97	15.18	23.35	17.37	14.44	14.25	21.78	25.11	18.43	18.73
	III	29.50	15.83	20.04	27.46	27.55	24.82	19.37	23.41	19.77	18.94	20.65	23.58	23.76	17.73	20.53
AUG	I	29.52	17.37	20.04	22.51	25.47	23.50	18.80	21.77	19.38	16.49	16.19	19.83	18.30	14.67	20.83
	II	30.71	14.92	-0.25	14.34	17.27	22.48	17.12	26.36	18.17	15.01	14.05	17.01	17.39	10.09	17.29
	III	28.83	11.34	11.65	8.62	7.45	21.86	17.27	21.56	12.30	14.77	13.59	17.14	16.76	8.18	16.78
SEP	I	22.99	10.41	9.45	7.18	3.90	16.82	8.73	14.73	10.40	10.49	7.20	12.41	13.99	4.24	14.86
	II	17.80	6.54	6.00	5.37	4.06	11.68	7.43	11.16	5.34	7.63	5.59	7.56	9.49	3.09	9.84
	III	14.65	3.11	4.50	4.06	2.38	6.59	2.35	6.83	4.30	6.37	3.14	4.37	7.70	1.35	7.50
OCT	I	12.79	1.73	3.08	2.54	1.42	4.54	1.67	4.88	2.45	3.74	0.33	2.44	5.31	0.42	6.83
	II	11.49	1.52	1.92	2.09	1.77	3.58	1.61	3.44	1.62	2.16	0.01	1.71	3.28	0.25	5.04
	III	9.91	0.82	1.48	1.61	1.69	2.70	1.35	2.65	1.06	1.55	0.04	1.03	2.51	0.16	4.18
NOV	I	3.31	0.40	0.67	1.36	1.44	2.05	1.02	1.93	0.70	1.11	-0.15	0.43	2.19	0.07	3.72
	II	2.94	0.40	0.42	1.05	0.98	1.71	0.72	1.48	0.58	0.83	-0.21	0.08	1.92	0.05	3.07
	III	2.69	0.46	0.38	0.94	0.80	1.38	0.51	1.29	0.44	0.50	-0.33	-0.08	1.95	-0.04	2.75
DEC	I	8.81	5.87	5.58	6.18	6.21	6.53	6.30	6.65	5.74	5.75	4.75	4.92	5.46	5.09	8.66
	II	8.87	5.92	5.52	5.95	6.01	6.15	6.24	6.20	5.54	5.65	4.69	4.77	5.44	5.03	7.93
	III	6.99	5.46	5.40	5.81	6.04	6.15	6.04	6.22	5.35	5.59	4.67	4.73	5.39	4.98	7.74
Annual Run-off		5299.37	2967.38	3016.17	2926.00	3036.96	3392.54	3456.78	3671.84	2678.80	2585.23	2689.22	2840.21	3544.29	2363.06	2930.56
Average Flow		14.45	8.12	8.23	7.97	8.29	9.23	9.40	10.00	7.31	7.04	7.32	7.72	9.66	6.45	7.99

Annexure-6.7

MONTH	PERIOD	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
JAN	I	6.82	5.08	6.31	6.20	6.34	5.90	5.85	5.93	6.11	6.05		5.46	5.14
	II	5.87	5.00	6.15	5.81	6.10	5.74	5.64	5.83	5.83	5.81		5.25	5.11
	III	5.62	4.96	5.99	5.39	5.89	5.66	5.62	5.78	5.72	5.66		5.00	5.11
FEB	I	5.48	4.77	5.80	5.76	5.80	5.68	5.75	5.72	5.63	5.47		4.99	4.90
	II	5.35	4.75	5.83	5.89	5.81	5.71	5.92	5.67	5.65	5.31		5.00	5.08
	III	5.16	4.75	5.92	5.87	5.82	5.76	6.37	5.74	5.75	5.25		5.11	4.90
MAR	I	5.22	4.75	6.01	5.93	6.13	6.06	6.71	5.85	5.90	5.55		5.27	4.87
	II	5.20	4.77	6.08	6.09	6.24	6.16	6.78	6.05	6.10	5.74		5.64	5.04
	III	5.25	4.88	6.57	6.78	6.43	6.17	7.28	6.30	6.81	6.66		5.81	5.01
APR	I	5.33	4.92	6.57	6.74	6.64	6.44	7.94	6.85	7.71	8.41		6.05	5.13
	II	5.69	4.92	6.80	8.40	7.14	6.98	9.29	8.79	8.56	9.92		6.59	5.96
	III	10.52	5.02	7.84	11.24	7.78	9.42	13.37	11.68	10.97	11.73		7.27	8.48
MAY	I	17.68	5.63	13.14	13.65	9.68	10.55	13.60	15.98	17.50	19.31		7.09	11.23
	II	12.69	6.81	29.78	14.12	11.90	14.67	18.88	26.10	25.22	50.65		11.25	10.99
	III	15.20	12.17	26.20	25.77	16.15	34.19	25.26	36.91	26.89	47.51		14.07	9.30
JUN	I	4.37	17.06	24.71	21.16	14.45	23.03	10.10	27.37	21.59	32.87	22.45	5.21	
	II	7.25	19.22	29.99	30.45	22.86	17.81	26.73	31.92	28.76	36.44	24.22	11.29	
	III	5.74	19.99	18.39	36.18	29.91	32.33	34.67	33.56	30.82	38.26	19.35	10.08	
JUL	I	11.20	22.09	28.80	17.16	29.51	39.21	46.76	36.58	37.19	39.55	23.68	14.17	
	II	13.62	24.29	38.83	24.33	34.97	32.61	48.57	42.51	39.50	37.70	26.86	13.02	
	III	7.95	28.94	35.53	29.07	31.21	30.90	46.84	41.63	40.56	32.78	29.40	12.14	
AUG	I	9.56	21.26	29.44	21.26	27.01	34.06	47.66	38.44	35.13	31.35	25.03	14.88	
	II	7.11	18.02	28.52	18.35	23.31	31.25	40.96	35.04	32.59	35.61	18.46	14.61	
	III	6.93	12.06	22.98	11.60	19.40	21.37	43.03	33.53	28.79	31.71	17.77	9.73	
SEP	I	5.77	14.71	19.42	10.85	13.25	19.80	37.58	28.78	21.91	24.21	11.86	6.11	
	II	4.78	11.04	9.59	6.51	12.35	16.00	20.18	18.73	11.12	20.22	9.28	6.76	
	III	2.02	7.22	5.36	5.24	7.06	19.24	19.16	13.52	6.97	13.72	7.62	2.64	
OCT	I	0.89	5.04	3.97	4.00	4.53	11.24	9.18	8.51	6.00	8.85	3.16	2.01	
	II	0.70	3.07	3.40	3.08	2.96	8.54	3.69	4.02	4.87	6.18	1.78	1.39	
	III	0.41	1.92	2.87	3.05	2.10	6.45	2.96	2.46	3.50	4.10	1.11	0.96	
NOV	I	0.24	1.47	2.40	2.69	1.54	4.59	2.21	1.99	2.42	2.74	0.74	0.74	
	II	0.18	1.30	2.09	2.32	1.22	2.89	1.73	1.74	1.92	2.14	0.50	0.54	
	III	0.05	0.98	1.53	1.64	3.63	1.57	1.44	1.56	1.23	1.24	0.41	0.27	
DEC	I	5.22	6.61	7.10	7.53	6.37	6.69	6.79	7.16	6.88	6.70	5.91	5.64	
	II	5.19	6.02	6.80	7.04	6.90	6.38	6.34	6.93	6.49	6.20	5.83	5.53	
	III	5.15	5.28	6.50	6.70	6.78	6.08	6.15	6.55	6.25	5.78	5.67	5.35	
Annual Run-off		2250.71	3368.57	4826.80	4115.21	4227.89	5170.41	6194.17	5938.71	5355.36	6297.60		2472.25	
Average Flow		6.15	9.19	13.14	11.22	11.53	14.09	16.86	16.16	14.58	17.15	12.43	6.75	6.42

Annexure-6.8
Page 1 of 1

Year	Annual inflow (MCM)	Rank	% Dependability
2002	617.389	1	4%
1999	606.978	2	7%
2000	581.704	3	11%
2001	524.835	4	15%
1978	520.074	5	19%
1998	507.111	6	22%
1995	473.200	7	26%
1997	415.156	8	30%
1996	403.857	9	33%
1985	360.160	10	37%
1990	347.756	11	41%
1984	338.476	12	44%
1983	332.186	13	48%
1994	330.788	14	52%
1982	298.420	15	56%
1980	296.381	16	59%
1979	292.477	17	63%
1992	287.463	18	67%
1981	286.795	19	70%
1989	277.769	20	74%
1988	263.571	21	78%
1986	263.041	22	81%
1987	253.519	23	85%
2004	242.940	24	89%
1991	232.241	25	93%
1993	221.451	26	96%

Methodology-4

10 DAILY DISCHARGE DATA OF TIDONG DERIVED FROM
LONG TERM DATA OF BASPA AT SANGLA BY AREA PROPORTIONATE METHOD

$Qt = Qb \times \text{Total Area}^{0.750} = 0.607\ Qb$

	Rain fed	Snow fed	Total
Baspa (Qb)	453.57	514.15	967.72
Tidong (Qt)	79.50	418.36	497.86
Ratio	**0.175**	**0.814**	**0.514**

Annexure-6.9

MONTH	PERIOD	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
JAN	I	7.29	7.65	5.28	5.28	6.14	5.70	5.97	5.22	4.97	4.93	4.80	3.75	3.67	5.24	4.38
	II	2.92	6.74	5.53	5.16	6.20	5.26	5.97	5.23	4.94	4.78	5.03	3.64	3.58	4.63	4.36
	III	11.18	5.95	5.59	5.10	5.89	5.24	6.06	5.33	5.37	4.73	4.80	3.57	3.60	3.92	4.37
FEB	I	11.18	5.10	5.28	4.98	5.71	5.08	5.49	5.14	4.80	4.77	4.80	3.52	3.52	3.87	4.36
	II	11.60	4.50	5.47	5.28	5.71	4.94	5.28	5.05	4.79	4.80	4.80	3.56	3.55	3.83	4.36
	III	10.57	4.56	5.47	5.35	6.01	4.75	5.18	5.08	3.83	4.31	5.13	3.61	3.58	3.83	4.34
MAR	I	7.96	4.86	5.47	5.35	6.01	4.48	5.47	5.04	4.85	4.21	4.54	3.51	3.33	3.83	4.36
	II	6.44	4.86	5.47	5.22	6.01	4.81	6.09	5.11	4.76	4.10	4.80	3.48	3.32	3.85	4.34
	III	9.54	4.86	4.07	4.98	6.14	4.91	7.81	5.24	4.75	4.28	4.97	3.42	3.26	4.15	4.37
APR	I	8.93	6.62	4.56	5.16	6.07	5.25	6.68	5.41	4.80	4.89	5.38	3.54	3.49	4.73	4.36
	II	13.30	7.65	5.59	11.24	6.32	5.35	7.65	7.81	5.85	4.48	8.84	4.39	4.17	4.63	4.76
	III	12.45	11.42	8.69	15.00	8.32	7.55	10.08	7.85	6.93	7.02	12.62	4.59	7.27	5.45	5.84
MAY	I	14.94	13.30	20.78	19.07	9.72	14.34	21.28	11.08	8.83	7.69	15.89	6.75	10.09	6.81	6.54
	II	23.39	14.15	22.35	18.80	9.48	24.52	31.28	29.94	17.17	7.23	22.89	12.74	34.44	10.75	8.32
	III	43.62	11.54	24.24	25.21	15.07	25.21	49.37	28.05	12.37	12.94	25.08	27.96	32.78	13.77	7.99
JUN	I	62.75	16.34	40.03	25.94	25.76	36.34	72.85	34.53	14.19	30.51	25.22	54.53	41.93	31.55	19.93
	II	59.47	42.34	48.60	28.22	60.75	32.34	59.59	55.96	30.90	26.07	27.58	33.20	43.81	42.62	22.06
	III	97.38	87.23	70.89	46.29	46.29	53.29	58.49	64.04	47.90	31.44	58.06	29.74	83.86	51.43	38.06
JUL	I	126.96	74.96	71.98	43.80	68.52	56.37	58.21	65.26	51.24	46.19	50.26	40.95	84.36	57.80	32.37
	II	94.70	76.84	67.97	55.10	84.68	39.98	49.36	73.21	55.76	47.19	46.65	68.62	78.37	58.84	59.72
	III	91.18	51.27	63.54	85.23	85.47	77.50	61.58	73.41	62.77	60.35	65.34	73.90	74.41	56.79	64.99
AUG	I	91.24	55.76	63.54	70.77	79.40	73.65	59.93	68.61	61.63	53.20	52.32	62.94	58.48	47.86	65.86
	II	94.70	48.60	4.29	46.90	55.46	70.69	55.02	82.00	58.10	48.86	46.06	54.71	55.81	34.50	55.52
	III	89.24	38.15	39.06	30.19	26.79	68.87	55.46	67.99	40.95	48.15	44.72	55.08	53.98	28.93	54.02
SEP	I	72.17	35.41	32.62	26.00	16.40	54.16	30.52	48.05	35.41	35.66	26.06	41.26	45.89	17.41	48.42
	II	57.00	24.12	22.54	20.71	16.89	39.13	26.71	37.61	20.63	27.30	21.35	27.11	32.75	14.06	33.76
	III	47.81	14.09	18.16	16.89	11.97	24.27	11.90	24.98	17.59	23.64	14.18	17.79	27.50	8.96	26.92
OCT	I	42.37	10.08	14.03	12.45	9.17	18.27	9.91	19.28	12.17	15.95	5.98	12.15	20.53	6.26	24.96
	II	38.57	9.48	10.63	11.12	10.21	15.47	9.73	15.08	9.74	11.33	5.06	10.02	14.59	5.75	19.75
	III	33.96	7.41	9.35	9.72	9.96	12.90	8.96	12.77	8.11	9.56	5.15	8.02	12.36	5.49	17.25
NOV	I	14.70	6.20	6.99	8.99	9.23	11.03	8.00	10.65	7.08	8.27	4.60	6.28	11.41	5.22	15.90
	II	13.61	6.20	6.26	8.08	7.90	10.02	7.14	9.34	6.73	7.45	4.40	5.26	10.64	5.17	14.00
	III	12.88	6.38	6.14	7.78	7.35	9.05	6.51	8.78	6.32	6.49	4.06	4.79	10.73	4.91	13.05
DEC	I	12.51	6.32	5.71	6.99	7.05	7.71	7.23	7.96	6.06	6.07	3.96	4.34	5.47	4.68	12.20
	II	12.64	6.44	5.59	6.50	6.62	6.92	7.11	7.01	5.63	5.87	3.85	4.02	5.42	4.56	10.65
	III	8.69	5.47	5.35	6.20	6.68	6.91	6.68	7.06	5.22	5.73	3.80	3.92	5.32	4.45	10.27
Annual Run-off		13964	7544	7611	7306	7757	8715	8691	9492	6763	6541	6674	7275	9191	5915	7522
Average Flow		38.05	20.64	20.75	19.86	21.15	23.67	23.63	25.84	18.42	17.79	18.14	19.74	25.03	16.13	20.46

Annexure-6.9

MONTH	PERIOD	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
JAN	I	8.33	4.67	7.25	7.03	7.31	6.39	6.29	6.45	6.83	6.70		5.46	4.78
	II	6.33	4.50	6.91	6.20	6.82	6.04	5.84	6.23	6.24	6.20		5.03	4.72
	III	5.81	4.40	6.58	5.32	6.37	5.88	5.80	6.13	6.01	5.89		4.49	4.72
FEB	I	5.52	4.02	6.18	6.10	6.18	5.93	6.07	6.01	5.83	5.49		4.49	4.28
	II	5.23	3.98	6.23	6.36	6.19	5.99	6.43	5.90	5.87	5.14		4.50	4.67
	III	4.83	3.98	6.42	6.32	6.22	6.09	7.38	6.04	6.08	5.02		4.74	4.28
MAR	I	4.95	3.98	6.62	6.45	6.88	6.73	8.10	6.29	6.39	5.66		5.07	4.23
	II	4.91	4.02	6.77	6.78	7.10	6.93	8.24	6.70	6.80	6.05		5.85	4.58
	III	5.03	4.25	7.81	8.25	7.50	6.95	9.29	7.22	8.30	8.00		6.20	4.51
APR	I	5.19	4.33	7.80	8.16	7.94	7.52	10.69	8.39	10.20	11.68		6.72	4.77
	II	5.95	4.33	8.29	11.65	8.99	8.67	13.52	12.47	11.99	14.84		7.83	6.52
	III	16.12	4.54	10.47	17.63	10.35	13.78	22.09	18.54	17.05	18.66		9.26	11.83
MAY	I	31.16	5.82	21.61	22.70	14.34	16.17	22.58	27.60	30.79	34.59		8.90	17.61
	II	20.68	8.31	56.63	23.67	19.00	24.84	33.68	48.87	47.02	100.52		17.64	17.09
	III	25.96	19.58	49.09	48.19	27.95	65.89	47.11	71.62	50.53	93.91		23.58	13.53
JUN	I	17.79	54.85	77.20	66.82	47.22	72.29	34.53	84.97	68.08	101.03	70.59	20.24	
	II	26.21	61.16	92.61	93.96	71.78	57.05	83.08	98.26	89.02	111.44	75.75	38.01	
	III	21.79	63.42	58.74	110.69	92.36	99.43	106.26	103.03	95.03	116.77	61.54	34.47	
JUL	I	37.72	69.53	89.12	55.13	91.20	119.54	141.59	111.85	113.63	120.52	74.17	46.42	
	II	44.81	75.97	118.44	76.09	107.16	100.27	146.86	129.17	120.38	115.14	83.47	43.04	
	III	28.24	89.54	108.80	89.93	96.19	95.26	141.82	126.59	123.49	100.75	90.90	40.47	
AUG	I	32.95	67.12	91.02	67.12	83.91	104.48	144.22	117.30	107.61	96.59	78.12	48.49	
	II	25.78	57.65	88.32	58.61	73.10	96.29	124.66	107.36	100.19	109.02	58.92	47.70	
	III	25.26	40.23	72.12	38.90	61.69	67.42	130.68	102.93	89.10	97.63	56.94	33.45	
SEP	I	21.88	47.99	61.75	36.71	43.71	62.85	114.77	89.07	69.01	75.74	39.67	22.88	
	II	18.99	37.27	33.04	24.03	41.08	51.74	63.97	59.73	37.51	64.08	32.13	24.78	
	III	10.93	26.10	20.67	20.34	25.65	61.23	60.97	44.52	25.38	45.09	27.27	12.73	
OCT	I	7.63	19.75	16.61	16.70	18.27	37.86	31.84	29.87	22.56	30.87	14.25	10.91	
	II	7.08	13.98	14.96	14.03	13.67	29.96	15.79	16.77	19.26	23.07	10.23	9.08	
	III	6.22	10.62	13.39	13.94	11.17	23.85	13.68	12.21	15.24	16.99	8.25	7.83	
NOV	I	5.73	9.33	12.02	12.88	9.51	18.44	11.48	10.85	12.09	13.04	7.18	7.18	
	II	5.55	8.82	11.12	11.80	8.60	13.47	10.09	10.11	10.63	11.27	6.49	6.61	
	III	5.18	7.89	9.49	9.81	15.62	9.60	9.22	9.58	8.63	8.64	6.21	5.80	
DEC	I	4.95	7.89	8.91	9.82	7.38	8.05	8.26	9.04	8.44	8.08	6.41	5.84	
	II	4.89	6.63	8.28	8.78	8.50	7.40	7.31	8.57	7.64	7.02	6.25	5.61	
	III	4.82	5.08	7.64	8.07	8.23	6.77	6.91	7.75	7.13	6.14	5.90	5.22	
Annual Run-off		5296	8821	12542	10549	11058	13630	16552	15662	14047	16392		6077	
Average Flow		14.46	24.04	34.14	28.75	30.14	37.14	45.03	42.61	38.22	44.65		16.57	

Annexure-6.10
Page 1 of 1

Year	Annual inflow (MCM)	Rank	% Dependability
1999	1621.118	1	4%
2002	1607.246	2	7%
2000	1534.008	3	11%
2001	1375.959	4	15%
1978	1369.824	5	19%
1998	1337.057	6	22%
1995	1228.905	7	26%
1997	1085.131	8	30%
1996	1034.949	9	33%
1985	930.186	10	37%
1990	901.259	11	41%
1994	865.516	12	44%
1983	852.255	13	48%
1984	850.524	14	52%
1982	761.330	15	56%
1980	747.092	16	59%
1979	742.864	17	63%
1992	736.704	18	67%
1981	715.048	19	70%
1989	710.668	20	74%
1986	663.147	21	78%
1988	653.020	22	81%
1987	640.421	23	85%
2004	596.490	24	89%
1991	580.544	25	93%
1993	520.418	26	96%

Methodology-5

10 DAILY DISCHARGE DATA OF TIDONG DERIVED FROM
LONG TERM DATA OF BASPA AT SANGLA BY AREA PROPORTIONATE METHOD

$Qt = 0.1597 \times Rainfed^{3/4} + 0.8403 \times Snowfed$
$= 0.727 \; Qb$

	Rain fed	Snow fed	Total
Baspa (Qb)	453.57	514.15	967.72
Tidong (Qt)	79.50	418.36	497.86
Ratio	**0.175**	**0.814**	**0.514**

Annexure-6.11

MONTH	PERIOD	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
JAN	I	8.72	9.16	6.33	6.33	7.34	6.83	7.15	6.25	5.95	5.90	5.74	4.49	4.39	6.27	5.24
	II	3.49	8.07	6.62	6.18	7.42	6.30	7.15	6.26	5.92	5.72	6.02	4.36	4.28	5.54	5.21
	III	13.38	7.12	6.69	6.11	7.05	6.27	7.26	6.38	6.43	5.66	5.74	4.27	4.30	4.69	5.23
FEB	I	13.38	6.11	6.33	5.96	6.83	6.08	6.57	6.15	5.74	5.71	5.74	4.22	4.21	4.63	5.22
	II	13.89	5.38	6.54	6.33	6.83	5.92	6.33	6.05	5.73	5.74	5.74	4.26	4.25	4.59	5.22
	III	12.65	5.45	6.54	6.40	7.20	5.69	6.20	6.08	4.58	5.16	6.14	4.32	4.28	4.59	5.19
MAR	I	9.52	5.82	6.54	6.40	7.20	5.36	6.54	6.03	5.80	5.04	5.44	4.19	3.99	4.59	5.22
	II	7.71	5.82	6.54	6.25	7.20	5.75	7.28	6.12	5.69	4.91	5.74	4.17	3.97	4.61	5.19
	III	11.41	5.82	4.87	5.96	7.34	5.88	9.34	6.27	5.69	5.12	5.95	4.09	3.90	4.97	5.23
APR	I	10.69	7.92	5.45	6.18	7.27	6.28	8.00	6.48	5.74	5.85	6.44	4.23	4.17	5.66	5.22
	II	15.92	9.16	6.69	13.45	7.56	6.41	9.15	9.35	7.00	5.37	10.58	5.26	4.99	5.55	5.69
	III	14.90	13.67	10.40	17.96	9.96	9.04	12.06	9.40	8.30	8.40	15.11	5.50	8.70	6.53	6.99
MAY	I	17.88	15.92	24.86	22.83	11.63	17.16	25.47	13.26	10.56	9.20	19.02	8.08	12.08	8.15	7.83
	II	27.99	16.94	26.75	22.50	11.34	29.35	37.44	35.83	20.55	8.65	27.39	15.25	41.22	12.86	9.96
	III	52.20	13.81	29.01	30.17	18.03	30.17	59.08	33.57	14.80	15.49	30.01	33.46	39.23	16.48	9.57
JUN	I	75.10	19.56	47.91	31.04	30.83	43.49	87.18	41.33	16.98	36.51	30.18	65.26	50.19	37.75	23.85
	II	71.17	50.67	58.16	33.78	72.70	38.71	71.31	66.97	36.98	31.20	33.01	39.74	52.43	51.01	26.40
	III	116.54	104.40	84.84	55.40	55.40	63.77	70.00	76.65	57.33	37.62	69.48	35.59	100.36	61.56	45.55
JUL	I	151.95	89.71	86.15	52.42	82.01	67.47	69.66	78.10	61.32	55.28	60.15	49.01	100.97	69.18	38.74
	II	113.34	91.97	81.35	65.94	101.35	47.85	59.07	87.62	66.74	56.48	55.83	82.12	93.79	70.43	71.47
	III	109.13	61.36	76.05	102.00	102.29	92.75	73.70	87.85	75.13	72.22	78.21	88.45	89.06	67.97	77.78
AUG	I	109.20	66.74	76.05	84.70	95.02	88.14	71.73	82.12	73.76	63.66	62.62	75.33	69.99	57.28	78.82
	II	113.34	58.16	5.13	56.13	66.38	84.60	65.85	98.13	69.54	58.48	55.13	65.48	66.79	41.29	66.45
	III	106.80	45.66	46.75	36.13	32.06	82.42	66.37	81.37	49.01	57.62	53.52	65.92	64.60	34.62	64.65
SEP	I	86.37	42.39	39.04	31.12	19.63	64.81	36.53	57.51	42.38	42.68	31.19	49.38	54.93	20.84	57.95
	II	68.22	28.86	26.97	24.79	20.21	46.83	31.97	45.02	24.69	32.67	25.55	32.45	39.19	16.82	40.41
	III	57.22	16.87	21.74	20.21	14.32	29.05	14.24	29.90	21.05	28.30	16.98	21.29	32.91	10.72	32.22
OCT	I	50.71	12.07	16.79	14.90	10.98	21.87	11.86	23.08	14.56	19.08	7.16	14.54	24.57	7.50	29.87
	II	46.17	11.34	12.72	13.30	12.21	18.52	11.64	18.04	11.66	13.56	6.06	12.00	17.46	6.88	23.64
	III	40.64	8.87	11.20	11.63	11.92	15.44	10.72	15.28	9.71	11.44	6.17	9.60	14.79	6.57	20.64
NOV	I	17.59	7.42	8.36	10.76	11.05	13.20	9.57	12.74	8.48	9.90	5.50	7.52	13.65	6.25	19.03
	II	16.29	7.42	7.49	9.67	9.45	12.00	8.54	11.17	8.06	8.92	5.27	6.30	12.73	6.19	16.76
	III	15.41	7.63	7.34	9.31	8.80	10.83	7.79	10.51	7.56	7.77	4.86	5.73	12.85	5.87	15.62
DEC	I	14.98	7.56	6.83	8.36	8.43	9.23	8.65	9.53	7.25	7.26	4.74	5.19	6.54	5.61	14.61
	II	15.12	7.71	6.69	7.78	7.92	8.28	8.51	8.39	6.74	7.02	4.60	4.81	6.48	5.46	12.74
	III	10.40	6.54	6.40	7.42	8.00	8.27	8.00	8.46	6.25	6.86	4.54	4.69	6.36	5.32	12.29
Annual Run-off		16713	9029	9109	8744	9284	10430	10401	11360	8094	7829	7987	8707	11000	7079	9002
Average Flow		45.54	24.70	24.84	23.77	25.31	28.33	28.28	30.92	22.05	21.29	21.71	23.63	29.96	19.30	24.49

Annexure-6.11

MONTH	PERIOD	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
JAN	I	9.97	5.59	8.68	8.41	8.75	7.65	7.52	7.72	8.18	8.01		6.53	5.73
	II	7.58	5.39	8.27	7.42	8.16	7.23	6.99	7.46	7.47	7.42		6.02	5.65
	III	6.95	5.27	7.88	6.36	7.63	7.04	6.94	7.34	7.19	7.05		5.37	5.65
FEB	I	6.60	4.81	7.40	7.30	7.40	7.10	7.27	7.19	6.98	6.57		5.37	5.13
	II	6.26	4.76	7.46	7.61	7.41	7.17	7.70	7.07	7.02	6.16		5.39	5.59
	III	5.78	4.76	7.68	7.57	7.44	7.28	8.83	7.23	7.28	6.01		5.67	5.12
MAR	I	5.93	4.76	7.92	7.71	8.23	8.06	9.69	7.52	7.65	6.77		6.07	5.06
	II	5.87	4.81	8.10	8.11	8.49	8.30	9.86	8.02	8.14	7.24		7.00	5.48
	III	6.02	5.08	9.34	9.87	8.97	8.32	11.12	8.64	9.93	9.57		7.41	5.40
APR	I	6.22	5.18	9.33	9.77	9.50	9.00	12.79	10.04	12.21	13.98		8.04	5.71
	II	7.12	5.18	9.92	13.94	10.76	10.37	16.18	14.93	14.34	17.76		9.37	7.80
	III	19.29	5.43	12.53	21.10	12.38	16.50	26.44	22.19	20.40	22.33		11.08	14.15
MAY	I	37.30	6.96	25.86	27.17	17.16	19.35	27.02	33.03	36.85	41.40		10.65	21.07
	II	24.75	9.95	67.77	28.33	22.74	29.73	40.31	58.49	56.28	120.30		21.11	20.45
	III	31.07	23.43	58.75	57.67	33.45	78.86	56.38	85.72	60.48	112.39		28.22	16.19
JUN	I	21.29	65.65	92.40	79.97	56.51	86.51	41.33	101.69	81.48	120.92	84.48	24.22	
	II	31.37	73.20	110.83	112.45	85.90	68.28	99.43	117.59	106.54	133.37	90.66	45.49	
	III	26.08	75.90	70.30	132.47	110.54	119.00	127.18	123.31	113.73	139.76	73.65	41.25	
JUL	I	45.15	83.21	106.66	65.98	109.15	143.07	169.46	133.87	135.99	144.24	88.77	55.55	
	II	53.63	90.92	141.75	91.07	128.25	120.01	175.76	154.59	144.07	137.80	99.89	51.51	
	III	33.80	107.16	130.22	107.63	115.12	114.01	169.73	151.51	147.80	120.58	108.79	48.43	
AUG	I	39.44	80.34	108.93	80.34	100.43	125.05	172.61	140.39	128.79	115.60	93.49	58.04	
	II	30.85	68.99	105.70	70.15	87.49	115.24	149.19	128.49	119.91	130.47	70.52	57.09	
	III	30.24	48.15	86.32	46.55	73.84	80.69	156.40	123.19	106.64	116.85	68.14	40.03	
SEP	I	26.19	57.43	73.90	43.94	52.32	75.22	137.36	106.60	82.59	90.65	47.47	27.38	
	II	22.73	44.60	39.54	28.75	49.17	61.93	76.55	71.48	44.89	76.69	38.46	29.65	
	III	13.09	31.23	24.73	24.34	30.70	73.28	72.97	53.28	30.37	53.97	32.64	15.23	
OCT	I	9.13	23.64	19.88	19.99	21.86	45.31	38.11	35.75	26.99	36.95	17.05	13.06	
	II	8.47	16.73	17.90	16.79	16.36	35.86	18.90	20.07	23.05	27.61	12.25	10.86	
	III	7.44	12.72	16.03	16.69	13.36	28.54	16.37	14.61	18.23	20.33	9.88	9.37	
NOV	I	6.86	11.17	14.39	15.41	11.39	22.06	13.74	12.98	14.47	15.60	8.59	8.60	
	II	6.64	10.56	13.30	14.12	10.29	16.12	12.08	12.10	12.72	13.49	7.77	7.91	
	III	6.20	9.44	11.36	11.74	18.70	11.49	11.04	11.47	10.32	10.35	7.43	6.94	
DEC	I	5.93	9.44	10.67	11.76	8.83	9.64	9.89	10.82	10.11	9.67	7.68	6.99	
	II	5.85	7.94	9.91	10.51	10.17	8.86	8.75	10.25	9.14	8.40	7.48	6.72	
	III	5.77	6.08	9.15	9.65	9.85	8.11	8.27	9.28	8.53	7.35	7.06	6.25	
Annual Run-off		6338	10557	15010	12626	13234	16313	19809	18745	16812	19618		7273	
Average Flow		17.30	28.77	40.85	34.41	36.07	44.45	53.89	51.00	45.74	53.43		19.83	

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Year	Annual inflow (MCM)	Rank	% Dependability
1999	1940.173	1	4%
2002	1923.571	2	7%
2000	1835.919	3	11%
2001	1646.764	4	15%
1978	1639.421	5	19%
1998	1600.205	6	22%
1995	1470.768	7	26%
1997	1298.697	8	30%
1996	1238.639	9	33%
1985	1113.258	10	37%
1990	1078.637	11	41%
1994	1035.859	12	44%
1983	1019.989	13	48%
1984	1017.917	14	52%
1982	911.169	15	56%
1980	894.128	16	59%
1979	889.068	17	63%
1992	881.696	18	67%
1981	855.778	19	70%
1989	850.536	20	74%
1986	793.661	21	78%
1988	781.542	22	81%
1987	766.464	23	85%
2005	713.880	24	89%
1991	694.802	25	93%
1993	622.842	26	96%

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Comparison of Derived and actual measured discharge data for Tidong HEP

		1			2			3			4			5			6		7	
		Regression-1			Regression-1			Regression-2			Catchment area proportion-1			Catchment area proportion-2			Actual measured data		Actual Measured	
		50%	75%	90%	50%	75%	90%	50%	75%	90%	50%	75%	90%	50%	75%	90%	(Tidong Nuziveedu)		Tidong HPSEB	
MONTH PERIOD		1984	1989	2004	10 daily	10 daily	10 daily	1983	1989	2004	1984	1989	2004	1984	1989	2004	2004-2005		(Average)	
JAN	I	5.57	4.65	5.46	5.52	5.20	4.94	5.57	4.65	5.46	7.15	4.49	6.53	5.97	3.75	5.46	4.53		3.72	
	II	5.36	4.60	5.25	5.33	5.11	4.61	5.36	4.60	5.25	7.15	4.36	6.02	5.97	3.64	5.03	5.41		3.63	
	III	5.35	4.56	5.00	5.37	5.09	4.73	5.35	4.56	5.00	7.26	4.27	5.37	6.06	3.57	4.49	4.61		3.62	
FEB	I	5.28	4.54	4.99	5.27	5.11	4.71	5.28	4.54	4.99	6.57	4.22	5.37	5.49	3.52	4.49	4.79		3.22	
	II	5.21	4.55	5.00	5.27	4.99	4.69	5.21	4.55	5.00	6.33	4.26	5.39	5.28	3.56	4.50	4.93		3.17	
	III	5.12	4.58	5.11	5.25	4.92	4.69	5.12	4.58	5.11	6.20	4.32	5.67	5.18	3.61	4.74	4.75		3.24	
MAR	I	4.99	4.53	5.27	5.24	4.98	4.69	4.99	4.53	5.27	6.54	4.19	6.07	5.47	3.51	5.07	5.26		3.35	
	II	5.15	4.52	5.64	5.31	5.10	4.70	5.15	4.52	5.64	7.28	4.17	7.00	6.09	3.48	5.85	5.47		3.62	
	III	5.20	4.49	5.81	5.22	4.93	4.80	5.20	4.49	5.81	9.34	4.09	7.41	7.81	3.42	6.20	5.29		3.90	
APR	I	5.36	4.54	6.05	5.39	5.12	4.91	5.36	4.54	6.05	8.00	4.23	8.04	6.68	3.54	6.72	5.22		4.26	
	II	5.41	4.95	6.59	6.38	5.37	4.94	5.41	4.95	6.59	9.15	5.26	9.37	7.65	4.39	7.83	5.94		5.62	
	III	6.45	5.05	7.27	7.46	6.22	5.41	6.45	5.05	7.27	12.06	5.50	11.08	10.08	4.59	9.26	7.93		8.89	
MAY	I	9.68	6.07	7.09	9.34	6.93	5.99	9.68	6.07	7.09	25.47	8.08	10.65	21.28	6.75	8.90	10.69		11.50	
	II	14.52	8.92	11.25	12.88	9.26	6.68	14.52	8.92	11.25	37.44	15.25	21.11	31.28	12.74	17.64	10.85		18.85	
	III	14.85	16.15	14.07	14.48	11.66	8.47	14.85	16.15	14.07	59.08	33.46	28.22	49.37	27.96	23.58			30.11	
JUN	I	20.14	28.79	12.48	19.07	14.39	10.87	10.72	16.95	5.21	87.18	65.26	24.22	72.85	54.53	20.24			25.84	
	II	18.24	18.65	20.93	24.49	17.30	14.59	9.35	9.65	11.29	71.31	39.74	45.49	59.59	33.20	38.01			22.91	
	III	28.20	17.00	19.25	28.97	23.47	16.90	16.53	8.46	10.08	70.00	35.59	41.25	58.49	29.74	34.47			29.43	
JUL	I	29.66	22.33	24.93	31.86	25.22	21.11	17.58	12.30	14.17	69.66	49.01	55.55	58.21	40.95	46.42			33.64	
	II	21.87	35.49	23.32	35.37	27.36	22.81	11.97	21.78	13.02	59.07	82.12	51.51	49.36	68.62	43.04			29.47	
	III	39.71	38.00	22.10	35.90	30.76	25.67	24.82	23.58	12.14	73.70	88.45	48.43	61.58	73.90	40.47			27.53	
AUG	I	37.88	32.78	25.92	32.68	28.86	24.44	23.50	19.83	14.88	71.73	75.33	58.04	59.93	62.94	48.49			27.10	
	II	36.47	28.87	25.54	27.68	24.49	18.25	22.48	17.01	14.61	65.85	65.48	57.09	55.02	54.71	47.70			22.10	
	III	35.60	29.05	18.77	26.87	20.20	15.79	21.86	17.14	9.73	66.37	65.92	40.03	55.46	55.08	33.45			16.44	
SEP	I	28.61	22.48	13.74	21.24	16.49	12.67	16.82	12.41	6.11	36.53	49.38	27.38	30.52	41.26	22.88			14.54	
	II	21.46	15.75	14.64	15.07	12.96	11.40	11.68	7.56	6.76	31.97	32.45	29.65	26.71	27.11	24.78			10.04	
	III	14.40	11.32	8.91	12.14	9.27	8.26	6.59	4.37	2.64	14.24	21.29	15.23	11.90	17.79	12.73			8.06	
OCT	I	11.55	8.64	8.05	10.35	7.82	6.37	4.54	2.44	2.01	11.86	14.54	13.06	9.91	12.15	10.91			6.02	
	II	10.22	7.63	7.18	9.04	7.31	6.13	3.58	1.71	1.39	11.64	12.00	10.86	9.73	10.02	9.08			5.15	
	III	9.00	6.68	6.59	7.70	6.59	5.75	2.70	1.03	0.96	10.72	9.60	9.37	8.96	8.02	7.83			4.80	
NOV	I	8.10	5.85	6.28	7.13	6.13	5.53	2.05	0.43	0.74	9.57	7.52	8.60	8.00	6.28	7.18			4.30	
	II	7.63	5.36	6.01	6.80	5.92	5.33	1.71	0.08	0.54	8.54	6.30	7.91	7.14	5.26	6.61			4.09	
	III	7.16	5.14	5.62	6.49	5.79	5.17	1.38	-0.08	0.27	7.79	5.73	6.94	6.51	4.79	5.80			3.97	
DEC	I	6.53	4.92	5.64	6.20	5.58	5.07	6.53	4.92	5.64	8.65	5.19	6.99	7.23	4.34	5.84	5.33		3.72	
	II	6.15	4.77	5.53	5.93	5.48	5.02	6.15	4.77	5.53	8.51	4.81	6.72	7.11	4.02	5.61	5.48		3.46	
	III	6.15	4.73	5.35	5.74	5.31	4.97	6.15	4.73	5.35	8.00	4.69	6.25	6.68	3.92	5.22	5.49		3.23	
Annual Run-off		5188	4504	3934	4895	4042	3372	3393	2840	2472	10401	8707	7273	8691	7275	6077			4248	
Average Flow		14.12	12.25	10.74	13.35	11.02	9.20	9.23	7.72	6.75	28.28	23.63	19.83	23.63	19.74	16.57			11.57	

1 Regression analysis of Baspa at Sangla and Tidong discharge measured by Nuziveedu for From Dec04 to May05. Dependable year calculation based on total annual flow.
2 Regression analysis of Baspa at Sangla and Tidong discharge measured by Nuziveedu for From Dec04 to May05. Dependable year calculation based on 10 daily discharge values.
3 Regression analysis of Baspa at Sangla with Tidong discharge(two regression equations, first for June to Nov Tidong discharge measured by HPSEB and second for Dec to May with the Tidong discharge measured by NSL for year 2004-2005)
4 Long term discharge data generated by catchment area proportionate method by dividing total area in to Sow fed catchment and Rain fed catchment.
Tidong discharge = Baspa discharge at Sangla X [(Rain-fed catchment area of Tidong Khad / Rain-fed catchment area of Baspa at Sangla site)$^{0.75}$ + (Ration of Snow fed catchment of Tidong and Baspa)]
5 Long term discharge data generated by catchment area proportionate method.
Tidong discharge = Baspa discharge at Sangla X (Total catchment area of Tidong Khad / Total catchment area of Baspa at Sangla site)$^{0.75}$
6 Discharge data measured by NSL at Barrage site of Tidong HEP wef Dec 2004.
7 Average of discharge(from June 97-Dec98 and yr 2003, 2004) data measured by HPSEB at Lamber village site

Annexure 4.2

Impacts on Fishery and Aquatic Ecology

Dr Kuldip Kumar

Contents

TIDONG HYDROELECTRIC POWER PROJECT

Impacts on Fishery and Aquatic Ecology

Dr Kuldip Kumar

1. Introduction

Originating from the permanent glaciers and located within the geographical ordinates of 78° 22' 10'' E to 78° 47 '50'' E longitude and 30° 20' 30'' N to 31° 33' 30'' N the Tidong stream is an important tributary of river Satluj. The tributary has its origin in the north western slope of Great Himalayan range at an altitude of 6740m. The Valley is undoubtedly the most rugged glen of Kinnaur district – often called scene of savage grandeur, the rocks are hollowed out into innumerable caves – the stream Tidong which swirls and rumbles with falls of 450 feet per kilometer gushes with deafening voice and later joins at Mooring with river Baspa – the second largest tributary of river Satluj. A number of rivulets join Tidong stream during its downward drift before its confluence with river Satluj just upstream of Tirung village. The altitude of Tidong stream ranges from 6740m in the glacier zone to 2200m at its entrance point with river Satluj.

Schatchung Khad

Tidong Khad

With a capacity of 100 MW the Tidong Hydel Project is being setup across the Tidong khad. It is basically a run-of-the-river project and will have 10m high concrete barrage at 9.8 Km upstream from the confluence point. The barrage will submerge an approximate area of 0.5 ha and divert the water into 4 hours peaking reservoir of 237000 cum storage capacity and 1.9 ha surface area. The stored water would be lead through 8461m long D shaped head race tunnel to a 1200m pressure shaft. Water from the project will be discharged back into the Tidong stream through 50m long open tail race channel.

In order to access the impact of construction of Tidong hydel electric project on the biocenosis and fishery of the main khad and feeding tributaries namely Shatchang, Saukui, Ghatleng, a snap study was undertaken during Oct 2012. The observations under the study covered both abiotic and biotic factors, planktonic concentration, benthic invertebrates and spectra of fish fauna pertaining different stages of life history.

The study aimed at:

- To generate baseline information on water quality, aquatic life including insect and fish life in the main stream Tidong and its tributaries flowing in the proximity of the project area
- Critically access the impact on fisheries and other aquatic life of the stream due to abstraction of water and converting a portion of linearly flowing water body into storage impoundment
- Spell out measures for mitigating fish losses if any ,due to abstraction and submergence of 0.5 ha
- Identifying and cataloguing fish species amenable to grow and propagate in the newly created sheet of impounded water

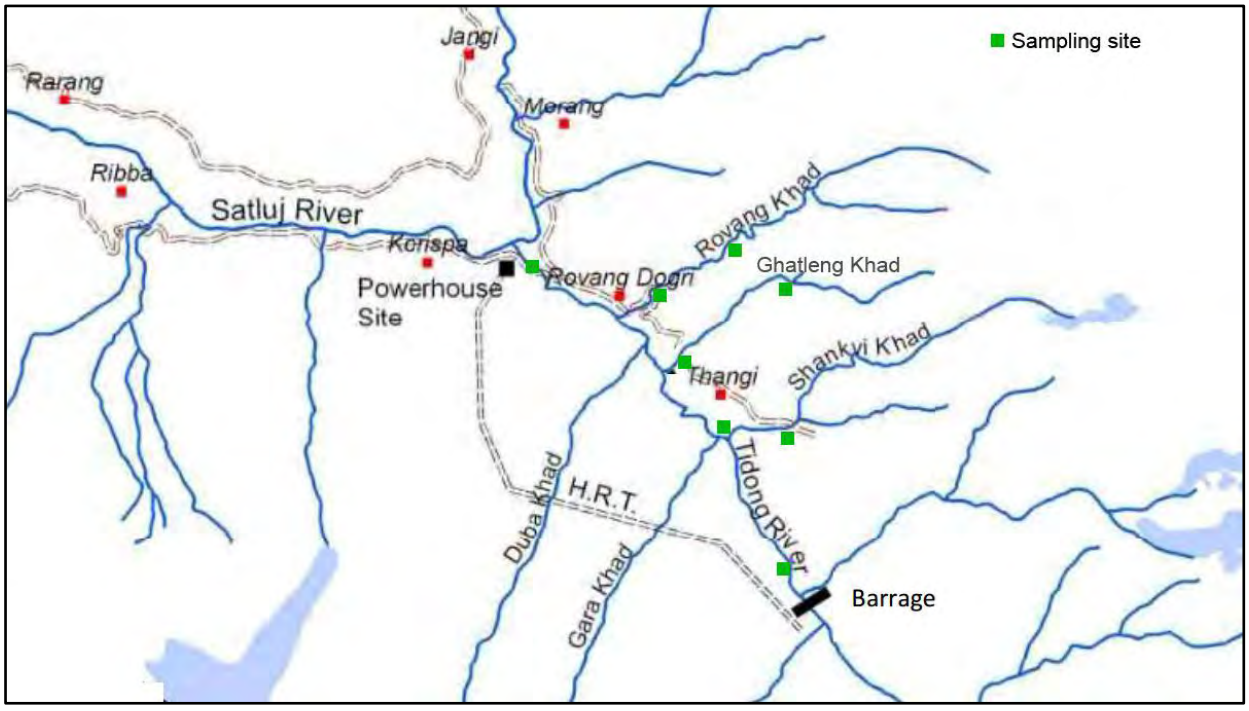


Fig 1: Map of project Area showing disposition of sampling sites selected at Tidong stream and three tributaries

2. Material and Methods

The analysis for physico-chemical factors is based on APHA manual. Due to shallow depth, stony bottom and fast current the transparency was measured by 'bright pin method' fixed at one end of the half meter scale. (Saha et al, 1971). The plankton sample were collected by filtering 100 lit of surface water through no. 21 bolting silk plankton net of 15cm dia and preserved in 5% formalin.(Needham,1934) estimation of plankton was done by numerical method. The aquatic insects and other benthic life were collected by enclosing one sq.m of stream bottom with square meshed cloth (Kumar and Bhagat, 1978). The bottom stones, gravel and sand were upturned to dislodge the aquatic life. Each of the insect was handpicked and preserved into 5% formalin for later identification. The identification of insect was done group wise, genera wise and where ever possible species wise.

In order to collect the available fish life in Tidong khad and its tributaries cast netting was done both intensively and extensively in the select pockets. Further a 2.0 meter mosquito net was also operated in rapids, riffles and other microhabitats where the hill stream fishes and their young ones normally reside(Cowk and Welcomme, 1980) On an average 20-30 cast nets were operated by trained state fisheries department fishermen. The shallow bank of main stream and tributaries were virtually combed for circumventing fry and juveniles. Sampling of two khads, Dubba khad and Gara Khad which join the Tidong on the left side couldn't be undertaken primarily due to free fall of the khads water and secondly inaccessibility to the streams sites.

Collection of plankton from Tidong Khad

3. Selection of sampling sites

Two sampling sites were selected for each of the three studied streams keeping at least 1.0km of intervening distance. In case of Tidong stream the selected sites were the barrage site and power house site (confluence point). The water flow, stream bed, presence of rapids, pools etc as well as accessibility were the other few criterions considered for site selection. Since the spawning site selection by hill fishes as well as trout is governed by a complex of environmental cues namely viz intra- gravel flow, gravel size, depth stream velocity as such these factors were kept in account during site selection. In all 8 sites were demarcated and water samples as well as plankton and benthic organisms were collected from these sites.

Dubba Khad

4. Observations

4.1 Physico-chemical characteristics

The physico-chemical parameters studied include air and water temperature, transparency, pH, dissolved oxygen, total alkalinity specific conductivity and silicates. In view of steep gradient, free fall of water and inaccessibility of the sites, the said information of Dubba khad and Gara Khad couldn't be collected. The results showed that the main stream and associated tributaries are characterized by low temperature (4.1-4.5°C), high dissolved oxygen (8.9-10.8ppm), neutral to slightly alkaline pH (7.0-7.2), low bicarbonate alkalinity (59-73ppm), low conductivity (15-17

mS/m), high transparency, low silicates values (0.51-0.71ppm) and nil to trace nitrates. *Table 1* embodies information on biological and physico-chemical characteristics of river Tidong, Shatcheng khad, Sukui and Ghatleng khad.

Table 1 : Physico-chemical and biological characteristic of River Tidong and its tributaries.

SNo.		Tidong	Shatcheng	Sukui	Ghatling
1	Elevation above *msl in m*	2200-6740	2310-3712	2412-3610	2410-3412
2	Velocity of stream	Fast and turbulent	Fast and turbulent	Fast and turbulent	Fast and turbulent
3	Water shed	Snow glacier	Snow glacier	Snow glacier	Snow glacier
4	Vegetation	*Pinus gerardiana, Cedrus*	*Pinus gerardiana, Cedrus*	*Pinus gerardiana, Cedrus*	*Pinus gerardiana, Cedrus*
5	Substratum	Boulders,stones, gravel and sand	Rocks, boulders and gravel	Rocks, boulders, gravel, sand	Rocks, boulders, gravel, sand
6	Air temperature	12.0˚C	12.2˚C	11.8˚C	12.1˚C
7	Water temperature in C	4.2˚C	4.1˚C	4.5˚C	4.4˚C
8	Dissolved Oxygen in *ppm*	8.9	10.9	10.8	10.2
9	Total Alkalinity	72 ppm	68 ppm	63 ppm	59 ppm
10	Silicates	0.51	0.53	0.52	0.51
11	Transparency in cm	Clear	Clear	Clear	Clear
12	Specific conductivity	17 mS/m	16 mS/m	15 mS/m	15 mS/m
13	pH	7.1	7.3	7.0	7.1
14	Nitrates	Traces	Traces	Traces	Traces

4.2 Plankton

The analysis of plankton sample collected from Tidong and its tributaries showed that the bulk of content was represented by phytoplankton while zooplankton occurred only in small

percentages. The trend was identical in the main stream as well as in the tributaries. On an average, the plankton population in all the four streams ranged from 67-110 u/lt and consisted of Bacillariophycea, Chlorophycea Desmidiacea and zooplankton.

The group Bacillariophycea emerged as a largest group in all the samples and its contribution ranged 72%, 65%, 82% and 72% in the total counts of Tidong, Shatchang, Sukui and Ghatleng khads respectively. The groups Chlorophycea and desmidiacea ranked second and third in their abundance. However in case of Ghatleng khad, the percentage of Desmidiacea were on percental basis more compared to Chlorophycae (6% against 2%). The important genera recorded among Bacillariophycea were *Navicula, Gomphonema, Cyclotella* and *Amphora* while in case of Chlorophycea and Desmidiacea the important genera were *Pleurococcus and Closterium.*

The average number of zooplankton in all the samples hardly exceeded 6-8% of the total count.The *difflugia* and *centropyxix* were the only two genera recorded in the samples. The amphipods and planarian, so commonly found in other streams of Kinnaur valley were conspicuously absent in the Tidong stream. *Table 2 and 3* portray information regarding different group of plankton and the prominent genera encountered in the study.

Table 2 : Information on availability of different group of plankton encountered in the study

Sno	Name of stream	Sample	Total count	Bacillariophycae	Chlorophycea	Desmidae	Others
1	Tidong	1	72u/l	72%	13%	11%	4%
	Tidong	2	97u/l	82%	6%	10%	2%
2	Shatcheng	1	24u/l	72%	12%	13%	3%
	Shatcheng	2	27u/l	76%	10%	10%	4%
3	Sukui	1	102u/l	70%	16%	8%	6%
	Sukui	2	106u/l	84%	6%	4%	6%
4	Ghatling	1	44u/l	93%	3%	2%	2%
	Ghatling	2	93u/l	68%	12%	11%	9%

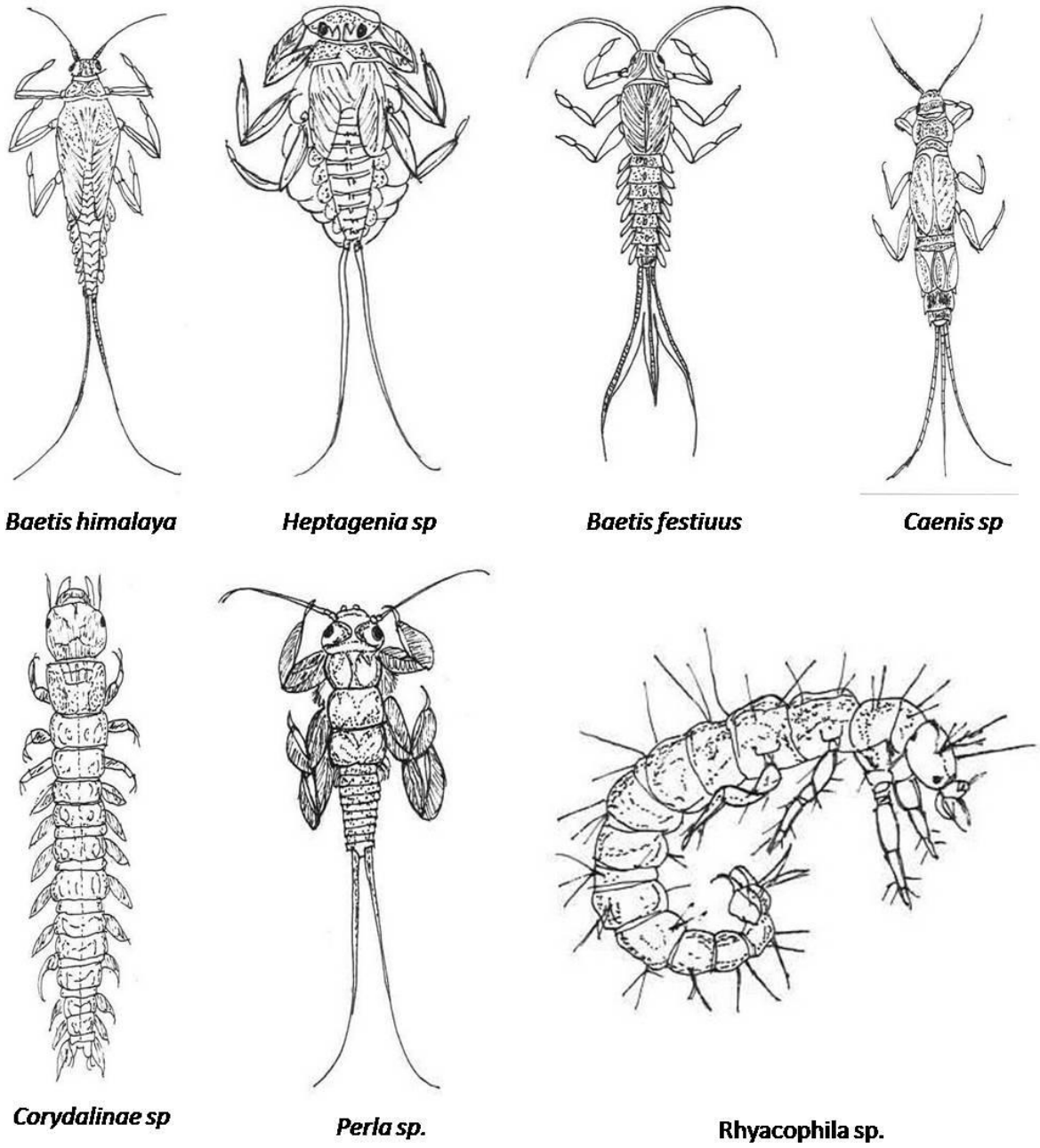
Table 3 : List of major genera of insects recorded in the Tidong khad and Tributaries.

1	Ephemeroptera Key to families: Edmund, Allen and Peters 1967	Heptagenidae *Heptagenia sp.* *Iron spp*. *Epeorus sp.* *Baetis bifurcates* *Baetis Himalaya* Ephemerellidae *Ephemerella sp.* *Caenis sp.*
2	Plecoptera Fresh water biology: Ward and Whipple 1964	*Chloroperla sp.* *Neoperla sp.* *Nemoura sp.*
3	Trichoptera	Hydropsychedae *Hydropsyche* *Rhyacophila sp.* *Mystacidae*
4	Neuroptera	*Cordialyneae*
5	Diptera	Atherix sp. Tabanus sp. Pediacia sp. Antocha sp.

4.3 Benthic life

Due to torrential nature of high altitude streams, the benthic life usually takes refuge under boulders, gravels, stones, detritus etc. The main constituents which accounted for the benthic life were the nymphs, larvae and adults of class insecta. The average numbers of insects were 57, 42, 37 and 28 units per sq.m in the Tidong, Schatchang, and Ghatling streams respectively. The population was contributed by nymphs of Ephemeroptera, Plecoptera, larvae of Trichoptera, Neuroptera and larvae and adults of Diptera. The Ephemeroptera (may flies) invariably dominated in all the samples, their percentages ranging from 67-80% in the samples. The important genera encountered in order of their abundance were *Baetis, Ephemerella, Heptagenia, Epeorus, Iron, Rithrogenia* and *Caenis.* The nymphs and larvae of Plecoptera (stone flies) were numerically more in Tidong khad than the other three Tributaries and were represented by Perla, Amphinemura, Numerella and Chloroperla. The larvae of Trichoptera

(caddis- fly) were available in all the streams except Ghatling and count wise ranged from 7-11 u/sq.mt. The important genera encountered were *Hydropsyche, Rhyacophila* and empty cases of *Mystacidae.* The larvae of Neuroptera were found only in one tributary Schatlung khad and represented by single specimen *corydalinae.* The larvae and adults of Diptera(two- winged fly) were encountered in all the streams with average number ranging from 3-17 u/sq.m. The important genera recorded were *Atherix, Tabanus, Pedicia* and *Antocha.*



Specimens of insects collected from Tidong and its tributaries.

4.4 Fish life

Indiscriminate fishing was done with cast net (1.5 dia) in the main khad and its tributaries. At each sampling site about 20-25 netting were operated for consecutively two days by trained departmental fisherman all along the stream banks, pools and the rapids as well as other ecologically suited habitats to which these hill stream denizens normally resides.

The shallow water along the stream banks were virtually combed with net cloth for collection of fish larvae, fry, juvenile etc but the efforts did not yield any results. The sandy bed and intra-gravel pockets along the stream were also meticulously searched to locate any "redds" but being a non breading season, no trace of any juvenile was found. (spawning seasons last from mid November to early February for rainbow trout and late November to late February for brown trout in the streams of Kinnaur district).

The information obtained from the state department officials as well as by the local residents revealed that certain rheophylic species of catfish (*Glyptosternum reticulatum*, *Nemacheilus* sp.), Snow trout (*schizothorax richardsonii)* have occasionally been noticed and caught in these waters. However, all these fishes are extremely slow growing and hardly form fisheries of any significance either from sport or consumption point of view. The salmonids viz brown trout (*Salmo trutta fario*) and rainbow trout (*Salmo gairdnerii gairdnerii*), ubiquitously available in Baspa and Rukti streams of Kinnaur district were also not encountered in Tidong khad and its tributaries.

5. General Remarks

Failure to find any fish in the said streams despite extensive and intensive fishing points out that streams around the project area are virtually devoid of any fish stock. Technically too, these streams are classified as **oligotrophic-** meaning low temperature, poor primary and secondary productivity and impoverished benthic fauna. The factors which seems to have contributed to barren status of these streams are steep slopes, high and variable velocity of stream flow, ice formation during winter, occurrence of periodic floods, continuous rolling of boulders, stones gravel etc. during periods following heavy precipitation. Probably these are the considerations under which these waters did not get any attention of the State Fisheries Department for exploiting their fisheries potential.. Till date, the department has never ranched any fish seed in these streams and no angler or local resident has ever approached the fisheries department for issuance of fishing license.

The creation of a water body (23700 cum capacity) and water spread of 1.9 ha is likely to offer tremendous potential for promotion of sport fishery in the water body. The environmental parameters of this water sheet would be quite congenial for introduction of much sought- after European trout especially Lake trout (*salvelinus* namaycush), Arctic char (*salvelinus alpines*) and Brown trout (*salmo trutta fario*). In fact the promotion of recreational fishery in the newly created water body holds a great promise and could go a long way in boosting tourism in this far flung valley. Alternatively, the seed of Prussian carp, a eurythermal species could be considered for stocking in the impoundment. This suggested carp is a prolific breeder and could easily form a fishery of substantial volume within a short time. This could obviously provide income as well as much needed animal protein to the local inhabitants.

The project authority has provided an amount of Rs 10.0 Lac to the Himachal Government for expansion of departmental fish farm at Sangla. The project authority may consider an allocation of additional funds to the tune of Rs 5 Lac or so for formulation of a program for fishery development in new water body covering items such as scientific study for screening of suitable species amenable to grow and propagate in this high altitude impoundment, import of new species of trout etc.

As per clause incorporated in the agreement between the project authority and state government, it has been agreed upon to maintain a minimum flow of 0.25 cum/sec (about 10% of stream's lean period flow). Such a quantity of water is quite suffice to support even 2.0 t of trout or other fishes (Stevenson, 1980). Such a flow would obviously not interrupt the longitudinal connectivity of stream's continuum and would allow unhindered passage to fish and other aquatic life.

Water, as a renewable natural resource has received a lot of attention in Himachal Pradesh and looked both for its consumptive and non-consumptive uses. Emergence of Hydro power projects and fisheries development both fall under the same page and need to be looked compatible to each other. The notable point is that while the abstraction and diversion of river water and barrages constructed do act as a physical barrier for free movement of fishes, but the dams do make available sprawling water bodies for large scale fish production and generating employment.

6. Summary

With a view to assess the impacts of emergence of Tidong hydroelectric project on the biocenosis and fishery of stream Tidong and adjoining tributaries (viz Shaktsanq, Ghat Leng,

Dubaa Khad,gara khad) an eco-hydrobiological study was carried out during Oct 2012. The study covered both abiotic and biotic factors; planktonic; benthic organisms and fish spectra during different stages of life history *viz* alevin, larva, fry, juveniles, adults etc of the main stream as well tributaries.

A week- long study results showed that the main Tidong stream as well as the five tributaries (flowing in the vicinity of project area) are characterized by high transparency, low temperature, high dissolved oxygen, low carbonate alkalinity, moderate silicates value, sparse plankton and insect life and negligible to stray fish specimens. The mean water temperature of Tidong and its tributaries ranged 10.2-12.5 °C, pH 7.1-7.3; dissolved oxygen 9.96-10.83 ppm' silicates 0.53-0.92 ppm. Among the biotic factors phytoplankton contributed over 92% of total /plankton counts and was mainly represented by Bacillariophycea, Chlrophycea and Desmidacea. The major taxa encountered among the diatoms are *Navicula, Gomphonema, Cyclotella, Amphora, Cymbella* while the green algae were represented by *Plurococcus, closterium.* The *Zooplankton* contribution ranged between 6-8% in all the samples and these were mainly represented by *Difflugia* and *Centropyxis.*

The benthic community of the main stream and its tributaries were constituted mainly by insects – the Amphipods and Plannarian frequently occurring in other neighboring streams of kinnour valley were all together elusive. The insect specimens encountered belonged to families Ephemeroptera, Trichoptera, Plecoptera Neuraptera , and Diptera. The Ephemeropteron were represented by naiads of *Baetis, Heptagenia, Caenis,* Plecopteron by nymphs of Perla, Chloroperla's Neuroptera by larvae of Corydalinae; Trichopteron by Hydrosychae, cases of mystacides; Dipteron by Tabanus, Atherix and Pedicia.
Quantitatively speaking, the number of insects recorded per square meter were abysmally low ranging from 32-71/cum; the highest number were recorded from station 3 of Shatsheng stream and the lowest at station 7 of Ghatleng stream. However in all the insect samples, the percentage of may flies dominated (over 70%), the *Baetis* being the most ubiquitous in all the samples.

In order to catalogue the various fishes including Fry, Fingerlings etc. harboured by the Tidong stream/ tributaries, extensive fishing by cast net (1.0 dia; mesh 1.2cm) as well as by mosquito net cloth was done in rapids, riffles and other micro-habitats to which these denizens normally resides. On an average 20-30 cast nettings were operated by trained fisherman at each sampling site but no specimen of any fish or larvae was encountered, despite dislodging of stony bottom of the streams to find any clinging fish specimen. The shallow banks of the

stream/ tributaries were also *combed* with mosquito nets but not a single spawn, alevin or fish juvenile could be circumscribed. Efforts were also made to locate 'redds' by studying the sandy and shallow pockets of streams along the banks but being a non- breeding season of trout the effort proved abortive.(*Trout breed from late Nov. to Feb. in Himachal waters*).

The virtual *barren* status from fishery point of view of the Tidong and conjoining tributaries may be attributed to frequent flooding resulting high and variable velocities of stream's water flow; steep gradient of streams beds, ice formation during long winter months; frequent rolling of boulders, stones, gravels during rainy months, scanty food for fish and other organisms to devour and absence of any fish seed stocking programme by the state fisheries department in these waters.

The information furnished by the officials of the State Fisheries Department Himachal Pradesh revealed that in view of absence of any fish stock in the said streams, no fishing license was ever issued to any visiting angler or local residents since establishment of the department. Further in view of harsh terrain and inaccessibility of Moorang Valley during most part of the year, the state department too never transplanted or ranched any fish seed in the stream or adjoining khads.

To sum up, from the aforesaid study as well as personal communication with state government Fisheries officials, it can safely be concluded that presently the Tidong stream and the surrounding project area tributaries are devoid of any fish stock and no fishery either of subsistence level or recreational nature (sport fishery) is in operation. However with the completion of the Tidong hydel project and resultant creation of a reservoir ,the new water body of 1.9 ha is likely to offer tremendous potential for development of fisheries activity in the area. The icy cold water sheet could be stocked with exotic trout or Chinese carps and the water bowl could be transformed into rich storehouse of fishes. The lake trout (*Salvelinus namycush)* , brown trout (*Salmo trutta fario*) and arctic char (*Salvelinus alpinus*)are ideal species for stocking in the lake and developing sport and commercial fisheries therein.

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Annexure 4.3

Questionnaire for Sample Survey of Project Affected Population

QUESTIONNAIRE FOR SOCIAL SURVEY

1. Name of land Owner (s) / shareholder (s) :
2. Village / Panchayat / Tehsil :
3. Head of the family :
4. Religion / Caste :
5. Tribal (Yes / No) :
6. Family pattern (Joint/Nuclear/Individual :
7. Family members (numbers) :

Family Members Details

Sl. No.	Name	Relation with head	Sex / approx. age	marital status	Education	Occupation

8. Family annual Income (approx) :
9. Source of income :
10. Family assets (land in Ha., etc.) :
11. Livestock (type and numbers :
12. House (own / rented) :
13. Drinking water facility (source for drinking and others):
14. Cropping pattern :
15. Type of effects / losses due to project (Multiple answers) and quantify,
    a. Losing house

b. Losing partial house
c. Losing land (waste/ Agriculture/ orchard/others)
d. Losing partial land (waste/ Agriculture/ orchard/others)
e. Losing land and house
f. Losing partial land house
g. Losing entire holdings
h. Losing economic bases
i. Others….

16. Rehabilitation & Resettlement

    a. In case you are displaced (residentially) where & how far you prefer to be located? (Multiple answers)
        i. Within the village
        ii. Outside the village
        iii. Distance
    b. What do you expect for relocation (Multiple answers)
        i. House site
        ii. Constructed house
        iii. House Construction assistance
        iv. Others specify…
    c. What assistance do you need in the process of rehabilitation in the new place?
    d. In case you lose agriculture land, what assistance do you require in recovering this loss? (Multiple answers)
        i. A land for cultivation
        ii. Assistance for taking up allied activities,
        iii. Irrigation to the left over land
        iv. Crop loan
        v. Others specify

17. Other comments from the investigator:

Name & Signature of the investigator:

Date:

Annexure 5.1

Status Report on Utilization Of Catchment Area Treatment (CAT) Plan Funds under Tidong-I Hep (100 MW) (June, 2012)

STATUS REPORT ON UTILIZATION OF CATCHMENT AREA TREATMENT (CAT) PLAN FUNDS UNDER TIDONG-I HEP (100 MW)

(June, 2012)

NSL Tidong Power Generation Pvt Limited
NSL Icon, 4th Floor, 8-2-684/2/A
Road No.12, Banjara Hills
Hyderabad-500034.

Contents

I. INTRODUCTION

The total catchment area of river Tidong at proposed barrage site is 570.55 sq km, out of which about 95% is above permanent snowline (EL 4200m), which is either stony or snowbound area. No vegetation grows in the snowbound and stony area. Any kind of treatment is neither possible nor warranted in such area. The remaining 5% area where any kind of vegetation can grow is substantially denuded and deforested due to indiscriminate felling, repeated lopping of trees for fodder, uncontrolled excessive grazing and annual burning of forest. Reduction of vegetative cover in the recent times has worsened the ecosystem of Tidong valley, which is otherwise fragile due to its geomorphologic features.

Tidong-1 HEP is a run of the river scheme; hence storage of water is not anticipated. A small balancing reservoir has been provided leading to desilting chamber. Silt load coming with the flowing water is removed by passing the water through desilting chamber to prevent the wear and tear of the turbine. Catchment area treatment results into less sediment load of water to be removed by desilting chamber and less amount of silt discharge downstream of barrage back into the river. It, therefore, becomes imperative to take adequate preventive measures towards soil erosions at the planning stage itself.

The Catchment Area Treatment (CAT) Plan pertains to preparation of a management plan for treatment of erosion prone area of the catchment through biological and engineering measures; however, a comprehensive CAT plan should also include the social dimensions associated directly or indirectly with the catchment. A well-designed CAT plan should not only control the sedimentation of reservoir but should also provide a life support system to the local population through their active involvement. An effective CAT plan of a hydropower project is a key factor to make the project eco-friendly and sustainable.

II. CAT PLAN FOR TIDONG-I HEP

A detailed CAT Plan for Tidong-I HEP is prepared in October 2007 and has been approved by HP Forest Department. An amount of Rs. 72.484 millions has been deposited by NTPGPL with HP Forest Department for implementation. The CAT Plan will be for the period of 10 years. However most of the activities will be completed during the initial 5 years and later half of the plan period will be mainly for the maintenance of plantation area.

The Catchment Area Treatment Plan (CAT) aims to develop the catchment area in an integrated manner by improving vegetative cover over the degraded and blank areas through afforestation and bio-engineering measures. It also envisages an active participation of the local community and to treat the flood prone nallas, stabilization of Tidong River bank, road side slopes by providing suitable bio-engineering structures and soil conservation measures. Some of these include the following :

- Establishment of Nurseries
- Forest Conservation & Improvement of Tree Cover
- Pasture Improvement
- Silvicultural Operation
- Soil & Moisture Conservation Works
- Road side avenue Planting and Landscaping
- Forest Infrastructure Development
- Rural Infrastructure Development
- Treatment of Private Lands
- Fuel Saving Devices
- Rain/ Snow Harvesting Structure
- Wildlife Management
- Training and Studies
- Awareness and Publicity
- Operational Supports
- Agricultural Support
- Horticultural Support

- Animal Husbandry Support
- Development of ECO Tourism
- Eco Task Force
- Allied Activities, etc.

IV. COMPONENT WISE PHYSICAL AND FINANCIAL OUTLAYS

The following table presents the Physical and Financial Outlay of the CAT Plan for Tidong-I HEP.

Sl No	Particulars	Physical	Financial	% to total
1.	**Establishment of CAT Plan Nurseries**	**3 ha.**	**1500000**	**2.07**
2.	**Forest Conservation and Improvement of Tree Cover**			
(a)	Afforestation of Degraded Forest Lands			
	(i) Chilgoza Plantation	28 ha.	2755200	3.80
	(ii) Conifere & B/L Plantation	16 ha.	1328240	1.83
(b)	Replenishment Afforestation	30 ha.	2104500	2.90
(c)	Assisted natural Regeneration	35 ha.	1537275	2.12
(d)	Introductory Plantation of N.T.F.P	20 ha.	1117400	1.54
	Total	**129 ha.**	**8842715**	**12.20**
3.	**Pasture Development**			
(a)	Alpine Pasture	10 ha.	122000	0.17
(b)	Low Line Pasture	15 ha.	851550	1.17
	Total	**30 ha.**	**973550**	**1.34**
4.	**Subsidiary Silivicultural Operation**	**15 ha.**	**52500**	**0.07**
5.	**Soil and Moisture Conservation Works**			
(a)	Stabilization of Active Land Slide		6500000	8.97
(b)	Treatment of Nallas		8300000	11.45
(c)	River Bank Stabilization		4700000	6.48
(d)	Road Side Erosion Control		800000	1.10
(e)	Snow Avalanche Control		7260000	10.02
	Total		**27560000**	**38.02**
6.	**Road Side Avenue Planting and landscaping**		**800000**	**1.10**
7.	**Forest Infrastructure Development**			

Sl No	Particulars	Physical	Financial	% to total
(a)	Repair of Forest Paths		315000	0.43
(b)	Repair of Bridges		500000	0.69
(c)	Repair/Construction of Operational Buildings		1500000	2.07
	Total		**2315000**	**3.19**
8.	**Rural Infrastructural Development**			
(a)	Village Ponds and Tanks		400000	0.55
(b)	Repair of other Water Sources		1000000	1.38
(c)	Strengthening of Village Road and Path		660000	0.91
(d)	Construction of Foot Bridges		400000	0.55
	Total		**2460000**	**3.39**
9.	**Treatment of Private Land**	**10 ha**	**500000**	**0.69**
10.	**Fuel Saving Device**			
(a)	Construction of Crematoria	4 No	400000	0.55
(b)	Provision/Distribution of Solar Appliances		1044000	1.44
	Total		**1444000**	**1.99**
11.	**Rain/Snow Harvesting Structure**	**8 No**	**1200000**	**1.66**
12.	**Wildlife Management**			
(a)	Wildlife Improvement			
	(i) Survey and documentation of Wildlife over Moorang Forest Range I/C Lippa Asrang WLS	2 No	250000	0.34
	(ii) Incentive to local communities for fire prevention	L/S	250000	0.34
	(iii) Incentive to local communities for protection of wildlife	L/S	250000	0.34
	(iv) Incentive to community to regulate local and migratory Gaziers in Lippa Asrang WLS	L/S	250000	0.34
(b)	Intensive Management of Wildlife			
	(i) Habitat improvement in Lippa Asrang WLS	5 ha.	250000	0.34
	(ii) Wildlife Census Survey every alternate Years	5 No	250000	0.34
	(iii) Capacity Building of Staff and Community I/C Two Exposure visit in 3rd and 7th year	L/S	650000	0.90
	(iv) Support for communication-mobile connectivity	30 No	100000	0.14
	(v) Purchase of Equipment	L/S	250000	0.34
	(vi) Amenities to Staff and Labour (LPG etc)	50 No	200000	0.28
	(vii) Establishment of nursery with infrastructure for distribution of plants in public	1 ha	500000	0.69
	(viii) Annual maintenance of plants in nursery		400000	0.55
	(ix) Soil and moisture conservation	50 No	1000000	1.38
	(x) Monitoring, evaluation and impact assessment	3 No	600000	0.83

Sl No	Particulars	Physical	Financial	% to total
	survey			
	(xi) Audio-visual documentation and publicity	L/S	300000	0.41
	(xii) Research Studies (for 3 years)	3 No	600000	0.83
(c)	Eco Development Activities			
	(i) Support for Vermi compost development	L/S	100000	0.14
	(ii) Support for introduction of LPG for poor house holds around Lippa Asrang WLS	125 No	500000	0.69
	(iii) Socio-economic survey around Lippa Asrang WLS	1	100000	0.14
	(iv) Promotion of Eco-tourism	L/S	500000	0.69
(d)	Ex-Situ Support for Pheasant Breeding		925000	1.28
	Total		**8225000**	**11.35**
13.	**Training and Studies**		**300000**	**0.41**
14.	**Awareness and Publicity**		**200000**	**0.28**
15.	**Operational Supports**			
	(i) Establishment Charges of CAT Plan Division		2500000	3.45
	(ii) O.E		150000	0.21
	(iii) T.E		100000	0.14
	(iv) Office Equipment		150000	0.21
	(v) Amenities of Staff and Labour		80000	0.11
	(vi) Motor Vehicle		150000	0.21
	(vii) Operational Mobility	L/S	500000	0.69
	Total		**3630000**	**5.01**
16.	**Agricultural Support**		**400000**	**0.55**
17.	**Horticultural Support**		**400000**	**0.55**
18.	**Animal Husbandry**		**400000**	**0.55**
19.	**Development of Eco-Tourism**		**612028**	**0.84**
20.	**Provision for Eco-Taks Force**		**2472592**	**3.41**
21	**Provision for Allied Activities**		**1607185**	**2.22**
22.	**Contingency**		**6589457**	**9.09**
	Grand Total		**72484026**	**100.00**

V. STATUS OF IMPLEMENTATION

The implementation authority for the CAT Plan for Tidong-I HEP is the Project Officer-Cum Divisional Forest Officer, Kinnaur Forest Division stationed at Reckong Peo. The release of funds and monitoring is through the Conservator of Forest (C.F), stationed at Rampur. The implementation works have started during 2010-2011 and as per the information by the Project Officer-Cum Divisional Forest Officer, Kinnaur Forest Division stationed at Reckong Peo it is only about Rs 11088000/- (15% of the total planned outlay) is being spent till end of March 2012. The year wise progress and the activity implemented in the last two years is presented below.

VI. PROGRESS FOR YEAR 2010-2011

The Table below presents the progress on Physical and Financial outlays for Year 2010-2011 (upto 31-03-2011).

Sl No	Particulars /Name of Area	Physical (in ha/No of works)	Financial (Rs)
1.	**Establishment of CAT Plan Nurseries**		
	Skibba	1 ha	400000
2.	**Soil and Moisture Conservation Works**		
(a)	Stabilization of Active Land Slide		
	Chara ng Slip Part-I		59000
	Chara ng Slip Part-II		59000
	Khartak Slip Part-I		44000
	Khartak Slip Part-II		44000
	Lamber Slip Part-I		44000
	Lamber Slip Part-II		44000
	Thangi Slip Part-I		51000
	Thangi Slip Part-II		44000
	Pibber Slip Part-I		44000
	Pibber Slip Part-II		44000
	Total		**477000**
(b)	Treatment of Nallas		
	Charang Nalla	1	132500
	Kunnu Nalla	1	132500
	Lamber Nalla	1	132500
	Total	**3**	**397500**
(c)	River Bank Stabilization		

Sl No	Particulars /Name of Area	Physical (in ha/No of works)	Financial (Rs)
	Holdo River Bank	240 m	1069180
	Rowang Khad	140m	568500
	Total	**380m**	**1637680**
(d)	Snow Avalanche Control		
	Kharba Nalla-I		73500
	Kharba Nalla-I		73500
	Kanikda Nalla		73500
	Total		**220500**
	Total SMC Works	**383**	**2732680**
3.	**Forest Infrastructure Development**		
(a)	Repair of Forest Paths or Roads		
	Rough Solling of approach road to FRH Akpa	1	200000
(b)	Repair/Construction of Operational Buildings		
	Repair of Range Office	1	100000
	Total	**2**	**300000**
4.	**Operational Supports**		
	Office Expenses		23320
	Travelling Allowances		24000
	Motor Vehicle		20000
	Total		**67320**
	Grand Total		**3500000**

VII. PROGRESS FOR YEAR 2011-2012

The Table below presents the progress on Physical and Financial outlays for Year 2011-2012 (upto 31-03-2012).

Sl No	Particulars /Name of Area	Physical (in ha/No of works)	Financial (Rs)
1.	**Establishment of CAT Plan Nurseries**		
	Lambar		500000
2.	**Soil and Moisture Conservation Works**		
(a)	Stabilization of Active Land Slide		
	Chara ng Slip Part-I	23	341000
	Chara ng Slip Part-II	17	341000
	Khartak Slip Part-I	31	256000
	Khartak Slip Part-II	14	256000

Sl No	Particulars /Name of Area	Physical (in ha/No of works)	Financial (Rs)
	Lamber Slip Part-I	17	256000
	Lamber Slip Part-II	9	256000
	Thangi Slip Part-I	60	299000
	Thangi Slip Part-II	47	256000
	Pibber Slip Part-I	52	256000
	Pibber Slip Part-II	24	256000
	Total	**294**	**2773000**
(b)	Treatment of Nallas		
	Charang Nalla	39	767500
	Kunnu Nalla	59	767500
	Lamber Nalla	19	767500
	Total	**117**	**2302500**
(c)	River Bank Stabilization		
	Holdo River Bank	178m	430820
	Rowang Khad	75m	231500
	Total	**253m**	**662320**
(d)	Snow Avalanche Control		
	Kharba Nalla-I	15	426500
	Kharba Nalla-I	5	426500
	Kanikda Nalla	76	426500
	Total	**96**	**1279500**
	Total SMC Works		**7017320**
4.	**Operational Supports**		
	Office Expenses		26680
	Travelling Allowances		24000
	Motor Vehicle		20000
	Total		**70680**
	Grand Total		**7588000**

VIII. FINANCIAL PROGRESS AGAINST TOTAL OUTLAYS

The Table below presents the financial progress against the total outlays for the works that have been initiated so far under CAT (upto 31-03-2012).

Sl No	Particulars	Total Financial Outlay (Rs)	Achievement (Rs)	% achieved to total Outlay
1	Establishment of CAT Plan Nurseries	1500000	900000	60.00
2	Forest Conservation and Improvement of Tree Cover	8842715	0	0.00
3	Pasture Development	973550	0	0.00
4	Subsidiary Silivicultural Operation	52500	0	0.00
5	Soil and Moisture Conservation Works	27560000	9750000	35.38
6	Road Side Avenue Planting and landscaping	800000	0	0.00
7	Forest Infrastructure Development	2315000	300000	12.96
8	Rural Infrastructural Development	2460000	0	0.00
9	Treatment of Private Land	500000	0	0.00
10	Fuel Saving Device	1444000	0	0.00
11	Rain/Snow Harvesting Structure	1200000	0	0.00
12	Wildlife Management	8225000	0	0.00
13	Training and Studies	300000	0	0.00
14	Awareness and Publicity	200000	0	0.00
15	Operational Supports	3630000	138000	3.80
16	Agricultural Support	400000	0	0.00
17	Horticultural Support	400000	0	0.00
18	Animal Husbandry	400000	0	0.00
19	Development of Eco-Tourism	612028	0	0.00
20	Provision for Eco-Taks Force	2472592	0	0.00
21	Provision for Allied Activities	1607185	0	0.00
22	Contingency	6589457	0	0.00
	Total	**72484026**	**11088000**	**15.30**

IX. STATUS OF OTHER ACTIVITY

The status of other important activity under CAT Plan and other is as follow:

- No activity has been carried out under establishment of Pheasant Breeding Centre at Sangla.
- No activity has been carried out under Compensatory Afforestation.

Annexure 5.2

ADM –Cum-Land Acquition Collector Letter for Land Compensation

Office of the ADM-Cum-Land Acquisition Collector, Pooh, District Kinnaur, H.P

Award No. 01/2009 Date for Announcement of award 30th July, 2009

In the matter of:

Acquisition of land for the construction of 100 MW Tidong – I Hydroelectric Project in Tehsil Moorang, District Kinnaur, H.P.

AWARD:

Award under section 11 of the Land Acquisition Act, 1894 for the acquisition of land for public purpose, namely, for the construction of 100 MW Tidong – I Hydroelectric Project by NSL Tidong Power Generation Private Limited (incorporated by M/s Nuziveedu Seeds Limited as special purpose vehicle company for the implementation of the said project), 78A, Sector – I, Phase – I, New Shimla, Shimla, Himachal Pradesh, which is a Company as per the provisions of the Section 3 (e) of the Act ibid, hereinafter referred to as the Company, at its own cost.

I. NOTIFICATION UNDER SECTION 4:

That the Government of Himachal Pradesh vide Notification No. Vidyut-Chh-(5)-31/2006 dated 12.10.2007 issued under Section 4 of the Land Acquisition Act, 1894, hereinafter referred to as the 'Act', notified that the land mentioned therein was proposed to be acquired for public purpose, namely, for the construction of 100 MW Tidong – I Hydroelectric Project by Company, the above mentioned Company, at its own cost. The land proposed to be acquired is situated in villages Lamber, Lizang and Ruwang of Tehsil Moorang, District Kinnaur, H.P. Public notice of the substance of the notification was given in convenient places in the locality and to the persons interested through the Tehsildar Moorang and Halqa Patwaries. The dates of publication through various modes/means are as under:-

(i)	The official Gazette of H.P. (Raj Patra)	-	29th October, 2007
(ii)	The News Paper 'Amar Ujala'	-	27th October, 2007
(iii)	The News Paper 'The Hindustan Times'	-	27th October, 2007
(iv)	Wide publicity in the locality	-	8th November, 2007

II. OBJECTIONS:

No objection was received from any quarter, including the interested persons, within the stipulated period of one month from the date of last publication. However, after the expiry of this period certain claims/objections were raised by some Associations and the Gram Panchayats Rispa, Thangi and Moorang relating to customary tribal rights, statutory provisions in Scheduled Tribal Area, Local Area Development Fund, Re-evaluation and enumeration of trees, etc., which were forwarded to the Deputy Commissioner Kinnaur and the State Government by the Land Acquisition collector from time to time.

III. DECLARATION UNDER SECTION 6 AND DIRECTIONS UNDER SECTION 7:

Vide notification No. Vidyut –Chh-(5)-31/2006 dated 7th May, 2008 issued u/s 6 of the Act ibid, it was declared that the acquisition of said land is required to be done for the public purpose as mentioned above. Accordingly, as per the provisions of the Section 7, the Land Acquisition Collector-Cum-Additional District Magistrate Pooh was directed to take order for the acquisition of the land in question. The publication details of the land in question are as under:-

(i)	The official Gazette of H.P. ('Raj Patra')	-	9th May, 2008
(ii)	The newspaper 'Amar Ujala'	-	14th May, 2008
(iii)	The newspaper 'The Hindustan Times'	-	14th May, 2008
(iv)	Wide publicity in the locality	-	10th September, 2008

IV. MEASUREMENT AND CLASSIFICATION:

The land proposal to be acquired was marked out, measured and planned as per the provisions of the Section 8 of Act after spot verification by the Revenue Field functionaries. The total area of the land was found to be the same as per the declaration under Section 6 and 7, i.e., 03-20-11 Hectares. The details of the measurement of the area and classification of land are as under:

District	Tehsil	Village	Khasra No.	Area (Ha)	Classification
Kinnaur	Moorang	Lumbar	31	00-15-68	Gair Mumkin Khad
			32	00-06-35	Gair Mumkin Khad
			33	00-07-08	Ghasni
			34	00-18-17	Ghasni
			35	00-05-62	Ghasni
			37	00-04-64	Ghasni
			39	00-06-23	Ghasni
			40	00-11-68	Ghasni
			61	00-06-11	Bagicha Kulahu Doyam
		Lizang	129	00-07-05	Gair Mumkin Dwar
			130	00-00-88	Gair Mumkin Khandar
			131	00-05-60	Gair Mumkin Dwar
		Ruwang	16	00-15-14	Bagicha Kulahu Awwal
			17	00-07-00	Banjar Kadeem
			18	00-04-00	Banjar Kadeem
			19	00-02-62	Banjar Kadeem
			439/20	00-00-36	Banjar Kadeem
			440/20	00-02-26	Banjar Kadeem
			21	00-04-88	Banjar Kadeem
			22	00-02-97	Banjar Kadeem
			23	00-02-75	Banjar Kadeem
			24	00-03-12	Banjar Kadeem
			25	00-02-40	Banjar Kadeem
			26	00-05-14	Banjar Kadeem
			27	00-07-84	Banjar Kadeem
			28	00-07-54	Banjar Kadeem
			29	00-05-98	Banjar Kadeem
			30	00-05-33	Banjar Kadeem
			31	00-05-46	Banjar Kadeem
			32	00-08-55	Bagicha Bakhal Doyam
			33	00-09-30	Bagicha Bakhal Doyam

			34	00-08-55	Bagicha Bakhal Doyam
			35	00-08-80	Bagicha Bakhal Doyam
			36	00-10-37	Bagicha Bakhal Doyam
			37	00-08-91	Bagicha Bakhal Doyam
			38	00-08-96	Bagicha Bakhal Doyam
			38/1	00-00-25	Gair Mumkin Kotha
			39	00-08-87	Bagicha Bakhal Doyam
			40	00-08-60	Bagicha Bakhal Doyam
			40/1	00-00-36	Gair Mumkin Kotha
			41	00-08-18	Bagicha Bakhal Doyam
			42	00-09-00	Bagicha Bakhal Doyam
			43	00-08-39	Bagicha Bakhal Doyam
			43/1	00-00-16	Gair Mumkin Kotha
			44	00-08-02	Bagicha Bakhal Doyam
			44/1	00-00-25	Gair Mumkin Kotha
			45	00-08-10	Bagicha Bakhal Doyam
			46	00-07-84	Bagicha Bakhal Doyam
			47	00-08-77	Bagicha Bakhal Doyam
			Kitta 49	**03-20-11**	

(i) Irrigated land/Orchard = 01-60-46 Ha

(ii) Un-irrigated land/Other = 01-59-65 Ha

Within the stipulated period of one month from the date of last publication of the declaration under Section 6, no objection/claim was received from any quarter, hence, the same classification and measurement were considered for calculation of the amount of compensation. However, certain issues were disposed off during inquiry under Section 9.

V. NOTICES AND CLAIMS:

In pursuance of the directions of the Govt. of H.P. contained in the notification/declaration under Section 7 of the Act, notices were issued under Section 9 to all the persons, who appeared to be interested in the land under acquisition. They were specifically required to state the nature of their respective interests in the land, the amount and particulars of

their claims to compensation and their objections (if any) to the measurement made under Section 8. These notices were duly served and also given wide publicity in the locality regarding the intention of the Govt. to give possession of the land involved in favour of the acquiring Company. During inquiry, the entries of relevant Jamabandis were read over and explained to the interest holders/authorized representatives.

In matters, where the classification/title of the land to be acquired had been challenged, it was pronounced by the Land Acquisition Collector that the Revenue Record has the 'Presumption of Truth' attached to it. Moreover, it can only be corrected by adopting the procedure prescribed under the H.P. Land Records Manual or upon the orders of a competent Revenue/Civil Court having jurisdiction.

Secondly, the company has obtained NOC's from the concerned Gram Sabha.

Thirdly, the issue of trees and kutcha/pucca structures and evaluation thereof has been referred to the competent authorities and compensation for the same determined as per prescribed norms.

Fourthly, in some cases compensation at a rate ranging between Rs. 80,000/- to Rs. 1,50,000/- per biswa has been demanded without producing any supporting evidence/precedent.

Fifthly, some of the interested persons have demanded land in exchange/Nautor proportionate to their share being acquired. It was advised that presently there is a bar on these grants, however, in the proposed Rehabilitation and Resettlement Scheme for this project these grants/alternatives have been addressed to.

VI. MARKET VALUE OF THE LAND:

To assess the market value of the land to be acquired, the average market value of the land in Up-Mohal Ruwang of the period of one year prior to the issue of notification (i.e. 1st July, 2007 to 30th June, 2008) was sent to the District Collector, Kinnaur for approval. There had been no transactions in Up-Mohal Lizang and Up-Mohal Lumber, therefore, the one year average market value as per sale-deeds w.r.t adjoining Up-Mohal Rispa and Up-Mohal Pibber

corresponding to the same period were submitted for approval accordingly. As per the office records, the rates approved by the District Collector Kinnaur have been tabulated below:

S. No.	Classification	Up-Mohal Ruwang (Rs. per Centiare)	Up-Mohal Lizang (Rispa) (Rs. per Centiare)	Up-Mohal Lumber (Pibber) (Rs. per Centiare)
1.	Bagicha Kulahu Awwal	110.00	110.00	416.67
2.	Kulahu Awwal	35.20	35.20	-------
3.	Kulahu Doyam	33.00	33.00	94.94
4.	Bagicha Kulahu Doyam	88.00	88.00	-------
5.	Bagicha Bakhal Doyam	95.33	95.33	361.11
6.	Bani	2.93	2.93	-------
7.	Banjar Kadim	5.50	5.50	20.83
8.	Ghasni	3.67	3.67	11.11

During the course of inquiry under Section 9 of the Act, some of the interested persons verbally contended that the acquisition of identical land for laying of transmission towers by the HPSEB in the same Tehsil and adjoining Mohals is being done at much higher rates. However, no documentary proof was enclosed. Similar procedure was claimed to have been adopted w.r.t. Kashang Hydroelectric Project being executed by the Himachal Pradesh Power Corporation limited. Obviously, more objection/claim without evidence cannot form the basis of assessment of market value/determination of the compensation amount.

A copy of the award announced by the Land Acquisition Collector-Cum-Sub Divisional Officer (Civil) Nichar at Bhawanagar w.r.t acquisition of private land for the construction of 400 KV D C Transmission Line from Karchham to Jhakri was supplied and placed on record. It has been mentioned therein that as per the letter no. MPP-P(10) 8/99 dated 11.10.2007 issued by the worthy Additional Chief Secretary (MPP and Power) to the Government of H.P., the amount of compensation for acquisition of private land in District Kinnaur cannot be less than that mentioned below:-

(i) Irrigated land/Orchard = Rs. 4,69,995/- per bigha
(ii) Un-irrigated land/Other = Rs. 1,04,416/- per bigha

To the above mentioned amount 10% enhancement per year is justifiable. Since another minimum three months are likely to be taken in the approval of the award by the competent authority i.e., the State Government and the pronouncement thereafter, so 20% increase over the amount mentioned as above is proposed. It is pertinent to re-iterate here that the acquisition of

private land in the Tribal, hilly and DDP block is being for the Company at its own cost, hence, a liberal view is solicited. By adding 20% enhancement, the rate of compensation, which is considered just, fair and equitable in light of the tourism/horticultural potential of the land is determined as under:

(i)	**Irrigated land/Orchard**	=	**Rs. 5,63,994.00** **i.e. Rs. 749.99 per Centiare**
(ii)	**Unirrigated land/Orchard**	=	**Rs. 1,25,299.20** **i.e. Rs. 166.62 per Centiare**

The rate shall be the basis of determination of compensation in all the three Up-Mohal, viz. Lizang, Ruwang and Lumbar.

VII. HOUSES AND OTHER STRUCTURES:

The value of 4 no. Kutcha/semi-pucca/pucca structures built up on the land to be acquired was got assessed through the Executive Engineer, HPPWD, B&R Division Kalpa and it amounts to **Rs 53,835.00**.

VIII. TREES

There are 39 Nos. fruit bearing and 134 Nos. non fruit trees on the acquired land. The enumeration and evaluation of these trees was done by the Forest/Horticulture Department. As per their assessment, the total cost of these trees has been worked out to be **Rs 23,89,692.00** and said amount is added to the award.

IX. SOLATIUM U/S 23(2) AND ADDITIONAL AMOUNT U/S 23(1A) OF THE ACT

Compulsory acquisition charges @ 30% of the market value are to be paid to the interested persons under section 23(2) of the Act, which is worked out as **Rs 51,41,403.00**. The interest holders are also entitled for additional amount @ 12% per annum of the market value under Section 23(1A) of the Act w.e.f the date of publication of the notification under Section 4 to the date of award, which is worked out to be **Rs 35,49,681.00**. Both the above mentioned amounts are thereby added to the award.

X. TOTAL COMPENSATION:

The total compensation as finally determined and proposed to be awarded for the acquired land is as under:

1.	Cost of land	= Rs. 1,46,94,481.00
2.	Cost of trees	= Rs. 23,89,692.00
3.	Cost of houses/structures	= Rs. 53,835.00
	Sub Total	**= Rs. 1,71,38,008.00**
4.	30% Compulsory Acquisition Charges u/s 23(2)	= Rs. 51,41,403.00
5.	12% Additional Charges per Annum u/s 23(1A) from the date of publication of notification u/s 4 to the date of award by the collector (from 8th November, 2007 to 30th July, 2009 = 600 Days)	= Rs. 35,49,681.00
	Total	**= Rs. 2,58,29,092.00**

Rupees Two Crore Fifty Eight Lac Twenty Nine Thousand Ninety Two only.

XI. MODE OF PAYMENT:

In entire amount of compensation payable to each of the interested persons is mentioned in the statement under para-55, Standing Order No. 28 issued by the Ld. Financial Commissioner attached with the award.

XII. REDUCTION OF LAND REVENUE

The net amount of land Revenue chargeable w.r.t the acquired land comes out to be **Rs 28.04** per annum. In accordance with the provisions of the para 81 (iii) of the Standing Order No. 28 issued by the Ld. Financial Commissioner the capitalised value @ 25 times the land revenue comes out to be **Rs. 701.00** which shall be paid by M/s NSL Tidong Power Generation Private Limited for the reduction of land revenue from the rent roll.

Thereafter, the land shall vest in Company, the company free from all encumbrances.

Sd/-

Land Acquisition Collector-Cum-
Additional District Magistrate,
Pooh, District Kinnaur, H.P.

No. SDP-III-71(Peshi) 2009- 3631 Dated :- 19-12-09

Copy forwarded to the following with the comments that the Item No. X of Final Award circulated vide this office Endst. No. SDP-III-71(Peshi)/2009-1669-70 dated 3-9-2009 needed correction in the amount which has been corrected in the present copy of the Award as such amount mentioned in the item No. X of Award circulated earlier dated 3-9-2009 may please be ignored.

1. The worthy Principal Secretary (Power) to the Government of H.P. for information please.
2. The District Collector, District Kinnaur at R/Peo for information please.
3. The Tehsildar Moorang for compliance alongwith copy of award.
4. The Vice President, NSL Tidong Power Generation Pvt. Limited, Himvik Niwas, Kothi Mor, Reoekong Peo, District Kinnaur, H.P. for information please

Land Acquisition Collector-Cum-
Additional District Magistrate,
Pooh, District Kinnaur, H.P.

Annexure 5.3

Resettlement and Rehabilitation Scheme for Tidong-I

Registered

No. KNR-II-211 (GB)/2012-
Office of the Deputy Commissioner,
Kinnaur district at Reckong Peo.

To

The Principal Secretary (Rev) to the
Government of H.P. Shimla-2.
Dated:-

Subject: Revised Resettlement and Rehabilitation Scheme for Project affected families of Tidong-1 Hydro Electric Project (100 MW).

Sir,

Kindly refer to your office letter No. Rev(PD)F(2)-8/2002-Loose dated 25th June,2012 on the subject cited above.

The Resived draft of Resettlement and Rehabilitation scheme in respect of project affected families of Tidong-1 Hydro Electric Project (100 MW) is enclosed herewith for favour of approval and taking further necessary action please.

Encls. As above.

Yours faithfully,

Deputy Commissioner,
Kinnaur district at R-Peo.

Endst. No. as above/- 1031102 Dated:- 30/11/12

Copy forwarded to the following alongwith copies of draft Resettlement and Rehabilitation scheme for favour of information and necessary action please.

1. The Principal Secretary (MPP & Power) to the Govt. of H.P. Shimla-2.
2. The Secretary (IT, BT and S&T) to the Govt. of H.P. Shimla-2.
3. The Vice President, NSL Tidong Power Generation Private Limited, Him Vir Niwas, Subji Mohalla, Kothi Mor, Reckong Peo, District Kinnaur, H.P.

30/11/12

Deputy Commissiner
Kinnaur district at R-Peo.

Resettlement and Rehabilitation Scheme for Project affected families of Tidong-I Hydro Electric Project (100 MW)

Whereas for construction of Tidong Hydro Electric Project (100 MW) besides Government land, Private land has also to be acquired by state Government for handing over to the Project Authority. Due to acquisition of private land for the project, many families will be affected though none is house less and landless.

And whereas to protect the interests of the project affected families, adequate arrangements for the Resettlement and Rehabilitation have to be made in accordance with Rule-8-A of the Himachal Pradesh Nautor land Rules, 1968, which provides for framing of special scheme for Resettlement and Rehabilitation of persons who are displaced as a result of anything done for any public purpose.

Now, therefore, the Government of Himachal Pradesh and M/s Nuziveedu Seeds Private Limited hereby make the following scheme for Resettlement and Rehabilitation of persons affected on account of acquisition/ Private negotiations/lease of land other immovable properties under the Land Acquisition Act, 1894 or otherwise for the construction of Tidong-I Hydro electric (100 MW).

Part-I

1.1 This scheme may be called for Resettlement and Rehabilitation scheme of M/s NSL Tidong-I Power Generation Private Limited for the project affected families of Tidong-I Hydro Electric Project (100 MW) hereinafter called R&R Scheme for Tidong –I Hydro Electric Project.

1.2 It shall extend to the whole of area affected or likely to affected as a result of construction of Tidong-I Hydro Electric Project (100MW) with in Moorang Tehsil of Kinnaur District of Himachal Pradesh.

1.3 The Commissioner for Resettlement and Rehabilitation appointed by the state Government for supervision the relief and rehabilitation works of various projects in Himachal Pradesh would also be the Commissioner for Resettlement and Rehabilitation under this Scheme. The Resettlement and Rehabilitation works shall be carried out under his direction and guidance.

1.4 The Deputy Commissioner Kinnaur in whose jurisdiction the Project Affected Area falls, will be the Administrator for Resettlement and Rehabilitation.

1.5 In this scheme, unless the context otherwise requires:

(a) Family

"family means husband/wife of the persons whose is entered as owner/ co- owner of land in the Revenue Record, their children including step or adopted children, grand children and includes his/her parents and those brother and sisters who are living jointly with him/her as per entries of Panchayat Parivar Register as on the date of notification under section-4 of Land Acquisition Act 1894.

Explanation

Only the Panchayat Parivar Register entry, as it stood on the date of notification under section-4 of the Land Acquisition Act, 1894, shall be taken in to account for the purpose of "separate family" for rehabilitation benefits as well as for consideration of employment.

(b) Project Affected Area/Affected Zones means area as notified by Deputy Commissioner Kinnaur, where land is acquired for construction of any component of project infrastructure, township, offices, construction facilities, welfare facilities etc. for the Project. Unit for declaring Project Affected area would be Revenue village.

(c) Project Affected Family (PAF's)

The Project affected families means a family/person whose residence or other properties or source of livelihood are affected by the process of acquisition of land for the Project and who has been residing continuously for a period of not less than three years proceeding the date of declaration of the Project Affected Area/ Affected Zone or practicing any trade, occupation or vocation continually for a period of not less then three years in the Project Affected Area/ Affected Zone, preceding the date of declaration of the Affected Zone.

Explanation :

The date of declaration will be taken as date of notification under section 4 of Land Acquisition Act, 1894. The Period of residence of not less then three years will not be applicable in respect of PAFs who own land in the Project Affected Area. The Deputy Commissioner Kinnaur would determine the period of residence of not less than three years as well as effected on source of livelihood.

(c) (1) Project Affected Family rendered landless

The Project Affected Family rendered landless means that family whose agricultural land is acquired for the Project and in whose case balance agriculture land left after acquisition is less than 20 (Twenty Bighas)

For this purpose agriculture land had within the Project area by all such persons and their family member shall be reckoned. The landless Project Affected Families shall be certified by the Deputy Commissioner Kinnaur.

(c) (II) Project Affected Family rendered houseless

The Project Affected Family rendered houseless means the family whose dwelling house is acquired for the Project. This will be certify by the Deputy Commissioner Kinnaur.

(d) Shopkeepers Displaced by the Project

Displaced Shopkeeper's means the shopkeepers, who had taken shops on rent and had been Genuinely running business therein as on the date of issuance of notification under section 4 of Land Acquisition Act, 1894 and whose such shops is acquired for the Project or the Shop owner who was himself running his business in such shops.

(e) Project Authority

"Project Authority in normal connotation refer to Project developer of Project Proponent e.g. State Government or Public Sector under taking implementing a Project etc. i.e. M/s NSL Tidong Power Generation (P) Ltd. In this case.

(f) words and expressions used in this scheme but not defined herein shall have the same meaning as assigned to them in the Himachal Pradesh Nautor Land Rules 1968.

Part-II

Sanction of Rehabilitation grant, infrastructural grant or facilities and grand to the Project affectrd families rendered landless or houseless or both.

2.0 Resettlement Grant.

2.1 The project Affected Family whose land has been acquired shall be eligible for resettlement grant in the following manner.

1. Family whose land acquired for the project was more than 1 bigha Rs. 1,20,000/-
2. Family whose land acquired for the project was less than 1 bigha Rs. 1,10,000/-.
3. Family whose cattle shed is acquired in the project area, shall get one time financial assistance of Rs. 50,000/-.

2.2 Each project affected family, which is rendered houseless will be provided an independent house with a built up plinth area of 60 Sqm on a plot of 5 biswa. Alternatively PAF can also be offered a plot of size, which allows construction of built up house of 60 Sqm. Plinth area plus construction cost of the house @ Rs. 5500/- per Sqm. A family, which does not opt for House/plot but constructs his house his own cost shall be paid the Construction cost of the house @ Rs. 5500/-per Sqm for a house 60 Sqm. In addition to this cost of 5 biswas of land will be paid by the Company.

The rate will be the same on which company had bought the land.

2.3 Displaced shopkeepers will be given shops in allotment in the market complex of the project colony wherever the project authority constructs such market places. The shops so given shall be Pucca shops with minimum size of 10x15' or size equivalent to it. In addition to this they will be entitled to one time displacement grant of Rs. 50,000/- . They or their successors in interest for bonafide use shall utilize the commercial premises/Shops allotted to such displaced shopkeepers only. In case the project is unable to provide shops, displaced shopkeepers (owner of the shops) shall get financial Assistance of Rs. 85,000/-.

2.4 Infrastructural facilities in the Rehabilitation colony will include water supply, sewerage, drainage, electricity, streets and approach paths/roads at the Project cost.

2.5 Transportation at the project cost will be provide for physical mobilization of all the PAFs and displaced shopkeepers, as soon as the houses/shop get constructed in the Rehabilitation colony or a sum of Rs. 10,000/- in lum sum shall be given in lieu and the option will be invited from the affected families/shopkeepers regarding this in advance.

2.6 Stamp duty and other fees payable for registration shall be borne by the Project Authority. The Deputy Commissioner Kinnaur will be the sanctioning authority for resettlement grant which shall be provided by the Projects Authorities and placed at the disposal of the Deputy Commissioner for disbursement to the eligible concerned.

Note: All the above grants shall be in addition to the compensation paid under Land Acquisition Act, 1894.

3.0 Employment:-

3.1 One member of each Project Affected Family rendered landless will be provided employment by the Project Authority in the category of skilled/ semiskilled/unskilled workmen subject to fulfilling the requisite criteria/qualification. It would be assured that land oustees eligible for employment as mentioned above are given chance first and normal recruitment would be made only if none are available from amongst them. In that case people of the Project Affected Area shall be given preference. The Project Management Shall provide appropriate training in time to the landless eligible persons so that trained persons as per requirement of the Project could be prepared. The company will supply list of all types of post which company fill up with salary etc. to the Deputy Commissioner. The following criteria will be adhered to by the Deputy Commissioner concerned for providing of preference while sponsoring the names for employment.

(a) Families whose land acquired for the project work more then 1 bigha of land.

(b) Family whose land acquired for the Project was less than 1 bigha of land.

(c) Family whose dwelling house was acquired for the project.

(d) Family whose shop was acquired for the project.

(e) Family whose cattle shed was acquired for the project.

(f) Others in the project affected area shall also be included if found eligible.

Within these categories preference will be given on the basis of quantum of land acquired. Those who loss more land will come first.

Company will keep 70% jobs reserved for Himachalis.

3.2 Secondary Employment:-

There may be families who are not covered under the Project Affected Family rendered landless/houseless/shopless as given at 1.5(c)(i)(c)(ii)(iii) and (d) but there land is acquired for the project, they shall have to be helped in starting some gainful occupation or getting training. Therefore, such families who may not be accommodated in direct employment, the project authorities will help them in any one of the following manners:-

3.2.1 The Project Authorities will considered to award petty contracts to these persons. cooperatives of eligible families on preferential basis so that they may be engaged in such jobs. Further the Project Authorities will advise their contractors to engage eligible persons from affected families on a preferential basis wherever possible during construction stage.

3.2.2 The Project affected families (including rural are artisans/Smart traders and self employed persons) will be assisted to start various suitable self employed occupations which include daily farming, poultry, weaving, bakery, handicraft, cottage industries units/ shops and hiring of vehicles to the Project Authority as per scheme to be drafted by them. The Project Authority will help them under the Project framed by Deputy Commissioner by giving them seed capital.

"only those families who have not been provided with employment in the Project or have not been allotted any shop will be eligible for this grant."

Explanation:-

The Deputy Commissioner Kinnaur will certify that their source of livelihood in case of rural artisan, small traders and self employed persons have been adversely affected only then they will be eligible.

3.2.3 The Project Authority will provide support service for project affected families interested in horticulture, Agriculture and veterinary.

PART-III

4.0 Community Development/Social responsibility:-

4.1 Project Affected areas/ villages, after due assessment done by the committee constituted under the chairmanship of the Deputy Commissioner will be provided with infrastructural up gradation scheme which will include:-

- Mobile health Centre/Van
- Approach road.
- Internal roads.
- Drinking Water supply schemes.
- Community/welfare centres.
- facilities/ furniture/lab equipment etc. for school.
- Merit scholarship.
- Playground.
- sanitation facilities.
- Street lighting.
- Agriculture/Horticulture camps & facilities.

4.2 The Project authority will pay Rupees 15 Lacs annually as the social responsibility towards the effected area to the Deputy Commissioner, Kinnaur after start of generation of electricity. The Deputy Commissioner will sanction schemes out of these funds in affected village.

4.3 Free of cost LPG gas cylinder to each effected family would be provided by the Project Authority.

4.4 Fatherless and Motherless girls and boys of effected area will be paid and amount of Rupees 1,00,000/- at the time of their marriage. And only fatherless girls of the affected area will be paid an amount of Rupees 51,000/- at the time of their marriage by the Project Authority.

4.5 **Infrastructural facilities:-**

The Project Authorities will build such infrastructural development works in the vicinity of the Project Area that may be essentially required for the construction of the Project and or benefit the local population. These works may be mutually decided with Government of Himachal Pradesh.

4.6. an amount of 7 Lacs for scholarship to the boys and girls of Project Affected Families (PAFs)/area will be paid annually by the Project Authority to the Deputy Commissioner Kinnaur. The Deputy Commissioner will sanction scholarship out of this fund on merit cum Poverty basis.

Note:-

Kindly again refer to clause 4.6 of Implementation Agreement dated 28.07.2006 for the Project, which reads as under:-

"The first party (Govt. of H.P) shall subject to the approval of Government of India or any other competent authority prepare a R&R Plan in association with second party for local residents likely to be adversely affected or displaced due to the construction of the project at the site at as on the effective date...."

The effective date is 28.07.2006, the date of signing of Implementation Agreement, in terms of its clause 1.2.21.

National R&R Policy-2007 came into force on 31.10.2007 and as such policy should not been applied on R&R plan of the project.

In fact National R&R Policy,2007 (NRRP-2007) applies to the projects where large scale involuntary displacement of 400 or more families enmasse in plain area or 200 or more families enmasse in tribal or hilly areas takes place as per clauses 4.1, 6.1 and 7.22.1 of NRRP-2007.

But this project involves only 29 project affected families and none of them have became houseless or displaced or adversely affected. Therefore, under this ground also NRRP-2007 should not be made applicable to Tidong—I HEP.

Annexure 5.4

Letter for Chilgoza Compensation

(October, 2012)

Summary of Letter for Chilgoza Compensation

Addressed to the:

Panchayat Development Committee and Head of the Three Concerned Panchayat

Based on the communication received and discussion, NSL Power Limited proposes to compensate the Panchayat of Moorang, Thangi and Rispa for the loss of Neoza tree on an annual basis.

The compensation will be based on the following productivity considered upfront:

- From compartment no. 194: 2.05 kg (Two Kilograms and Fifty Grams) of yield per tree per year for 156 trees.
- Compartment no. 192: 2.63kg (Two Kilograms and Sixty Three Grams) of yield per tree per year for 131 trees.
- Compartment no. 193: 2.63kg (Two Kilograms and Sixty Three Grams) of yield per tree per year for 111 trees.

The payment will be made by 30thNovember of each year based on the bulk rate in Reckong Peo that is prevailing in the First Week. Company will disburse the compensation to the Panchayats through the Deputy/Additional District Magistrate. The compensation will be paid for a period of 40 years commencing from 2013 to 2052. This additional cost will be incorporated in the final R&R Plan.

NSL POWER
Clean Energy for a Green Tomorrow

NSL Tidong Power
Generation Pvt. Ltd.
Himvir Niwas, Kothi Mor,
Reckong Peo, Tehsil Kalpa,
Distt. Kinnaur (H.P.)-172 107
Ph : 91-01786-223366
Fax : 91-01786-223029
Email: nsltydel.reckongpeo@nslpower.com

संख्याः एन0एस0एल0–टी/जी-4/2012–13 दिनांकः 30.10.2012

सेवा में,

1. अध्यक्ष,
   टिडोंग वैली पंचायत कल्याण समिति (ठंगी, मूरंग, रिस्पा),
   गांव व डा0 ठंगी,
   तहसील मूरंग, जिला किन्नौर (हि0 प्र0)
2. श्रीमती प्रधान महोदया,
   ग्राम पंचायत ठंगी,
   गांव व डा0 ठंगी,
   तहसील मूरंग, जिला किन्नौर (हि0 प्र0)
3. श्रीमान् प्रधान महोदय,
   ग्राम पंचायत मूरंग,
   गांव व डा0 मूरंग,
   तहसील मूरंग, जिला किन्नौर (हि0 प्र0)
4. श्रीमान् प्रधान महोदय,
   ग्राम पंचायत रिस्पा,
   गांव व डा0 रिस्पा,
   तहसील मूरंग, जिला किन्नौर (हि0 प्र0)

विषयः टिंडोंग जल विद्युत परियोजना – निर्माण के दौरान न्योजे के पेड़ों को हुए नुकसान की भरपाई बारे।

संदर्भः–1 एन0एस0एल0–टी/जी-4/2012–13 दिनांकः 03.10.2012 ।
2 बैठक के मुद्दे दिनांक 13.10.2012 टिडोंग विद्युत गृह स्थल पर हुई।

महोदय/महोदया,

उपरोक्त पत्रों एवम् बैठक के संदर्भ में एन0एस0एल0 पावर लिमिटेड द्वारा यह तय किया है कि न्यौजे के पेड़ों को हुए नुकसान की भरपाई ग्राम पंचायत ठंगी, मूरंग व रिस्पा को वार्षिक आधार पर करने का प्रस्ताव रखा है। वार्षिक भरपाई पहले ही तय की गई ईकाईयों के अनुसार हेगी जैसे किः–

1. कम्पार्टमेन्ट संख्या 194 में 156 (एक सौ छप्पन) पूरी तरह ग्रस्त पेड़ों का 02.05 (दो किलो पचास ग्राम) किलो ग्राम प्रति पेड़ प्रति वर्ष के आधार पर ।

2. कम्पार्टमेन्ट संख्या 192 में 131 (एक सौ इक्कतीस) पूरी तरह ग्रस्त पेड़ों का 02.63 (दो किलो तरेसठ ग्राम) किलो ग्राम प्रति पेड़ प्रति वर्ष के आधार पर ।

3. कम्पार्टमेन्ट संख्या 193 में 111 (एक सौ ग्यारह) पूरी तरह ग्रस्त पेड़ों का 02.63 (दो किलो तरेसठ ग्राम) किलो ग्राम प्रति पेड़ प्रति वर्ष के आधार पर ।

कम्पनी प्रत्येक वर्ष 30 नवम्बर तक उपरोक्त भरपाई रिकांग पिओं में थोक मूल्य जो प्रथम सप्ताह में होगा के आधार पर करेगी ।

उपरोक्त भरपाई वर्ष 2013 से 40 (चालीस) वर्ष के लिए वर्ष 2052 (दो हजार बावन) तक रहेगी ।

कम्पनी उपरोक्त भरपाई का मूल्य उपायुक्त या अतिरिक्त जिला दण्डाधिकारी के माध्यम से सम्बन्धित पंचायतों को आवंटन करेगी ।

यह उपरोक्त भरपाई खर्च उपरोक्त परियोजना के आए0 एण्ड आर0 प्लान/ योजना में समायोजित किया जाएगा जिसको जिलाधीश किन्नौर, हिमाचल प्रदेश द्वारा अन्तिम रूप दिया जाएगा।

धन्यवाद सहित ।

भवदीय,

अधिकृत हस्ताक्षरकर्ता
एन. एस. एल. टिडोंग विद्युत उत्पादन (प0) लि0 की ओर से

प्रतिलिपिः—

1 श्रीमान् उपायुक्त किन्नौर को सूचनार्थ ।
2 श्री अतिरिक्त जिला दण्डाधिकारी, पूह को सूचनार्थ ।
3 श्रीमान् पुलिस अधीक्षक किन्नौर को सूचनार्थ ।
4 श्रीमान् तहसीलदार मूरंग को सूचनार्थ ।
5 मुख्य कार्यकारी अधिकारी ।
6 मुख्या हाईड्रो ।
7 वरिष्ट उपाध्यक्ष ।
8 सलाहार शिमला ।

Annexure 7.1

Minutes of Public Consultation under EIA Notification

H.P. STATE ENVIRONMENT PROTECTION
&
POLLUTION CONTROL BOARD
PARYAVARAN BHAVAN, PHASE III, SHIMLA-171 009

PROCEEDINGS OF THE ENVIRONMENTAL PUBLIC HEARINGS HELD ON 21-07-2006 ON THE PROPOSAL OF M/S NUZIVEEDU SEEDS LIMITED, TIDONG –1, HYDRO ELECTIRIC PROJECT (100MW) ON TIDONG KHAD IN DISTRICT KINNAUR (H.P.)

The State Board organized internal presentation about the project on 05-04-2006 before the Subject Matter Specialists of HPSEP&PCB on the Environmental Impact Assessment (EIA/EMP) submitted by M/S Nuziveedu Seeds Limited, Tidong –1, Hydro Electric Project (100mw) on Tidong Khad in District Kinnaur (H.P.). Observations of the Subject Matter Specialists were conveyed to the proponent on 07-04-2006 and they were asked to integrate these observations in the EIA / EMP. Proponent supplied complete requisite information and data on these observations on 10-05-2006. Secretary (ST&E), Govt. of Himachal Pradesh, Shimla vide letter No. STE-F(2)-2 /2005 dated 18-05-2006 informed the State Board to conduct the Environmental Public Hearing of the aforesaid project as per procedure laid down in the EIA Notification No S.O. 318 (E) dated 10-04-1997. Thereafter the process of holding the Environmental Public Hearing commenced. Public Notices for holding Environmental Public Hearings near proposed diversion weir (at 11:00 A.M. on 21-07-2006) in Village Lumber, Tehsil Moorang,and near proposed power house site of the project near village Rispa, Tehsil Moorang, District Kinnaur, (H.P.) were published in News Papers including the Hindi News Papers on 20-06-2006 for holding the Public Hearings on the above time & dates. Copies of the observations of the State Board on presentation made by the proponent and the Public Notices published for the Environmental Public Hearing are annexed with these proceedings.

The public hearing was conducted on 21-07-2006 at the above venue as stated above in pursuance to the notification of Ministry of Environment & Forests, Govt. of India bearing No. SO-318 (E) dated 10-04-1997 to integrate the public suggestions, views, comments and objections from interested persons/groups/ organizations on the proposal with a view to have maximum public participation.

H. P. State Environment Protection &
Pollution Control Board, "Paryavaran Bhawan"
Phase-III, New Shimla-171009.

No. EP & PCB/ Tidong Hydroelectric Project Kinnaour /06-17378-83 Dated: 1-9-06
From: Member Secretary

To

The Principal Secretary (ST&E) to
the Govt. of H.P. Shimla.

Subject: - Proceedings of Environmental Public Hearing.

Sir,

The mandatory Environmental Public Hearings according to notification No. SO-318(E) dated 10-04-1997 issued by the Ministry of Environment & Forests, Govt. of India as requirement for the Environmental Clearance to be granted by the Ministry of Environment & Forests, Govt. of India, were convened by the H.P. State Environment Protection and Pollution Control Board near proposed diversion weir (at 11:00 A.M.on 21.07.2006) in Village – Lumber, Tehsil- Moorang and near proposed power house site of the project near village- Rispa, Tehsil- Moorang, Distt. Kinnaur, (H.P) on the proposal of the M/s Nuziveedu Seeds Limited , Tidong-I , Hydro Electric Project (100 MW) on Tidong Khadd, in Distt. Kinnaur (H.P).

In pursuance to the Notification No. EDN (S&T) A (4)-2/2000 dated 9th September, 2002, issued by the State Government, the proceedings of the mandatory Environmental Public Hearing alongwith observations of the State Board on the scrutiny of the proposal are enclosed herewith for favour of further necessary action in the matter. Copies of the Public Notices published for Public Hearing, Presentation, proceeding and attendance sheet of those present in the proceedings as panelists/senior citizens are also enclosed for doing the needful in the matter.

Encl: (i) Proceeding of Public Hearing
(ii) Attendance sheet.
(iii) Public Notice published for public hearing.
(iv) Presentation.
(v) Representation.

Yours faithfully;

Member Secretary

Copy forwarded to the following for information and necessary action alongwith proceeding.

1. The Principal Secretary (Pollution Control) to the Govt. of H.P.
2. The Deputy Commissioner, ~~Shimla~~ Kinnaur, Distt. ~~Shimla~~ Kinnaur.
3. M/s Nuziveedu Seeds Limited.905, Kanchanjunga Building, 18 Bara Khamba Road, Connaught Place, New Delhi 110001
4. The Environmental Engineer, HPSEP & PCB, Rampur, Distt. Shimnla.
5. Joint Member Secretary-cum-Director, EPU, HP State Council for ST&E, 34 SDA Complex, Shimla

Member Secretary

HEARING IN VILLAGE LUMBER, TEHSIL MOORANG, DISTRICT KINNAUR,(H.P.)ON 21-07-06 AT 11:00 A.M.

At the outset participants were welcomed and briefed about the objectives of conducting public hearing by the representative of HPSEP&PCB. This was followed by presentation regarding the salient features of the project and EIA/EMP by the proponent. Proceedings were, thereafter, left open for discussions and raising issues pertaining to the project.

The following participated in the hearing besides the general public:

Sr.No	Name & Designation	Department Represented
1	Sh. Sukhdev Singh, P.O. ITDA, Reckong Peo Kinnaur	District Administration Kinnaur.
2	Sh.B.S. Negi, S. E.	Representative of HPSEB
3	Sh. Nand Lal Rathore, Moorang	Deputy Commissioner Nominee
4	Smt.Munesh Kumari Pradhan Gram Panchayat,Thangi.	Deputy Commissioner Nominee
5	Sh. Naresh Kumar Pradhan Gram Panchayat Rispa.	Deputy Commissioner Nominee
6	Sh. Ramanuj Negi, Moorang	Deputy Commissioner Nominee
7	Sh. Maheshwar Negi,	Chairman BDC Pooh
8	Sh.Arun Kumar, D. F. O.	Wild Life Sarahan
9.	Sh. Tarun Gupta, Environment Engineer	Science and Technology Shimla
10.	Sh Sunil Kumar, A.E.	HPSEB, Jeori
11	Sh. Ajab Kumar Negi, Agriculture Officer	Agriculture Office, Pooh

Project Proponent was represented by the following

1	Sh. G. Chowdaraiah, Vice President (Hydel Project NSL).	M/s Tidong –I –Hydro-Electiric Project
2.	Sh. D.P. Verma, Consultant	M/s Tidong –I –Hydro-Electiric Projec
3.	Sh. Ravinder Jeet Singh, (Project Manager)	M/s Tidong –I –Hydro-Electiric Project

The following represented HPSEP&PCB:

1.	Sh. S.P. Vasudeva, Member Secretary	HPSEP&PCB
2.	Sh Ajeet Kumar Ravi ,Environmental Engineer Rampur.	HPSEP&PCB
3	Sh.S K Shandil, Assistant Environmental Engineer, (HQ)	HPSEP&PCB

ISSUES RAISED IN HEARING AT VILLAGE LUMBER:

S. No	Issue Raised	Comments
1	**Sh. Ravi Kant Negi, Secretary Tidong Valley Parvavaran Sarankashan Smiti.** The following points were read out: (i) **Damage due to road construction from village Lamber to adit no.1** Thousands of trees of Deodar, Chilgoza, Kail, Bhojpatra, will be uprooted due to construction of 2.9 km road along the tunnel. Environment of the area will be destroyed and economy of the villages will be affected due to cutting of chilgoza trees.	It was apprised by the project proponent that about 43.59 ha of forestland would be diverted for the project. Compensatory afforestation over an area of 87.18 ha. to compensate for the loss of forest cover in the nearby degraded forest area. will be carried out. The total cost of afforestation will be Rs.23.81 lakhs.
	(2) **Damage due to muck from adit-1.** Due to mucking from adit-1 flood in the river can cause damage to the orchards and house near to river. This will also cause soil erosion.	It was apprised that the dumping shall be done in designated dumping sites in such a way that no spillage of excavated material takes place and cause damage to houses and orchards The State Board would also do continuous monitoring for ensuring compliance to norms.
	(3,4) **Drying of water from Gara and Duba Khad and other water sources in the area.** Water from Gara and Duba Khad is used for irrigating for about 800 bighas of land, which is very fragile and is landslide prone area. It is apprehended that the above-mentioned khads and other sources will dry due to construction of tunnel.	It was apprised by the Member Secretary of HPSEP&PCB that the sources of water in the villages falling in the project will be inventorised and these sources shall be properly documented and video graphed and in case any damages are observed due to project activities during the construction of project it will have to be compensated by the projected proponent It was also emphasized that due care will be taken by project proponents.
	(5) Forest destruction at Piber area. One portion of the Thangi village is near forest from where we get wood for house	It was apprised by the proponent that about 43.59 ha of forest land will be diverted for the project and compensatory afforestation over an area of

	construction, fuel wood, manure and natural herbs. These will be destroyed due to construction of the project.	87.18 ha in the nearby degraded forest area will be carried out. The total cost of reafforestation will be Rs.23.81 lakhs. This will help in compensating for loss of wood, fuel wood etc.
	(6) **Damage to Environment.** The main source of income in this area is apple. Almond, Apricot, Grapes, etc. which will be heavily damaged with the change in the environment due to project construction. Pollination will be affected due to increase in local temperature and cash crop will be damaged.	The project proponent clarified that almost all the works will be under ground and there will be no such emission from the project that will damage apple or any other crop in the area.
	(7) **Melting of glaciers.** Due to construction of tunnel and other various project activities i.e. blasting cutting of trees, etc. ambient temperature will increase which will result in melting of the glaciers and as such livelihood of the local people will be adversely affected.	It was apprised by the Member Secretary of HPSEP&PCB that, shrinking of glacial deposits is a universal phenomenon due to global warming and the activities of the project are likely to have insignificant impact due to hydro power being more environment friendly as compared to other methods of power generation. However, Scientific studies may be conducted through Science & Technology Council in case there is serious impact on the glaciers in the region due to this project.
	(8) **Apprehension of Extinction of many species of animals.** Due to the construction of the project it is apprehended that many wild animals, which are found only in this area, will be in danger/ threatened with extinction.	It was apprised by the project proponents that project area does not harbour any wildlife at or near the site of power house or barrage. The wild animals like snow leopard, bear, etc. live at high altitude and are quite away from the proposed project site. the operation of the project will not any impact on the wildlife functioning in the area.
	(9) **Apprehension of Extinction of many species of plants.** Due to the construction of the project it is apprehended that many species of plants, which is only available in this area, will be in danger/ threatened with extinction.	The proponents clarified it that the major forest type of the project area is a temperate mixed evergreen forest .A total number of 94 plants species were recorded during the floristic survey in the project area. Plant diversity of the project area encompasses 20 species of trees, 30 species of herbs including 6 species of climber 8 species of

		grasses. Silvipasture development and plantation of the Medicinal Plants e.g .trees, shrubs and herbs plantation shall be taken up in degraded patches of Van panchayats and civil Forest lands. A budgetary provision of Rs. 6,00,000 shall be made for this purpose
	(10) **Danger to national security.** This village is very near to Tibet and thousand of workers will come to work in the project and it will be difficult to recognise the anti national element, which can cause threat to the security of country.	No comments
	(11) **Cold desert.** At one hand Govt. is spending crores of rupees in desert development project and at the other hand Govt. wants to establish such project After 100 years Chilgoza tree is ready for the crop, even after spending billions of rupees it is not possible to grow Chilgoza forest	It was apprised by the project proponent that there is no cold desert in the project area and compensatory afforestation will be carried out over an area of 87.18 ha in the nearby degraded forest area. The total cost of reafforestation will be Rs.23.81 lakhs
	(12) **Damage to the local culture.** People from the different part of the country will come to work in the project due to which pristine tribal culture will be damaged	No comments
	(13) **There is no mention of village Piber in DPR.** Headrace tunnel of the project will go just below this village but there is no mention of this village in the Detailed Project Report and it is apprehended that this will be most affected village	The project proponent apprised that tunnel cover is about 140 mtrs over the village Piber and there will be no adverse impact due to the construction of the project. However, any lose due to the construction of the project occurs compensation will be given the proponents.
2	**Sh. Prem Lal Negi Ex Pradhan village Thangi.**	
	(1) TBM should be used for the construction of tunnel	(1) It was clarified by the project proponent that use of TBM is not viable in such a small project.
	(2) There are number of Natural Habitat	(2) It was apprised by the project proponents that

	in the jungle what steps will be taken by the project proponent so that natural habitant are not disturbed due to the construction of the project	project area does not harbour any wildlife at or near the site of powerhouse or barrage. The wild animals like snow leopard, bear, etc. live at high altitude and are quite away from the proposed project site. The operation of the project will not have any impact on the wildlife functioning in the area.
3	**Sh, B.S Negi. HPSEB.** Gel based explosive should be used for tunneling.	Proponent explained that it is not possible as it is not being used anywhere.
4	**Sh. Raj Narian. Up Pradhan Thangi** Local area development money should be given to the panchayat directly.	It was clarified by the Member Secretary that LADA amount will be spent on the resolution of the local panchayat through Deputy Commissioner Kinnaur.
5	**Smt. Munish Kumari. Pradhan Gram Panchayat Thangi.** (1) Gara khad will dry up due to construction of project.	It was apprised by the Member Secretary of HPSEP&PCB that the sources of water in the villages falling in the project will be inventorised and these sources shall be properly documented and video graphed and in case any damages are observed due to project activities during the construction of project it will have to be compensated by the projected proponent
	(2) It may be clarified that this public hearing is NOC from local panchyat for project or it is to be obtained separately by the proponents from the local panchayat.	(2) Representative of Deputy commissioner said that he will clarify this point latter to the panchayat after going through the tribal Act
6	**Rama Nand Negi. Thangi.** (1) Crate wall should be provided at the muck dumping sites before starting of muck dumping	(1) It was apprised by the Member Secretary HPSEP& PCB that the dumping shall be done in designated dumping sites in such a way that no spillage of excavated material takes place and it will be made mandatory for the proponents to develop all the dumping sites before muck dumping starts.
	(2) Water sources and houses in the project-affected area should be Video graphed before the project construction	(2) It was apprised by the Member Secretary of HPSEP&PCB that the sources of water and houses in the project affected villages will be

	starts	inventorsied and shall be properly documented and video graphed in consultation with revenue/PWD & local Panchayat.
	(3) Road should be made pucca so that there is no air pollution from the roads.	(3) It was clarified by the proponents that during the construction period all the project roads will be kept wet by sprinkling water regularly through water tankers so that there is no air pollution from the roads.
	(4) As the workers from different part of the country will come to work in the project and may carry some disease with them therefore, the company should provide hospital facilities	(4) Only those persons shall be employed who are medically fit.
	Nand Lal Rathore. Thangi	
7	(!) The CAT plan work should be started simultaneously as the project work starts.	(1) The CAT plan shall be implemented through Forest Division District Kinnaur and Rs 4.86 Crores have been estimated for the CAT works.
8	**Dr.Nisar Ahamed** Labourer may bring some diseases with them and may cause occupational health hazard. Therefore team of doctors is required.	The project proponents at village Lumber and Rispa will provide hospital facilities and Doctors. However, only those persons shall be employed who are medically fit.
9	**G.K Rathore.Thangi** Who will monitor plantation work	The monitoring of plantation work is the responsibility of the Forest Department. It was apprised by the Member Secretary HPSEP&PCB that local committees of the affected villages can be formed to check the plantation work.

The Member-Secretary, HP SEP&PCB in his concluding remarks at village Lumber congratulated people for their participation and appreciated their concern regarding environmental issues. While expressing thanks to the people for the participation and valuable suggestions, the Member Secretary exhorted people to maintain tl is participatory approach towards environmental issues during subsequent stages of the project also. He further said that these proceedings shall be duly recorded and sent to the State Government before the case is sent from the State Government to Government of India.

HEARING IN VILLAGE RISPA, TEHSIL MOORANG, DISTRICT KINNAUR, (H.P.) ON 21-07-2006 AT 03:00 P.M.

The following were present for the hearing:

Sr.No	Name & Designation	Department Represented
1	Sh. Sukhdev Singh, P.O. ITDA. Reckong Peo, Kinnaur	District Administration Kinnaur.
2	Sh.B.S. Negi, S. E.	Representative of HPSEB
3	Sh.Arun Kumar, D. F. O.	Wild Life Sarahan
4	Sh J.L Sharma Distt. Agri. Officer Reckong Peo, Kinnaur	District Agriculture Office, Reckong Peo, Kinnaur
5.	Sh. Tarun Gupta, Environment Engineer	Science and Technology Shimla
6	Dr Naser Ahmed Distt. Health Officer Reckong Peo	Health Department, Reckong Peo, Kinnaur
7	Sh Sunil Kumar, A.E.	HPSEB, Jeori
8	Sh. Ajab Kumar Negi, Agriculture Officer	Pooh

Project Proponent was represented by the following

1	Sh. G. Chowdaraiah, Vice President (Hydel Project NSL).	M/s Tidong –I –Hydro-Electiric Project
2.	Sh. D.P. Verma, Consultant	M/s Tidong –I –Hydro-Electiric Project
3.	Sh. Ravinder Jeet Singh, (Project Manager)	M/s Tidong –I –Hydro-Electiric Project

The following represented HPSEP&PCB

1.	Sh. S.P. Vasudeva, Member Secretary	HPSEP&PCB
2.	Sh Ajeet Kumar Ravi (Environmental Engineer Rampur.	HPSEP&PCB
3	Sh.S K Shandil, Assistant Environmental Engineer, (HQ)	HPSEP&PCB

The local people of Rispa village did not participate. As the local public did no participate no issues were raised. A copy of representation given to the Deputy Commissioner, kinnaur and received in this office is enclosed herewith.

The copies of representations received/given during the public hearing on 22-02-2006 with reference to the proposed project; (ii) the notices published in the press for organizing Environmental Public Hearing; (iii) the observations of the State Board based on internal presentation made by the proponent and; (iv) attendance sheets of the Public Hearing are enclosed herewith for the perusal of the State Level Environment Impact Assessment & Monitoring Hearing to Ministry of Environment, Government of India are enclosed herewith.

The proceedings of the public hearing for the proposal as mentioned above are submitted for further necessary action in pursuance to the Notification No. Edn. (S&T) A (4)-2/2000 dated 9th September 2002 issued by the State Government.

Member Secretary

Annexure 7.2

NOCs and Agreements with Affected Gram Panchayats

कार्यालय ग्राम पंचायत मूरंग

ग्राम व डा0 मूरंग, तहसील मूरंग, जिला किन्नौर, (हि0प्र0)

अध्यक्षता श्री प्रेम कुमार, प्रधान दिनांक : 01-04-2009 गणपूर्ति: 8/8
प्रस्ताव संख्या : 1

हिप्रेंग -I जल विद्युत परियोजना (100 M.W.) के निर्माण व संचालन हेतू अनापत्ति प्रमाण पत्र जारी करने बारे।

बैठक में ग्राम पंचायत मूरंग सर्वसम्मति से प्रस्ताव पारित कर हिप्रेंग -I जल विद्युत परियोजना (100 M.W.) के निर्माण व संचालन हेतू मैसर्स एन0 एल0 एच0 पावर जेनरेशन (प्रा0) लिमिटेड को अनापत्ति प्रमाण पत्र जारी करती है।

प्रमाणित किया जाता है कि वकल कार्यवाही रजिस्टर मूरंग अनुसार सही व दुरुस्त है।

सचिव 01-04-2009
ग्राम पंचायत.....मूरंग.....
विकास खण्ड.....पूह.....

कार्यालय ग्राम पंचायत रिस्पा

विकास खण्ड पूह, जिला किन्नौर (हि०प्र०)

अध्यक्षता : श्री नरेन्द्र कुमार नेगी प्रधान

दिनांक 05-04-09

प्रस्ताव संख्या : 4 गणपूर्ती : 8/15

प्रेषित :

विषय :

अनापत्ति प्रमाण पत्र

यह कि ग्राम सभा रिस्पा ने मैसर्ज एन० एस० एल० टिडोंग पावर जैनरेशन प्राईवेट लिमिटेड जिसका गठन मैसर्ज नूजीवियु सीडस प्राईवेट लिमिटेड ने टिडोंग-I जल विद्युत परियोजना (100मेगावाट) के क्रियान्वयन के लिए किया है को उपरोक्त परियोजना के निर्माण एवम् संचालन हेतु अनापत्ति प्रमाण पत्र (NOC) जारी किया जाता है।

प्रस्ताव पारित है।

प्रमाणित किया जाता है कि जिस कार्यवाही रजिस्टर की यह नकल है, असल के सही है।

Pradhan
Gram Panchayat Ribba
Dev. Block Poo (H.P.)

हस्ताक्षर .....

दिनांक 6-4-09

कार्यालय ग्राम पंचायत ठंगी

तहसील मूरंग, जिला किन्नौर, हि०प्र०

अध्यक्षता : प्रधान श्रीमति मैत्रा कुमारी   दिनांक : 13-01-2009   गणपूर्ति: 9/2/6

प्रस्ताव संख्या : 01

अनापत्ति प्रमाण पत्र

आज दिनांक 13 जनवरी 2009 को एन० एस० एल० टिडोंग पावर जैनरेशन प्राईवेट लिमिटेड जिसका गठन मैसर्ज नूजीविडु सिडस लिमिटेड ने टिडोंग-I जल विद्युत परियोजना (100 मैगावाट) के क्रियान्वन के लिए एक विशेष उद्देश्य वाहन कम्पनी के रूप में किया है जिसका पंजीकृत कार्यालय 78 A, सैक्टर-3, फेज-I न्यू शिमला हि० प्र० 171009 को उपरोक्त परियोजना के निर्माण एवं संचालन हेतु अनापत्ति प्रमाण पत्र जारी किया जाता है।

प्रधान ग्राम पंचायत ठंगी वि.ख. पूह, जिला किन्नौर

हस्ताक्षर.......

दिनांक 13/1/09

हिमाचल प्रदेश HIMACHAL PRADESH 00AA 260165

समझौता नामा

यह समझौतानामा आज दिनांक 31 मार्च, 2009 को एन0 एस0 एल0 टिडोंग पावर जैनरेशन प्राईवेट लिमिटेड, जिसका गठन मैसर्ज़ नूज़ीविडु सीडस् लिमिटेड ने टिडोंग – I जल विद्युत परियोजना (100 मैगावाट) के कियान्वन के लिए एक विशेष उदेद्श्य वाहन् कम्पनी के रुप में किया है जिसका पंजीकृत कार्यालय 78 ए, सेक्टर – 1, फेज़ – 1, न्यू शिमला–171009 हि0 प्र0 वज़रिया श्री बाल दत्त शर्मा, उपाध्यक्ष, (टिडोंग – 1 जल विद्युत परियोजना 100 मैगावाट) अधिकृत अधिकारी, आयु 64 वर्ष, सुपुत्र स्व0 श्री जयकृष्ण शर्मा, हिमवीर निवास, कोठी मोड़, रिकांगपिओ, ज़िला किन्नौर हि0 प्र0 (जिसे आगे प्रथम पक्ष भी कहा जा सकेगा) ।

एवं

ग्राम पंचायत/सभा मूरंग, तहसील मूरंग, जिला किन्नौर, हि0 प्र0 वज़रिया श्री प्रेम कुमार, प्रधान, ग्राम पंचायत मूरंग, ज़िला किन्नौर हि0 प्र0 (जिन्हें आगे द्वितीय पक्ष भी कहा जा सकेगा) के बीच परस्पर सम्पन्न हुआ ।

Attested to be a true copy
C. L. Negi (Advocate)
NOTARY PUBLIC
Sub-Div. Kalpa (H.P.)

हिमाचल प्रदेश HIMACHAL PRADESH 00AA 969454

1. जबकि हिमाचल प्रदेश सरकार ने मैसर्ज़ नूज़ीविडु सीडस् लिमिटेड को "बनाओ, अपनाओ, चलाओ और हस्तांतरित करो" के आधार पर (BOOT Basis) टिडोंग–I जल विद्युत परियोजना (100 मैगावाट) के क्रियान्वन का कार्य सौंपा है ।

2. जबकि मैसर्ज़ नूज़ीविडु सीडस् लिमिटेड को इस परियोजना के कियान्वन के लिए ग्राम पंचायत/सभा मूरंग से अनापत्ति प्रमाण पत्र की आवश्यकता है । इस अनापत्ति प्रमाण पत्र के लिए प्रथम पक्ष ने द्वितीय पक्ष को आवेदन किया था । जिस पर ग्राम पंचायत/सभा मूरंग ने विशेष संज्ञान लेते हुए प्रधान, ग्राम पंचायत मूरंग, श्री प्रेम कुमार की अध्यक्षता में दिनांक 29 मार्च, 2009 को एक विशेष बैठक बुलाई । इस बैठक में ग्राम पंचायत/सभा मूरंग ने विस्तृत विचार विमर्श करने के उपरान्त निम्नलिखित शर्तें प्रथम पक्ष के समक्ष रखीं :–

क) निर्माण कार्य में योग्यतानुसार 70 प्रतिशत रोज़गार स्थानीय लोगों को प्रदान करना होगा ।

For NSL Tidong Power Generation (P) Ltd.

Authorised Signatory

Attested to be a true copy.

C. L. Negi (Adv.)
NOTARY
Sub-Div. Kalpa

दिनांक

ख) स्थानीय लोगों को योग्यतानुसार निर्माण कार्यो में ठेकों के लिए 70 प्रतिशत कार्य ग्राम पंचायत मूरंग के लिए आरक्षित रखना होगा ।

ग) निर्माण कार्य के परिवहन कार्यो में प्रयुक्त होने वाले वाहनों में 50 प्रतिशत वाहनों का प्रयोग ग्राम पंचायत मूरंग से होगा ।

घ) उप–मुहाल ग्रामंग में जहाँ से प्रथम पक्ष में रेता व बजरी उठाना है, उस रेता खान से ग्राम वासियों को मूरंग में ही अपना निजी भवन निर्माण हेतू खान से निःशुल्क/मुफ्त रेता व बजरी प्रदान करना होगा । इसके लिए ग्राम वासियों को रेता व बजरी के लिए ग्राम पंचायत से आज्ञा पत्र लेना अनिवार्य होगा ।

ड.) ग्राम पंचायत मूरंग के क्षेत्र में रेता व बजरी खनन प्रयोग के समय सम्बन्धित क्षेत्र में किसी भी प्रकार का भू–स्खलन या निजी भूमि व मकानों को नुकसान पहुचने की स्थिति में क्षतिपूर्ति प्रथम पक्ष करेगा ।

च) जहां से प्रथम पक्ष ने द्वारा रेता व बजरी उठाना है, उस क्षेत्र को ग्राम वासियों द्वारा दाह संस्कार के रुप में प्रयोग किया जाता है । प्रथम पक्ष दाह संस्कार इत्यादि पर असुविधा उत्पन्न नही करेगा । इस उद्देश्य हेतू प्रथम पक्ष अलग से क्षेत्र आरक्षित करेगा ।

छ) प्रस्तावित विद्युत परियोजना के विद्युत गृह क्षेत्र के वन भूमि कम्पार्टमेंट संख्या 193 में ग्राम मूरंग का पारम्पारिक व राजस्व वन अधिकार है । जिसके लिए उस क्षेत्र में लोगों के अवाजाही पर प्रथम पक्ष किसी भी प्रकार की असुविधा उत्पन्न नहीं करेगा । तथा कम्पनी द्वारा निर्मित सड़क का प्रयोग करने का अधिकार ग्राम वासियों को होगा ।

ज) प्रथम पक्ष द्वारा सड़क में स्थानीय लोगों की अवाजाही में किसी भी प्रकार की बाधा उत्पन्न नहीं करेंगा ।

For HSL Tidong Power Generation (P) Ltd.

Authorised Signatory

NOTARY C. L. NEGI Sub-Div. KALPA Regd.No. 283 GOVT. OF (H.P.)

Attested to be a true copy

C. L. Negi (Advocate)
NOTARY PUBLIC
Sub-Div. Kalpa (H.P.)

6/9/2011

झ) प्रथम पक्ष रेता व बजरी खान का प्रयोग विद्युत उत्पादन तक व अधिकतम 8 वर्षों तक करेगा ।

ञ) प्रथम पक्ष उपरोक्त मांगों के इलावा ग्राम पंचायत के विकास हेतू मु0 रुपये 1,00,00,000/– (रुपये एक करोड़ केवल) देगा । उक्त राशि को कृषि विकास संघ मूरंग के खाते में जमा किया जाएगा ।

त) उपरोक्त वर्णित मांगे स्थानीय क्षेत्र विकास प्राधिकरण निधि के अलावा होगा ।

3. यह कि प्रथम पक्ष ने ग्राम पंचायत/सभा मूरंग कि उपरोक्त सभी शर्तों को स्वीकार किया । प्रथम पक्ष मु0 1.00 करोड़ (मुवलिक एक करोड़ रुपये) निम्नलिखित किश्तों में द्वितीय पक्ष को देने का इकरार करता है :–

क) पहली किश्त मु0 50.00 लाख रुपये (मुवलिक पचास लाख रुपये) द्वितीय पक्ष द्वारा अनापत्ति प्रमाण पत्र जारी करने के समय देय होगी ।

ख) दूसरी किश्त मु0 25.00 लाख रुपये (मुवलिक पचीस लाख रुपये) माह मार्च 2010 में देय होगी ।

ग) तीसरी किश्त मु0 25.00 लाख रुपये (मुवलिक पचीस लाख रुपये) माह मार्च 2011 में देय होगी ।

4. अतः द्वितीय पक्ष, प्रथम पक्ष द्वारा उक्त सभी मांगों को पूर्ण करने पर, प्रथम पक्ष को रुवांग खडड् से पेयजल व उपमहाल ग्रामंग से रेता व बजरी के खनन् का अधिकार प्रदान करता है ।

5. यह कि प्रथम पक्ष द्वारा सभी शर्तों की स्वीकार करने पर ग्राम सभा ने अनापत्ति प्रमाण पत्र जारी करने में लिये स्वीकृति प्रदान की । श्री प्रेम कुमार, प्रधान, ग्राम पंचायत मूरंग को सर्वसम्मति से अनापत्ति प्रमाण पत्र जारी करने के लिए प्राधिकृत किया ।

For NSL Tidong Power Generation (P) Ltd.

Authorised Signatory

Attested to be a true copy

C. L. Negi (Advocate)
NOTARY PUBLIC
Sub-Div. Kalpa (H.P.)

6/9/2010

№ 1508830 2008 **Himachal Government Judicial Paper**

6. यह कि यदि उपरोक्त समझौतानामा में उल्लिखित शर्तों का उल्लंघन किया गया तो दोनों पक्ष आपस में समझौते द्वारा झगड़े का निपटारा करेंगे अन्यथा दोनो पक्ष किसी भी सक्षम न्यायलय में जाने के लिए स्वतन्त्र होंगे ।

अतः यह समझौतानामा दोनों पक्षों ने उपरलिखित दिनांक, माह व सन् को बिना किसी बाहरी दबाव व फरेब के गवाहों के समक्ष लिख दिया ताकि सनद रहे और समय पर काम आवे ।

गवाहन
1. (Rajesh Gupta)
Deputy General Manager
NSL Tidong Power Generation (P) Ltd.
Him Vir Niwas Kothi Mor
Reckong Peo Distt Kinnaur (H.P.)
2. (U.V. SHAMANTHAK)
NSL TIDONG POWER GENERATION (P) LTD.
HIMVIR NIWAS, KOTI MOR
RECKONG PEO
DIST- KINNAUR (H.P)
3. (HANS DAS NEGI)
Vill. Ozralangi, P.O. Kothi,
Teh. Kalpa, Distt. KNR (HP)

प्रथम पक्ष
कृते एन0 एस0 एल0 टिडोंग पावर जैनरेशन प्राइवेट लिमिटेड

For NSL Tidong Power Generation (P) Ltd.
Authorised Signatory
अधिकृत हस्ताक्षर कर्ता
बाला दत्त शर्मा, उपाध्यक्ष
(टिडोंग – I जल विद्युत परियोजना)

गवाहन
1. Maheshwar Singh S/o Sh. Fachhan Nargu V.P.O Moorang Distt. Kinnaur (HP)
2. (RSingh) राजेश्वर सिंह उप-प्रधान ग्राम पंचायत मूरंग, जिला किन्नौर हि० प्र०
3.

द्वितीय पक्ष
कृते ग्राम सभा मूरंग, तह. मूरंग, ज़िला – किन्नौर हि0 प्र0

ग्राम पंचायत मूरंग
अधिकृत हस्ताक्षर कर्ता
प्रेम कुमार, प्रधान,
ग्राम पंचायत मूरंग

हस्ताक्षर..........
दिनांक..........

NOTARY
C.L. NEGI
Sub-Div. KALPA
Regd.No. 233
GOVT. OF INDIA

Attested to be a true copy
6/9/2010
C. L. Negi (Advocate)
NOTARY PUBLIC
Sub-Div. Kalpa (H.P.)

6/09.

भारतीय गैर न्यायिक

भारत

TEN RUPEES

Rs.10

सत्यमेव जयते

INDIA

INDIA NON JUDICIAL

हिमाचल प्रदेश HIMACHAL PRADESH 00AA 260169

C.L. NFCI Sub-Div. KALPA Regd.No. 283 GOVT. OF (H.P.)

समझौता नामा

यह समझौतानामा आज दिनांक 30 मार्च, 2009 को एन0 एस0 एल0 टिडोंग पावर जैनरेशन प्राईवेट लिमिटेड, जिसका गठन मैसर्ज़ नूज़ीविडु सीडस् लिमिटेड ने टिडोंग – I जल विद्युत परियोजना (100 मैगावाट) के कियान्वन के लिए एक विशेष उद्देश्य वाहन् कम्पनी के रुप में किया है जिसका पंजीकृत कार्यालय 78 ए, सेक्टर – 1, फेज़ – 1, न्यू शिमला–171009 हि0 प्र0 वज़रिया श्री बाला दत्त शर्मा, उपाध्यक्ष, (टिडोंग–I जल विद्युत परियोजना 100 मैगावाट) अधिकृत अधिकारी, आयु 64 वर्ष, सुपुत्र स्व0 श्री जयकृष्ण शर्मा, हिमवीर निवास, कोठी मोड़, रिकांगपिओ, ज़िला किन्नौर हि0 प्र0 (जिसे आगे प्रथम पक्ष भी कहा जा सकेगा) ।

एवं

ग्राम पंचायत/सभा रिस्पा, तहसील मूरंग, जिला किन्नौर, हि0 प्र0 वज़रिया श्री विमल चन्द्र, सुपुत्र श्री बहादुर सिंह उप प्रधान, ग्राम पंचायत रिस्पा, ज़िला किन्नौर हि0 प्र0 (जिन्हे आगे द्वितीय पक्ष भी कहा जा सकेगा) के बीच परस्पर सम्पन्न हुआ ।

उप-प्रधान ग्राम पंचायत रिस्पा

For NSL Tidong Power Generation (P) Ltd.

Authorised Signatory

Attested to be a true copy

G. L. Negi (Advocate) 6/4/09
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दिनांक .....

भारतीय गैर न्यायिक

पाँच रुपये FIVE RUPEES

रु.5 Rs.5

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भारत INDIA

INDIA NON JUDICIAL

हिमाचल प्रदेश HIMACHAL PRADESH 00AA 969457

1. जबकि हिमाचल प्रदेश सरकार ने मैसर्ज़ नूज़ीविडु सीडस् लिमिटेड को "बनाओ, अपनाओ, चलाओ और हस्तांतरित करो" के आधार पर (BOOT Basis) टिडोंग–I जल विद्युत परियोजना (100 मैगावाट) के कियान्वन का कार्य सौंपा है ।

2. जबकि मैसर्ज़ नूज़ीविडु सीडस् लिमिटेड को इस परियोजना के कियान्वन के लिए ग्राम पंचायत/सभा रिस्पा से अनापत्ति प्रमाण पत्र की आवश्यकता है । इस अनापत्ति प्रमाण पत्र के लिए प्रथम पक्ष ने द्वितीय पक्ष को आवेदन किया था । जिस पर ग्राम पंचायत/सभा रिस्पा ने विशेष संज्ञान लेते हुए उप प्रधान, ग्राम पंचायत रिस्पा, श्री विमल चन्द्र की अध्यक्षता में दिनांक 30 मार्च, 2009 को एक आपात्कालीन बैठक बुलाई । इस बैठक में ग्राम पंचायत/ सभा रिस्पा में विस्तृत विचार विमर्श करने के उपरान्त निम्नलिखित शर्तें प्रथम पक्ष के समक्ष रखीं :–

NOTARY C.L. NEGI Sub-Div. KALPA Regd.No. 283 GOVT. OF (H.P.)

उप-पंजीकरणाधिकारी तहसील कल्पा जिला किन्नौर, हि०प्र०

For NSL Tidong Power Generation (P) Ltd.

Authorised Signatory

Attested to be a true copy

C. L. Negi (Advocate) 6/9/2010
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उप-प्रधान ग्राम पंचायत रिस्पा तह. पूह, जिला किन्नौर

हस्ताक्षर ....
दिनांक ....

क) प्रथम पक्ष ग्राम पंचायत/सभा रिस्पा को देवता 'माटिंग कुलदेयो' के मोहतमीन श्री मनोहर सिंह सुपुत्र श्री भगवान दास के माध्यम से मु0 2 करोड़ रूपए (मुवालिक दो करोड़ रूपए) ग्राम रिस्पा के निवासियों को परियोजना से होने वाले प्रत्यक्ष व अप्रत्यक्ष प्रभावों के लिए देना होगा । यह राशि स्थानीय क्षेत्र विकास प्राधिकरण (LADA) पुनर्वास एवं पुर्नस्थापना (Rehabilitation and Resettlement Plan) तथा पर्यावरण प्रबंधन योजना (Environment Management Plan) को दी जाने वाली राशि के अतिरिक्त देय होगी

ख) प्रथम पक्ष परियोजना निर्माण कार्य में ग्राम पंचायत/सभा रिस्पा के बेरोजगारों को उनकी योग्यता एवं पदों की उपलब्धता के आधार पर रोजगार में 30% ग्राम रिस्पा के बेरोजगार युवक–युवतियों को प्राथमिकता देगी ।

ग) परियोजना निर्माण कार्यों में ग्राम पंचायत/सभा रिस्पा के लोगों को योग्यता एवं प्रतिस्पर्धात्मक बोली के आधार पर काम ठेके में देने में प्राथमिकता दी जाएगी ।

घ) परियोजना निर्माण में होने वाली परिवहन (Transportation) में ग्राम पंचायत/सभा रिस्पा के लोगों को प्रतिस्पर्धात्मक बोली के आधार पर प्राथमिकता दी जाएगी ।

ङ) परियोजना निर्माण से भविष्य में रिस्पा के उप महाल लिजंग में किसी भी प्रकार से होने वाले नुकसान (जैसे कि भुस्खलन, मकानों का धंसना इत्यादि) का मुआवजा माल महकमें की औसत के आधार पर प्रदान किया जाएगा ।

च) परियोजना निर्माण में सीमेंट बिस्फोटक का इस्तेमाल किया जाए ।

छ) परियोजना निर्माण से होने वाले दुष्प्रभावों के कारण नकदी फसले जैसे:– सेब, बादाम, राजमाह, चिलगोज़ा (न्यौज़ा), अखरोट, मटर आदि की पैदावार बन्द होने की स्थिति में प्रथम पक्ष पूर्ण अनुमानित मुआवजा महकमा बागवानी व कृषि के आधार पर इस क्षेत्र के लोगों को प्रदान करेगा ।

For NSL Tidong Power Generation (P) Ltd.

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Sub-Div. Kalpa (H.P.)
6/9/2010

ज) अगर ग्राम पंचायत/सभा रिस्पा के निवासी प्रथम पक्ष में छोटी गाड़ी लगाना चाहे तो उन्हें प्राथमिकता दी जाएगी।

झ) कम्पार्टमेंट संख्या 191-192, 193 में ग्राम रिस्पा वासियों के माल– मवेशी जो गर्मी के मौसम में चरने हेतू इस जंगल में छोड़ दिए जाते हैं यदि उन्हें जलविद्युत परियोजना के निमार्ण कार्य के दौरान कोई नुकसान पहुंचता है या मारा जाता है तो उसका संपूर्ण मुआवजा प्रथम पक्ष देगा ।

ञ) कम्पार्टमेंट संख्या 191-192, 193 में रिस्पा वासी घासपत्ती, न्योज़ा व लक्कड़ प्राप्त करते हैं। परियोजना निर्माण के दौरान उक्त उद्देश्य के लिए प्रथम पक्ष ग्रामवासियों को सुरक्षित रास्ता प्रदान करेगा । यदि इस दौरान कोई अप्रिय घटना घटती है तो उसकी जिम्मेवारी प्रथम पक्ष की होगी एवं ऐसी परिस्थिति में प्रथम पक्ष पीड़ित को संपूर्ण मुआवज़ा प्रदान करेगा ।

ट) प्रथम पक्ष ने परियोजना के निर्माण कार्य के लिए जो भूमि अधिकृत नहीं की है यदि उस भूमि से रेता बज़री व पत्थर उठाता है तो प्रथम पक्ष द्वितीय पक्ष को रायल्टी देगा।

NOTARY C.L. NEGI Sub-Div. KALPA Regd.No. 233 GOVT. OF H.P.

ठ) प्रथम पक्ष तिनाला चश्में से पांनी को पेयजल के रूप में प्रयोग कर सकता है । लेकिन उसके लिए वह कोई भी पाईप लाईन नहीं बिछा सकता और ना ही कोई टैंक का निर्माण कर सकता है । तिनाला चश्में का पानी प्रथम पक्ष यदि परियोजना निर्माण के लिए उपयोग करता है तो उसे द्वितीय पक्ष को रायल्टी देना होगा ।

उप-प्रजीकाध्यक्ष
तहसील मुरंग
जिला किन्नौर, हि0प्र0

ड) प्रथम पक्ष ग्राम रिस्पा में 20 स्ट्रीट लाईटें लगवाएगा, जिसको लगाने का खर्चा एवं रख – रखाव का खर्चा स्वयं वहन करेगा।

ढ) जल विद्युत परियोजना निर्माण के बाद सड़क जो पावर–हाऊस से सर्ज शाफ्ट तक जाती है का प्रयोग ग्रामवासी रिस्पा कम्पार्टमेंट संख्या 191-192, 193 में आने जाने के लिए कर सकते हैं ।

For NSL Tidong Power Generation (P) Ltd.

Authorised Signatory

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C. L. Negi (Advocate)
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Sub-Div. Kalpa (H.P.)
6/9/2010

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हस्ताक्षर

1508853 2008 **Himachal Government Judicial Paper**

न) प्रथम पक्ष ग्राम रिस्पा में मन्दिर निर्माण के लिए मू0 3.00 लाख रुपए (एक मुश्त) ग्राम रिस्पा को देगा ।

प) प्रथम पक्ष यदि जल विद्युत परियोजना के निर्माण कार्य के दौरान डुब्बा खडड् के पानी का प्रयोग करता है, तो वह उतने ही पानी की व्यवस्था वहां करेया।

फ) परियोजना निर्माण कार्य के दौरान यदि गांव रिस्पा के किसी भी भाग में परियोजना निर्माण के कारण भूस्खलन होता है या पत्थर गिरता है, तो उससे होने वाली क्षति की भरपाई प्रथम पक्ष करेगा ।

NOTARY C.L. NEGI Sub-Div. KALPA Regd.No. 233 GOVT. OF H.P.

ब) परियोजना निर्माण कार्य के दौरान ग्रामवासी रिस्पा के कम्पार्टमेंट संख्या 191-192, 193 आने जाने के लिए प्रथम पक्ष एक सुरक्षा कोष्ठ गठित करे। जिसको सूचित करके व जिसकी आज्ञा मिलने पर ग्रामवासी रिस्पा उपरोक्त कम्पार्टमेंट में सुरक्षित आ जा सके । इस सुरक्षा कोष्ठ में ग्राम रिस्पा के बेरोजगार युवकों को ही रोजगार दिया जाएगा ।

भ) प्रथम पक्ष को कम्पार्टमेंट संख्या 191-192, 193 में प्रत्यावर्तित हुई भूमि का पक्का सीमाकन प्रथम पक्ष ग्रामवासी रिस्पा या चुने प्रतिनिधियों के समक्ष करेगा ।

उप-पंजीकाध्यक्ष तहसील कुरंग जिला किन्नौर, हि0प्र0

प्रथम पक्ष ने ग्राम पंचायत/सभां रिस्पा कि उपरोक्त सभी शर्तों को स्वीकार किया । प्रथम पक्ष मु0 2.00 करोड़ रूपए (मुवलिक दो करोड़ रुपए) निम्नलिखित किश्तों में द्वित्तीय पक्ष को देने का इकरार करता है :–

क) पहली किश्त मु0 1.00 करोड़ रूपए (मुवलिक एक करोड़ रुपए) द्वित्तीय पक्ष द्वारा अनापत्ति प्रमाण पत्र जारी करने के समय देय होगी ।

ख) दूसरी किश्त मु0 50.00 लाख रूपए (मुवलिक पचास लाख रुपए) माह अप्रैल 2010 में देय होगी ।

ग) तीसरी किश्त मु0 50.00 लाख रूपए (मुवलिक पचास लाख रुपए) माह अप्रैल 2011 में देय होगी ।

For NSL Tidong Power Generation (P) Ltd,

Authorised Signatory

Attested to be a true co

C. L. Negi (Advocate)
NOTARY PUBLIC
Sub-Div. Kalpa (H.P.)
6/9/2010

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हस्ताक्षर
दिनांक

Nº 1508835 2008 **Himachal Government Judicial Paper**

4. प्रथम-पक्ष परियोजना निमार्ण हेतू विस्फोटक सामग्री भण्डारण के लिए उप महाल लिज़ंग एवं DPF 193 में जो एक्सप्लोसिव मैगज़ीन की स्थापना करेगा । उसके लिए द्वितीय पक्ष को कोई आपत्ति नहीं है ।

5. यह कि यदि उपरोक्त समझौतानामा में उल्लिखित शर्तों का उल्लंघन किया गया तो दोनों पक्ष आपस में समझौते द्वारा झगड़े का निपटारा करेंगे । यदि आपसी समझौते से मामला नहीं निपटा तो Indian Arbitration & Conciliation Act, 1996 के अन्तर्गत Arbitrator नियुक्त करके झगड़े का निपटारा करेंगे ।

अतः यह समझौतानामा दोनों पक्षों ने उपरलिखित दिनांक, माह व सन् को बिना किसी बाहरी दबाव व फरेब के गवाहों के समक्ष लिख दिया ताकि सनद रहे और समय पर काम आवे ।

NOTARY C.L. NEGI Sub-Div. KALPA Regd.No. 283 GOVT. OF INDIA

गवाहन

1. Rajesh Gupta (DGM) NSL Tidong Power Generation (P) Ltd Himvir Niwas, Kathi Mor, Reckong Peo Distt Kinnaur (H.P.)

2. Ravinder Singh Manager Electrical. NSL Tidong Power Generation (P) Ltd Himvir Niwas, Kothi Mor Reckong Peo Distt Kinnaur (HP)

प्रथम पक्ष
कृते एन० एस० एल० टिडोंग पावर जैनरेशन प्राइवेट लिमिटेड
For NSL Tidong Power Generation (P) Ltd.
Authorised Signatory

अधिकृत्त हस्ताक्षर कर्त्ता
बाला दत्त शर्मा, उपाध्यक्ष
(टिडोंग -- I जल विद्युत परियोजना)

उप-पंजीकाध्यक्ष तहसील ... जिला ...

गवाहन

1. Maheshwar Singh S/o Lt. Sh. Rakhan Negi VPO Moorang Distt Kinnaur

2. Meghu Chhetan S/o Late Sh Padam Ram R/o Moorang

Identifier Vir Pathe R/o Moorang

द्वितीय पक्ष
कृते ग्राम सभा रिस्पा, तह. मूरंग जिला किन्नौर हि० प्र०

ग्राम पंचायत रिस्पा ... पूह, जिला किन्नौर

अधिकृत्त हस्ताक्षर कर्त्ता
विमल चन्द, उप-प्रधान
ग्राम पंचायत रिस्पा

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6/9/2010
C. L. Negi (Advocate)
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Sub-Div. Kalpa (H.P.)

समझौता नामा

यह समझौतानामा आज दिनांक 13 जनवरी, 2009 को एन0 एस0 एल0 टिडोंग पावर जैनरेशन प्राईवेट लिमिटेड, जिसका गठन मैसर्ज़ नूज़ीविडु सीडस् लिमिटेड ने टिडोंग – I जल विद्युत परियोजना (100 मैगावाट) के क्रियान्वन के लिए एक विशेष उदेद्श्य वाहन् कम्पनी के रुप में किया है जिसका पंजीकृत कार्यालय 78 ए, सेक्टर – 1, फेज – 1, न्यू शिमला–171009 हि0 प्र0 वज़रिया श्री बाला दत्त शर्मा, उपाध्यक्ष, (टिडोंग – I जल विद्युत परियोजना 100 मैगावाट) अधिकृत अधिकारी, आयु 63 वर्ष, सुपुत्र स्व0 श्री जयकृष्ण शर्मा, हिमवीर निवास, कोठी मोड़, रिकांगपिओ, ज़िला किन्नौर हि0 प्र0 (जिसे आगे प्रथम पक्ष भी कहा जा सकेगा) ।

एवं

ग्राम सभा ठंगी, तहसील मूरंग, जिला किन्नौर, हि0 प्र0 वज़रिया श्रीमती मनेष कुमारी, प्रधान, ग्राम पंचायत ठंगी, जिला किन्नौर हि0 प्र0 (जिन्हें आगे द्वितीय पक्ष भी कहा जा सकेगा) के बीच परस्पर सम्पन्न हुआ ।

1. जबकि हिमाचल प्रदेश सरकार ने मैसर्ज़ नूज़ीविडु सीडस् लिमिटेड को "बनाओ, अपनाओ, चलाओ और हस्तांतरित करो" के आधार पर (BOOT Basis) टिडोंग – I जल विद्युत परियोजना (100 मैगावाट) के क्रियान्वन का कार्य सौंपा है ।

2. जबकि मैसर्ज़ नूज़ीविडु सीडस् लिमिटेड को इस परियोजना के क्रियान्वन के लिए ग्राम पंचायत/सभा ठंगी से अनापत्ति प्रमाण पत्र की आवश्यकता है । जिसके लिए प्रधान, ग्राम पचायत ठंगी से 20 जुलाई 2006 के एक समझौता नामा हस्ताक्षरित किया गया था ।

Attested to be a true copy
6/1/2010
Advocate
NOTARY PUBLIC
Sub-Div. Kalpa (H.P.)

Authorised Signatory

हस्ताक्षर
दिनांक

हिमाचल प्रदेश HIMACHAL PRADESH

OOAA 834424

3. जबकि उपरोक्त समझौतानामा इंगित करता है कि रु0 2.00 करोड़ (दुवलिक दो करोड़ रुपये) की राशि ग्राम पचांयत ठंगी के उल्लिखित विकास कार्यो के लिए प्रथम पक्ष द्वारा ग्राम पंचायत ठंगी को परियोजना के लिए अनापत्ति प्रमाण पत्र जारी करने की एवज़ में होगी और समझौता नामा यह भी इंगित करता है कि अनापत्ति प्रमाण पत्र जारी करने के समय एक अंतिम समझौता नामा हस्ताक्षरित किया जाएगा।

अतः अंतिम समझौता नामा इस प्रकार से साक्ष्य है :-

Attested to be a true copy

C. L. Negi (Advocate)
NOTARY PUBLIC
Sub-Div. Kalpa (H.P.)

4. जबकि प्रथम पक्ष ने अनापत्ति प्रमाण पत्र के लिये द्वितीय पक्ष से आवेदन किया था। दिनांक ..... को विसपुर ग्रामवासियों ने दिनांक 13 जनवरी, 2009 को ग्राम सभा का आयोजन किया तथा उपरोक्त विषय पर विस्तृत चर्चा की गई । ग्राम सभा ठंगी, प्रथम पक्ष समक्ष निम्नलिखित मांगें/शर्तें रखीं :-

For NSL Tidong Power Generation (P) Ltd.

Authorised Signatory

Attested

Additional District Magistrate
Pooh (H.P.)

हस्ताक्षर .....
दिनांक 31/1/09

क) प्रथम पक्ष ग्राम सभा ठंगी को देवता 'श्री रापुक शंकर ठंगी' के माध्यम से मु0 2.00 करोड़ (मुवलिक दो करोड़ रुपये) ग्राम ठंगी के निवासियों को परियोजना से होने वाले प्रत्यक्ष व अप्रत्यक्ष प्रभावों के लिए देना होगा । यह राशि स्थानिय क्षेत्र विकास प्राधिकरण (LADA), पुर्नवास एवं पुर्नस्थापना (R&R) तथा पर्यावरण प्रबंधन योजना (EMP) को दी जाने वाली राशि के अतिरिक्त देय होगी ।

ख) कम्पनी में गांव के बेरोज़गारों को उनकी योग्यता एवं पदों की उपलब्धता के आधार पर रोज़गार में प्राथमिकता दी जाये।

ग) परियोजना स्थल में मौजूद सभी पानी के चश्मों के सूखने की सूरत में उक्त स्थान पर उतने ही पानी की व्यवस्था करे ।

घ) परियोजना के निर्माण कार्य से गारा खड्ड के पानी सूखने की अवस्था में पानी की व्यवस्था कम्पनी करे ।

ड.) परियोजना निर्माण कार्यों में गांव के लोगों को योग्यता एवं प्रतिस्पर्धात्मक बोली के आधार पर काम ठेके पर देने में प्राथमिकता दी जाये।

च) परियोजना निर्माण में होने वाली ट्रांस्पोर्टेशन में गांव ठंगी व लम्बर की ट्रांस्पोर्ट यूनियन को प्रतिस्पर्धात्मक बोली के आधार पर प्राथमिकता दी जाये।

छ) परियोजना निर्माण से भविष्य में पिब्बर गांव में किसी भी प्रकार से होने वाले नुकसान (भुस्खलन, मकानों का धंसना) की बागवानी व माल महकमा औसत से मुआवज़ा कम्पनी प्रदान करे।

ज) परियोजना निर्माण में सीमित विस्फोटक का इस्तेमाल करे ।

झ) परियोजना निर्माण से होने वाले दुष्प्रभावों के कारण नकदी फसलें जैसेः– सेब, बादाम, राजमाह, चिलगोज़ा (न्यौज़ा), अखरोट, मटर आदि की पैदावार बन्द होने की स्थिति में कम्पनी पूर्ण अनुमानित मुआवज़ा इस क्षेत्र के लोगों को प्रदान करे ।

Attested to be a true copy
C. L. Negi (Advocate)
NOTARY PUBLIC
Sub Div. Kalpa (H.P.)

Additional District Magistrate
Pooh, Distt. Kinnaur (H.P.)

For NSL Tidong Power Generation (P) Ltd.

Authorised Signatory

ग्राम पंचायत ठंगी • जिला. पूह, जिला किन्नौर •

हस्ताक्षर
दिनांक 3/11/09

ञ) परियोजना निर्माण के दौरान सड़क पर भारी वाहनों के चलने से फैलने वाली प्रदूषण व उड़ने वाली धूल को रोकने का प्रावधान कम्पनी करे ।

त) अगर कोई लम्बर व ठंगी वासी कम्पनी में काम करना चाहता है तो उसे कर्मचारी के रुप में योग्यता एवं पदों की उपलब्धता के आधार पर कार्य करने की प्राथमिकता दी जाये ।

थ) लम्बर व ठंगी वासियों को उनकी योग्यता एवं प्रतिस्पर्धात्मक बोली के अनुसार ठेकेदारी का कार्य कम्पनी प्राथमिकता के आधार पर दे ।

द) अगर लम्बर व ठंगी वासी कम्पनी में गाड़ी लगाना चाहे तो उसे प्रतिस्पर्धात्मक बोली के आधार पर प्राथमिकता दी जाये ।

ध) परियोजना कार्य के दौरान अगर कहीं भूस्खलन होता है तो कम्पनी उसकी मुरम्मत अपने खर्चे पर करवाये ।

5. यह कि प्रथम पक्ष ने ग्राम सभा कि उपरोक्त सभी शर्तों को स्वीकार किया । प्रथम पक्ष मु0 2.00 करोड़ (मुवलिक दो करोड़ रुपये) निम्नलिखित किश्तों में द्वित्तीय पक्ष को देने का इकरार करता है :–

क) पहली किश्त मु0 1.00 करोड़ (मुवलिक एक करोड़ रुपये) द्वित्तीय पक्ष द्वारा अनापत्ति प्रमाण पत्र जारी करने के समय देय होगी ।

ख) दूसरी किश्त मु0 50.00 लाख (मुवलिक पचास लाख रुपये) माह जनवरी 2010 में देय होगी ।

ग) तीसरी किश्त मु0 50.00 लाख (मुवलिक पचास लाख रुपये) माह जनवरी 2011 में देय होगी ।

6. यह कि प्रथम पक्ष द्वारा सभी शर्तों को स्वीकार करने पर ग्राम सभा ने अनापत्ति प्रमाण पत्र जारी करने में लिये स्वीकृति दी । ग्राम सभा ने श्रीमती मनेष कुमारी, प्रधान ग्राम पंचायत ठंगी को सर्वसम्मति से अनापत्ति प्रमाण पत्र जारी करने के लिए अधिकृत्त किया ।

Attested to be a true copy
6/9/2010
C. L. Negi (Advocate)
NOTARY PUBLIC
Sub-Div. Pooh (H.P.)

For NSL Tidong Power Generation (P) Ltd.

Authorised Signatory

Additional District Magistrate
Pooh, Distt. Kinnaur (H.P.)

ग्राम पंचायत ठंगी तह. पूह, जिला किन्नौर

हस्ताक्षर
दिनांक 13/1/09

№ 0345016 2007 Himachal Government Judicial Paper

7. यह कि यदि उपरोक्त समझौतानामा में उल्लिखित शर्तों का उल्लंघन किया गया तो दोनों पक्ष आपस में समझौते द्वारा झगड़े का निपटारा करेंगे । यदि आपसी समझौते से मामला नहीं निपटा तो Indian Arbitration & Conciliation Act, 1996 के अन्तर्गत Arbitrator नियुक्त करके झगड़े का निपटारा करेंगे ।

अतः यह समझौतानामा दोनों पक्षों ने उपरलिखित दिनांक, माह व सन् को बिना किसी बाहरी दबाव व फरेब के गवाहों के समक्ष लिख दिया ताकि सनद् रहे और समय पर काम आवे ।

गवाहन्
1. (Rajesh Gupta). Deputy General Manager NSL Tidong Power Generation (P) Ltd. Reckong Peo Distt Kinnaur (H.P.)
2. (Krishan Lal) AGM NSL Tidong Power Generation (P) Ltd Reckong Peo Distt Kinnaur (H.P.)
3. (V.V. SHANTHAK). NUZIVEEDU SEEDS LTD NSL TIDONG POWER GENERATION (P) LTD. RECKONGPEO DIST- KINNAUR (H.P).

प्रथम पक्ष
कृत्ते एन0 एस0 एल0 टिडोंग पावर जैनरेशन प्राईवेट लिमिटेड
For NSL Tidong Power Generation (P) Ltd.
Authorised Signatory
अधिकृत हस्ताक्षर कर्त्ता
बाला दत्त शर्मा, उपाध्यक्ष
(टिडोंग – I जल विद्युत परियोजना)

गवाहन्
1. Naresh Kumar Negi V.H.P.O. Shillo Tehsil Distt KNR. (HP)
2. Bynee Lal Negi V.P.O Shillo Tehsil Distt KNR. (HP)
3. (Nand Lal Rathore)

द्वितीय पक्ष
कृत्ते ग्राम सभा ठंगी, पो0 भरग,
ज़िला – किन्नौर

ग्राम पंचायत ठंगी • हि.प्र. •

अधिकृत हस्ताक्षर कर्त्ता मुह, जिला किन्नौर
मनेष कुमारी, प्रधान ग्राम पंचायत ठंगी
हस्ताक्षर
दिनांक 13/1/09

Attested to be a true copy
6/9/2012
C. L. Negi (Advocate)
NOTARY PUBLIC
Sub-Div. Kalpa (H.P.)

Addl. District Magistrate
Pooh, ...

Annexure 7.3

Gist of Consultations with 3 affected Panchayats during 2005 to 2012

Gram Panchayat : Thangi

A brief of the meeting with Gram Panchayat Thangi held at village Thangi on 12th April, 2005.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Sh. Prem Singh Rathor, Pradhan.
  - Sh. Nand Lal Rathor.
  - 4 Panchayat Members.

- **Nuziveedu Seeds Ltd.**

  - Sh. Ravinder Jeet Singh, Project Manager.
  - Sh. Rama Shashanka, Engineer.

- At the outset, Sh Ravinder Jeet Singh, Project Manager briefed the detail of the Tidong – 1 HEP (100MW) for which MOU has been signed with Govt. of Himachal Pradesh on September 23, 2004.

- He gave a letter to Pradhan Gram Panchayat requesting therein for issue of NOC for the construction of Project whose components are located in Tehsil Moorang of Distt. Kinnaur.

- Pradhan Gram Panchayat informed that some more time is required on this vital issue

A brief of the meeting with Gram Panchayat Thangi held at village Thangi on 24th March, 2006.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Smt. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - Sh. Nand Lal Rathor.

- **Nuziveedu Seeds Ltd.**

  - Sh. Ravinder Jeet Singh, Project Manager.

- The issue of NOC for the construction of Project was raised by the Project proponent.

- Pradhan Gram Panchayat wanted to know the followings:-

  - DPR of the Project.
  - Layout of the project.
  - Extent of Land involved for the project.

- Sh Ravinder Jeet Singh, Project Manager apprised about the layout of the project and the extent of Land involved.

- He also handed over DPR of the Project to Pradhan Gram Panchayat.

- Pradhan Gram Panchayat informed that they will take some time to go thro' the DPR.

- The next date of meeting fixed on 22nd May, 2006

A brief of the meeting with Gram Panchayat Thangi held at village Thangi on 22nd May, 2006.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Smt. Manesha Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - Sh. Nand Lal Rathor.
  - 4 Panchayat members.

- **Nuziveedu Seeds Ltd.**

  - Sh. Ravinder Jeet Singh, Project Manager.

- Detailed discussion held on DPR of the Project.

- The Layout of different components of the Project (e.g. Intake works, HRT, Surge Shaft, Pressure Shaft, Power House) were also shown from PWD road near village Lamber and Up-Mohal Ruwang to the Panchayat members.

- Next meeting fixed on 6th July ,2006

A brief of the meeting with Gram Panchayat Thangi held at village Thangi on 6th July, 2006.

The followings were present in the Meeting:-

- **Gram Panchayat**
  - Smt. Manesha Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - Sh. Nand Lal Rathor. Chairman Tidong Valley Environment Protection and Development Sammittee.
  - 5 Panchayat members.
- **Nuziveedu Seeds Ltd.**
  - Sh. Ravinder Jeet Singh, Project Manager.
- Gram Panchayat putforth the following demands for issue of NOC.
  - Construction of sewage line in village Thangi.
  - Street lights in village Thangi.
  - Concrete foot path and Railing from Bus stand to village Thangi.
  - Construction of Community Hall.
  - Construction of Mini Stadium.
  - Construction of road and bridges up to village Lamber.
  - Construction of Mahila Mandal Bhawan.
  - Construction of span-trolley for Pibber Village.
- Panchayat further raised the other conditions
  - Preference to the villages in terms of employment, petty work contract and transport union of village Thangi for transportation of material required for the Project.
  - Construction of permanent bridge for Pibber village.
  - Rs 2 Lac for 35 years for development works of village.
  - Construction of 0.5 Km road to village.
  - Construction of Panchayat Bhawan.
  - Arrangement of water in the event of drying out springs in the area.
  - Compensation for damage to houses etc in village Pibber due to construction of the project in future.
  - Controlled blasting in tunnel.
  - Safety of wild animals in village Lamber and Pibber.
- Next date of meeting fixed on 12th July, 2006.

A brief of the meeting with Gram Panchayat Thangi held at village Thangi on 12th July, 2006.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Smt. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - Sh. Nand Lal Rathor.
  - 5 Panchayat members.

- **Nuziveedu Seeds Ltd.**

  - Sh. Ravinder Jeet Singh, Project Manager.
  - Sh. Rajesh Gupta, Project Engineer.

1. Gram Panchayat putforth seven demands out 12 demands listed in the previous meeting on 6th July , 2006

2. Gram Panchayat further raised two modes of execution for aforesaid development works

Alternative – 1

Execution of works by the company. Company will deposit Rs. 100Lac to the Gram Panchayat as advance, which will be utilized for above works under the intervention / supervision of Panchayat

Alternative-2

In case works to be executed by Gram Panchayat, The Company will make payment of Rs. 200 Lac to Gram Panchayat for construction of these works

- After detailed discussions in the matter, the next meeting fixed on 20th July, 2006 to arrive at an Agreement.

A brief of the meeting with Gram Panchayat Thangi held at village Thangi on 20th July, 2006.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Smt. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - 3 Panchayat members.
  - Sh. Nand Lal Rathor, Chairman, Tidong valley Environment Protection and Development Sammittee.
  - 21 villagers of Thangi & Lamber.

- **Nuziveedu Seeds Ltd.**

  - Sh. Ravinder Jeet Singh, Project Manager.

- Project proponent requested Gram Panchayat to review their demands.

- After lot of deliberations on the Panchayat demands a provisional agreement was signed with Gram Panchayat on 20th July, 2006 with the stipulation that the final agreement shall be signed at the time of issue of NOC.

Gist of the Public hearing with Gram Panchayat Thangi held at village Lamber on 21st July, 2006.

The followings were present in the public hearing:-

- **HP State Pollution Control Board**
  - Member Secretary.
  - Environmental Engineer.
  - Asstt. Environment Engineer.

- **Nuziveedu Seeds Ltd.**
  - Chief Consultant.
  - Vice President (Hydel Projects).
  - Project Manager.
  - Project Engineer.

- **Gram Panchayat**
  - Sh. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - Sh. Nand Lal Rathore, Chairman, Tidong Valley Environment Protection and Development Sammittee.
  - Panchayat Members and villagers of Thangi and Lamber.

- A public hearing was conducted by HP State pollution Control Board at Lamber.
- Project proponent gave a brief of the Project.
- Views expressed by the representatives of project affected Panchayat were taken note by HP State Pollution Control Board.
- Representatives of Project affected Panchayat were generally observed in favour of construction of the project of State importance.

Gist of the meeting with Gram Panchayat Thangi held at village Lamber on 7th March, 2007.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Smt. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - Sh. Nand Lal Rathore, Chairman, Tidong valley Environment Protection and Development Sammittee.
  - 5 Panchayat members.

- **Nuziveedu Seeds Ltd.**

  - Sh. Ravinder Jeet Singh, Project Manager.

- Discussion held on mode of execution of development works of the Gram Panchayat.

- Project proponent expressed preference for Alternative-1 vide which the company shall execute the proposed development works of the Panchayat.

A brief of the meeting with Gram Panchayat Thangi held at village Thangi on 3rd March, 2008.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Smt. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - Sh Nand Lal Rathor, Chairman, Tidong Valley Environment Protection & Development Sammittee,
  - 6 Panchayat Members

- **Nuziveedu Seeds Ltd.**

  - H K .Singh, General Manager.
  - V.V Shamanthak.

- Gram Panchayat stressed for appropriate land rates for the private land at Lamber under acquisition.

- Gram Panchayat demand of free electricity to villages of Lamber and Thangi.

- Project proponent impressed upon to review these additional demands.

Gist of the meeting with Gram Panchayat Thangi held at village Thangi on 21st June, 2008.

The followings were present in the meeting:-

- **Gram Panchayat**
  - Sh. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - Sh Nand Lal Rathor, Chairman, Tidong Valley Environment Protection & Development Sammittee,
  - 5 Panchayat Members
- **Departmental Officials.**
  - Range Officer, Akpa.
  - Block Officer,
  - Beat Guard.
  - JE, PWD.
  - JE, IPH.
  - Kanoongo.
  - Patwari.
  - Representative of horticulture.
- **Nuziveedu Seeds Ltd.**
  - Sh. B.D. Sharma, Vice President.
  - Sh. Kishori Lal, AGM.
  - Sh. V.V. Shamanthak
- Discussions regarding Forest Land, trees and private land involved in the construction project we held.
- Videography of Houses, Water sources including project area of village Lamber in presence of representatives of Revenue, Forest, Horticulture, PWD & IPH Deptts.
- Videography for Village Pibber fixed on 22nd June, 2008.

Gist of the meeting with Gram Panchayat Thangi held at village Thangi on 22nd June, 2008.

The followings were present in the meeting:-

- **Gram Panchayat**

  - Sh. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - Sh Nand Lal Rathor, Chairman, Tidong Valley Environment Protection & Development Sammittee,
  - 5 Panchayat Members.

- **Departmental Officials.**
  - Range Officer, Akpa.
  - Block Officer,
  - Beat Guard.
  - JE, PWD.
  - JE, IPH.
  - Kanoongo.
  - Patwari.
  - Representative of horticulture.
- **Nuziveedu Seeds Ltd.**

  - Sh. B.D. Sharma, Vice President.
  - Sh. Kishori Lal, AGM.

- Discussions held regarding Forest land/ trees and alignment of HRT passing under Gara & Duba Nallahs.
- Videography of orchards, houses and water Sources carried out in Pibber village.

Gist of the meeting with Gram Panchayat Thangi held at village Thangi on 27th September, 2008.

The followings were present in the meeting:-

- **Gram Panchayat**
  - Sh. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - Sh Nand Lal Rathor, Chairman, Tidong Valley Environment Protection & Development Sammittee,
  - 7 Panchayat Members
- **Nuziveedu Seeds Ltd.**
  - Sh. B.D. Sharma, Vice President.
  - Sh. Pawan Shandil, AGM.
  - Sh. V.V. Shamanthak.
- At the outset Pradhan Gram Panchayat started discussions for appropriate rates to private land.
- Project proponent apprised that Land Acquisition Officer-cum-ADM-Pooh already taking care thereof.
- Project proponent requested for issued of NOC on the basis of provisional agreement arrived at on 20th July, 2008.
- Project proponent, in reference to the meeting on R&R Plan held in the Chamber of Deputy Commissioner, Kinnaur on 16th September, 2008, informed that the development works will be executed by Panchayat. Out of Rs. 2 crores as per agreement an amount of Rs. 1 crore will be released immediately on issue of NOC and the balance Rs. 1 crore shall be released five equal annual installments.
- Pradhan Gram Panchayat was insisting to release above funds in two installments only.
- No consensus on this issued could arrived at.

Gist of the meeting with Gram Panchayat Thangi held at village Thangi on 15th December, 2008.

The followings were present in the meeting:-

- **Gram Panchayat**

  - Sh. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - Sh Nand Lal Rathor, Chairman, Tidong Valley Environment Protection & Development Sammittee,
  - 7 Panchayat Members

- **NSL Tidong Power Generation Pvt. Ltd.**

  - Sh. B.D. Sharma, Vice President.
  - Sh. Rajesh Gupta, DGM.
  - Sh. V.V. Shamanthak.

- Discussions on issue of NOC initiated by the Project Proponent.

- Pradhan Gram Panchayat informed that the payment for NOC shall be by Cheque in the name of Mohatmi Sri Rapuk Shankar, Thangi, Sh. Ashok Kumar, Kamdar.

- NOC will be issued after the appropriate land rates of villagers of village Lamber are decided.

A brief of the meeting with Gram Panchayat Thangi held at village Thangi on 16th December, 2008.

The followings were present in the meeting:-

- **Gram Panchayat**

  - Sh. Raj Narayan, Up-Pradhan.
  - 5 land losers (Project affected families) of villages Lamber namely Manoj Kumar, Prem Lal, Surjan Bhagat, Jay Narayan, Vidya Rajan.

- **NSL Tidong Power Generation Pvt. Ltd.**

  - Sh. B.D. Sharma, Vice President.
  - Sh. Rajesh Gupta, DGM.
  - Sh. V.V. Shamanthak.

- Land losers stressed for good compensation of private land.

- Priority to be given in employment as well as in award of petty contracts to land losers.

- Priority in hiring of Vehicles to land losers.

- Repair to the damages caused by land slides to be borne by the Company.

Gist of the meeting with Gram Panchayat Thangi held at village Thangi on 13th January, 2009.

The followings were present in the meeting:-

- **Gram Panchayat**

  - Smt. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - Gram Sabha.

- **NSL Tidong Power Generation Pvt. Ltd.**

  - Sh. B.D. Sharma, Vice President.
  - Sh. Rajesh Gupta, DGM.
  - Sh. V.V. Shamanthak.

- Project proponent initiated the discussions on NOC for the Project.

- After detailed deliberations on the demands of Gram Panchayat, it was finally agreed by the Panchayat that out of Rs. 2 crore, 1 crore will be released immediately and the balance Rs. 1 crore shall be released in two equal annual installments.

- Accordingly an agreement thereof signed on 13th January, 2009.

- NOC was issued by Gram Panchayat.

Gist of the meeting with Gram Panchayat Thangi held at village Thangi on 3rd August, 2010.

The followings were present in the meeting:-

- **Gram Panchayat**

  - Smt. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - 25 Villagers of Pibber & Thangi

- **Revenue Deptt.**

  - Patwari, Thangi.

- **NSL Tidong Power Generation Pvt. Ltd.**

  - Sh. Ravinder Singh Negi, Manager (Electrical).
  - Sh. Arun Dhiman, Geologist.

- Discussions held regarding houses and water sources falling in village Pibber.

- Project proponent briefs the alignment of HRT passing quite away from Pibber Village.

- Videography of houses, water sources of part Pibber village and orchards was done under the directions of Local Area Development Committee meeting held on 7th July, 2010.

Gist of the meeting with Gram Panchayat Thangi held at village Thangi on 4th August, 2010.

The followings were present in the meeting:-

- **Gram Panchayat**

  - Smt. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - 25 Villagers of Pibber & Thangi

- **Revenue Deptt.**

  - Patwari, Thangi.

- **NSL Tidong Power Generation Pvt. Ltd.**

  - Sh. Ravinder Singh Negi, Manager (Electrical).
  - Sh. Arun Dhiman, Geologist.

- Discussions held regarding houses and water sources.

- Videography of houses, water sources for the balance Pibber Village orchards under the directions of Local Area Development Committee meeting held on 7th July, 2010.

A brief of the meeting with Gram Panchayat Thangi held at village Thangi on 5th August, 2010.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Smt. Manesh Kumari, Pradhan.
  - Sh. Raj Narayan, Up-Pradhan.
  - 25 Villagers of Pibber & Thangi

- **Revenue Deptt.**

  - Patwari, Thangi.

- **NSL Tidong Power Generation Pvt. Ltd.**

  - Sh. Ravinder Singh Negi, Manager (Electrical).
  - Sh. Arun Dhiman, Geologist.

- Discussions held regarding houses and water sources.

- Project proponent briefed the Layout of Project components.

- Videography of houses and water sources including project area of village Lamber carried out under the direction of Local Area Development Committee held on 7th July, 2010.

THANGI PANCHYAT

Date	19-04-2012
Venue	Residence of Sarpanch and village Temple Thangi, Thangi Panchayat
Participants from Village	Mrs Sujata Kumari , Pradhan, Thangi Panchayat, and Gram Panchayat secretary village
Participants from NTPGL	Mr G.Sharat Chandra Rao, Manager- Social
Issues Raised by the Villagers	• Loss of Chilgoza trees in the haphazard construction of the approach roads to the audit at intake point. • Payment of Chilgoza compensation as per the assessment done by them. • Retrenchment of local labour and payment of dues pending to the local labour • Dust pollution to the apple orchards from the movement of project vehicles and demand for water sprinkling along the village roads • Adequate compensation for the loss of crops and apple orchards from setting up of the Stone Crusher Plant in Thangi village.
Issued discussed by the NTPGL representatives during the visit to the village	• The local social profile of the village and local customs, traditions, family systems and other support systems • The availability of education infrastructure such as schools and levels of literacy among the local people • The occupation profile, dependence on agriculture and livestock activity. • The historical importance of the Thangi village and its religious places • The availability of community infrastructure in the village. • The production levels of Apple and annual village level income, the technologies used for agricultural activity and support given agricultural department • The incidence of household or cottage industries and the support from government • The incidence of any major health problems and the participation of the local people in immunization programmes and other health camps • The need for health camps in the village. • The coordination of village level institutions such as Temple Committee, Gram Panchayat, Youth Association , Women Association • The management of Chilgoza seeds collection and distribution of income

	among the various groups in the village • The schemes approved under LADA and status of completion of the schemes • The utilization of the funds provided as part of the MOU for NOC
Responses given by NTPGL representatives	• Informed about the measures to address the social and environmental impacts through various management plans and apprised the seriousness with which the company is trying to address the issues amicably. • Assured that all necessary steps will be taken towards building the confidence among the locals through continuous discussion and dialogue process. • On the compensation for loss of Chilgoza it was stated that as the assessment for the loss is being completed and details are being shared among the various stakeholders and as soon as possible the issues will be resolved amicably. • For impacts to the crops and apple orchards from stone crushing plant it was informed that monitoring and assessment of damage from pollution to the apple orchards and other crops is being completed at Lambar and report is awaited from the PCB authorities and suitable compensation if any will be paid accordingly. • As part of the discussion it was communicated that company also expects cooperation and assured that in coordination with them the company will take up measures for improving the socio-economic conditions and involve them in decision making processes
Further activity proposed under E&S initiatives	• The Pradhan was informed that a detailed need assessment survey to understand the current socio-economic situation of the locals and availability of the community infrastructure and livelihood opportunities will be undertaken in the coming months.
Other activity in the village	• Visited the total village and surveyed the village to understand the local housing conditions, local community infrastructure, cropping pattern and others. • Visited the school premises where a proposal for Multi Purpose Community Building under LADA is being planned, • Visited the works that are completed under LADA.

Gram Panchayat : Rispa

A brief of the meeting with Gram Panchayat Rispa held at village Rispa on 19th April, 2005.

The followings were present in the Meeting:-

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - 4 Panchayat members.
- **Nuziveedu Seeds Ltd.**
  - Sh. Ravinder Jeet Singh, Project Manager.
  - Sh. Rama Shashanka, Engineer.

- Project Manager gave a brief introduction of the company.
- He also informed that Tidong-I HEP, located in Tehsil Moorang, has been allotted to the company and MOU thereof has been signed on September 23, 2004.
- He further requested for issue of NOC for the Project and a request letter thereof also handed over to Pradhan Gram Panchayat.
- Pradhan Gram Panchayat asked for DPR of the Project for which the Project proponent informed that the same shall be submitted on 24th April, 2006.

A brief of the meeting with Gram Panchayat Rispa held at village Rispa on 24th April, 2006.

The followings were present in the Meeting:-

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - 5 Panchayat members.
- **Nuziveedu Seeds Ltd.**
  - Sh. Ravinder Jeet Singh, Project Manager.

- Project proponent handed over DPR of the Project to Pradhan. He also briefed various provisions contained in the DPR and also explained the layout of the Project.

- He again requested Pradhan Gram Panchayat for issue of NOC of the Project.

- Pradhan Gram Panchayat informed that they will go thro' DPR of the Project and subsequently discussions in the matter will be held in the Panchayat.

A brief of the meeting with Gram Panchayat Rispa held at village Rispa on 22nd June, 2006.

The followings were present in the Meeting:-

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - 5 Panchayat members.
- **Nuziveedu Seeds Ltd.**
  - Sh. Ravinder Jeet Singh, Project Manager.
- Project proponent handed over to Pradhan Gram Panchayat a notice of HP State Pollution Control Board vide which Public hearing for the Project was fixed on 21st July, 2006.
- He again briefed the details of Project components and also requested Pradhan Gram Panchayat to issue NOC for the Project at the earliest.
- He further requested for the presence of all villagers of Rispa Panchayat in the proposed public hearing.

A brief of the meeting with Gram Panchayat Rispa held at village Rispa on 21st July, 2006.

The followings were present in the Meeting:-

- **HP State Pollution Control Board**
  - Members Secretary
  - Environment Engineer
  - Asstt. Environment Engineer
- **Nuziveedu Seeds Ltd.**
  - Sh. G. Chowdariah, Vice President.
  - Sh. D. Paul Verma, Chief Consultant.
  - Ravinder Jeet Singh, Project Manager.
- All the above officers/ Executives of HP State Pollution Control Board and the Project proponent assembled at Village Rispa at 3PM to hold Public hearing.
- No villager of Rispa Panchayat turned up for the Public hearing till 5PM.
- Above officers/ Executives waited for villagers till 5PM and thereafter disbursed.

A brief of the meeting with Gram Panchayat Rispa held at village Rispa on 22nd July, 2006.

The followings were present in the Meeting:-

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - Sh. Dinesh Kumar, Pradhan, Tidong Valley Environment Conservation & Development Sammittee.
  - 19 Panchayat members.
- **Nuziveedu Seeds Ltd.**
  - Sh. G. Chowdariah, Vice President.
  - Sh. D. Paul Verma, Chief Consultant.
  - Ravinder Jeet Singh, Project Manager.
- **Forest Deptt.**
  - Range Officer.
  - 2 Guards.
- Pradhan Gram Panchayat raised objections on construction of road to Surge Shaft through Rispa village as well as DPF compartment No – 190 & 191.
- He also raised objections in felling of trees in DPF-192 & 193.
- He further expressed apprehension of drying water sources due to basting in the Project area including damage to apple trees.
- Project proponent explained that the Project area is about 3km's away from Rispa village and there is no any probability of drying water sources and damage to apple trees.
- But Pradhan Gram Panchayat didn't show any positive response for issue of NOC.

A brief of the meeting with Gram Panchayat Rispa held at village Rispa on 23rd September, 2006.

The followings were present in the Meeting:-

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - 4 members of Tidong Valley Environment Conservation Development Sammittee, as constituted by Gram Panchayat, as per its letter dated 7th August, 2006.

- **Nuziveedu Seeds Ltd.**
  - Sh. Ravinder Jeet Singh, Project Manager.
  - Sh. Rajesh Gupta, Project Engineer.
  - Sh. Manoj Kumar, Surveyor.

- **Forest Deptt.**
  - Block Officer

- Beat guard.

- Joint enumeration of part trees falling in DPF-191 & 193, which is proposed to be diverted for the Project, was carried out by the above team.

A brief of the meeting with Gram Panchayat Rispa held at village Rispa on 24th September, 2006.

The followings were present in the Meeting:-

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - 4 members of Tidong Valley Environment Conservation Development Sammittee, as constituted by Gram Panchayat, as per its letter dated 7th August, 2006.

- **Nuziveedu Seeds Ltd.**
  - Sh. Ravinder Jeet Singh, Project Manager.
  - Sh. Rajesh Gupta, Project Engineer.
  - Sh. Manoj Kumar, Surveyor.

- **Forest Deptt.**
  - Block Officer

- Beat guard.

- Joint enumeration of part trees falling in DPF-191 & 193, which is proposed to be diverted for the Project, was carried out by the above team.

A brief of the meeting with Gram Panchayat Rispa held at village Rispa on 25th September, 2006.

The followings were present in the Meeting:-

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - 4 members of Tidong Valley Environment Conservation Development Sammittee, as constituted by Gram Panchayat, as per its letter dated 7th August, 2006.

- **Nuziveedu Seeds Ltd.**
  - Sh. Ravinder Jeet Singh, Project Manager.
  - Sh. Rajesh Gupta, Project Engineer.
  - Sh. Manoj Kumar, Surveyor.

- **Forest Deptt.**
  - Block Officer

- Beat guard.

- Joint enumeration of part trees falling in DPF-191 & 193, which is proposed to be diverted for the Project, was carried out by the above team.

Gist of the meeting with Gram Panchayat Rispa held at village Rispa on 5th January, 2007.

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - Panchayat members.
  - Representatives of Tidong Valley Environment Conservation Development Sammittee.
- **Nuziveedu Seeds Ltd.**
  - Sh. G. Chowdariah, Vice President.
  - Sh. Ravinder Jeet Singh, Project Manager.
  - Sh. V.V. Shamanthak.
- Discussions on NOC of the project was initiated by the Project proponent.
- Pradhan Gram Panchayat put forth exorbitantly high demands for issue of NOC, which are listed below:-

- Payment of Rs. 6.00 crore as compensation for economic damage in the following installments:-

i) Before start of construction activities Rs. 5 Lac as "Biyana" besides above payment of Rs. 6 crore and Rs. 2.00 Crore

ii) Balance Rs. 4.00 crore in ten annual installments for ten years.

- Providing 20 street lights in Rispa village.
- 1% of profit after generation of electricity from the Project towards development works of village.
- Free electricity to villagers.

- Next date of meeting fixed on 1st February, 2007.

Gist of the meeting with Gram Panchayat Rispa held at village Rispa on 1st February, 2007.

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - Sammittee & Panchayat members.

- **Nuziveedu Seeds Ltd.**
  - Sh. Ravinder Jeet Singh, Project Manager.
  - Sh. V.V. Shamanthak.

- Discussions on justification of aforesaid demands initiated by the Project proponent.

- Project proponent handed over to Pradhan Gram Panchayat a letter dated 1st February, 2007 to review above demands, which are exorbitantly high.

- After lot of discussions in the matter no outcome emerged.

Gist of the meeting with Gram Panchayat Rispa held at village Rispa on 29th April, 2007.

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - Panchayat members & representative of Sammittee.

- **Nuziveedu Seeds Ltd.**
  - Sh. G. Chowdariah, Vice President
  - Sh. Rajesh Gupta, AGM.
  - Sh. V.V. Shamanthak.

- Detailed discussions further held on aforesaid demands of Sammittee.

- Project proponent again requested the Sammittee to review their demands and handed over a requested letter dated 29.04.2007 thereof to Pradhan Gram Panchayat.

- But no outcome thereof arrived at.

Gist of the meeting with Gram Panchayat Rispa held at village Rispa on 16th April, 2008.

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - Gram Sabha.

- **Nuziveedu Seeds Ltd.**
  - Sh. G. Chowdariah, Vice President.
  - Sh. H.K. Singh, General Manager.
  - Sh. Rajesh Gupta, AGM.
  - Sh. V.V. Shamanthak.

- Discussions to review the demands for issue of NOC for the Project initiated by the Project proponents.

- But no outcome emerged after lot of deliberations in the matter.

Gist of the meeting with Gram Panchayat Rispa held at village Rispa on 23rd June, 2008.

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - 4 Panchayat members.

- **Nuziveedu Seeds Ltd.**
  - Sh. B.D. Sharma, Vice President.
  - Sh. Kishori Lal, AGM.

- Project proponent briefed the detail of extent of land and trees involved in diversion of forestland for the Project.

- Videography of trees in DPF 191-193 carried out in presence of Villagers.

Gist of the meeting with Gram Panchayat Rispa held at village Rispa on 24th June, 2008.

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - 3 Panchayat members.

- **Govt. Deptt. Officials**
  - Range Officer, Forest Range Moorang.
  - Block Officer.
  - 2 Beat Guards.
  - Kanoongo, Moorang Tehsil.
  - Patwari, Ribba.
  - Representative of horticulture.

- **Nuziveedu Seeds Ltd.**
  - Sh. B.D. Sharma, Vice President.
  - Sh. Kishori Lal.

- Videography of trees in DPF 191-193 including orchards in the vicinity of Project area was also carried out jointly by above team in presence of villagers.

Gist of the meeting with Gram Panchayat Rispa held at village Rispa on 2nd February, 2009.

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - 3 Panchayat members.

- **Forest Deptt.**
  - Divisional forest Officer, Kinnaur Division.
  - Range Officer, Moorang.
  - 2 Beat Guards.

- **Nuziveedu Seeds Ltd.**
  - Sh. B.D. Sharma, Vice President.
  - Sh. Ravinder Singh Negi, Manager (Electrical).

- Discussions regarding issues of Panchayat regarding the extent of damage to the trees involved in the diversion of Forest Land for the Project and Environment measures suggested in the DPR of the Project.

- Project proponent again requested Pradhan Gram Panchayat to review their demand and issue of NOC for the Project.

Gist of the meeting with Gram Panchayat Rispa held at village Rispa on 10th February, 2009.

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - 4 Panchayat members.

- **Nuziveedu Seeds Ltd.**
  - Sh. B.D. Sharma, Vice President.
  - Sh. Rajesh Gupta, DGM.
  - Sh. V.V. Shamanthak.

- Discussions to review the demands of Gram Panchayat for issue of NOC for the Project were initiated by the Project proponent.

- But no outcome thereof emerged even after lot of discussions in the matter.

Gist of the meeting with Gram Panchayat Rispa held at village Rispa on 30th March, 2009.

- **Gram Panchayat**
  - Sh. Vimal Chander, Up-Pradhan.
  - Gram Sabha.

- **Nuziveedu Seeds Ltd.**
  - Sh. B.D. Sharma, Vice President.
  - Sh. Rajesh Gupta, DGM.

- After lot of deliberations on aforesaid demands of Gram Sabha a consensus arrived at.

- Accordingly an agreement thereof signed between Project proponent and Gram Panchayat.

- Up-Pradhan Gram Panchayat informed that NOC for the Project shall be issued in the meeting fixed on 5th April, 2009.

Gist of the meeting with Gram Panchayat Rispa held at village Rispa on 5th April, 2009.

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - Sh. Vimal Chander, Up-Pradhan.
  - All the members of Panchayat.

- **Nuziveedu Seeds Ltd.**
  - Sh. B.D. Sharma, Vice President.
  - Sh. Rajesh Gupta, DGM.

- Gram Panchayat issued NOC for the Project.

Gist of the meeting with Gram Panchayat Rispa held at village Rispa on 23rd July, 2010.

- **Gram Panchayat**
  - Sh. Narender Kumar Negi, Pradhan.
  - Panchayat members & Villagers.

- **NSL Tidong Power Generation Pvt. Ltd.**
  - Sh. Ravinder Singh Negi, Manager (Electrical).
  - Sh. Arun Dhiman, Geologist.

- Project proponent apprised about the extent of forestland and private land required for construction of project.

- Videography of houses, water sources near the project area was carried out under the directions of LADC meeting held on 7th July, 2010.

RISPA PANCHAYAT

Date	18-04-2012
Venue	Gram Panchayat Office at Rispa, Village Rispa Gram Panchayat
Participants from Village	Mr Raghubeer Singh,Up-Pradhan, Rispa Panchayat, Mrs Bhagwati, Gram Panchayat Secretary Other representatives of Gram Panchayat
Participants from NTPGL	Mr G.Sharat Chandra Rao, Manager- Social Mr Devender Singh - Coordinator
Issues Raised by the Villagers	• Loss of Chilgoza trees in the construction of the approach roads to the audit at Powerhouse area • Payment of adequate Chilgoza compensation at the earliest. • Compliance of the MOU assurances given in lieu of the NOC issued by the GP especially setting up of street lights in the Rispa Village • Lack of confidence among the locals in the company • Employment of local people from Skiba in the project activity • Adverse impacts to the crops and apple orchards from setting up of the Stone Crusher Plant in Rispa village.
Issued discussed by the NTPGL representatives	• The local social profile of the village • The availability of education infrastructure such as schools and levels of literacy among the local people • The various occupation profile of the local people and dependence on agriculture and others • The presence of local people in government employment and people in high positions • The nature of the database on socio-demographic profile available in Panchayat Parivar Register • The methods and technologies used for agricultural activity and support given by the agricultural department on awareness and training • The incidence of household or cottage industries in the village • The availability of health infrastructure and incidence of any major health problems. • The participation of the local people in immunization programmes and other health camps • The management of Chilgoza seeds collection and distribution of income

	among the various groups in the village • The role of the village level institutions such as Temple Committee, Gram Panchayat, Youth Association , Women Association with respect to their activity and coordination in community works • The fund flow pattern to the Gram Panchayat from the Government agencies and utilization for various schemes • The watershed related schemes implemented in the village • The presence of any self help groups for watershed activity, micro finance or any other enterprising activity • The schemes approved under LADA and status of completion of the schemes • The utilization of the funds provided as part of the MOU for NOC • The utilization of the funds provided for specific activity such as construction/renovation of temple and others
Responses given by NTPGL representatives	• Informed about the purpose of the visit and the seriousness with which the company is trying to address the social and environmental issues under the project. Explained about the various management plans prepared under the project. • On the issue of the setting up of 20 street lights in the village it was informed that the detailed estimate and design for the locations and others are completed. The quotations from various agencies for supply of necessary equipment is in progress and the erection may be completed within a months time. • On the compensation for Chilgoza the villagers were informed that the assessment for the loss is being undertaken and details are being shared among the various stakeholders and as soon as possible the issues will be resolved amicably. • On issue of adverse impacts to the crops and apple orchards from stone crushing plant it was informed that monitoring and assessment of damage from pollution to the apple orchards and other crops is being undertaken by the PCB authorities and suitable compensation if any will be paid accordingly. • The locals were requested for their cooperation and assured that in coordination with them the company will take up measures for improving the socio-economic conditions and involve them in decision making processes
Further activity proposed under E&S initiatives	• The villagers are informed that a detailed need assessment survey to understand the current socio-economic situation of the locals and availability of the community infrastructure and livelihood opportunities will be undertaken in the coming months.
Other activity in	• Visited some of the works being undertaken with the funds given by the

the village	company such as construction/renovation of local Temple. • A survey of the village to understand the local housing conditions, local agricultural practices, cropping pattern and others. • Visited the village Temple and interacted with the local Mahila Mandali (Women Association). • Visited the Khadi and Gram Udyong Centre in Skibba used for processing the wool collected locally. • Visited the local Primary Health Centre (PHC) at Skibba • An informal discussion with the local women association at Community Hall located in the premises of Village Temple at Rispa.

Consultation with Women Association in Rispa

Date	18-04-2012
Venue	Community Hall at Village Temple at Rispa, Rispa Gram Panchayat
Participants from Women Association	Mrs Saroj, Pradhan, Mahila Mandali, Rispa and other members of the association
Participants from NTPGL	Mr G.Sharat Chandra Rao, Manager- Social Mr Devender Singh - Coordinator
Issues Raised and discussed with the women association	• The constitution of the women association and their roles and responsibilities towards community development • The coordination of the women association with other bodies • The incidence of any micro financing activity and awareness activity taken by women associations • The association has demanded furniture for their community hall • The need for awareness on health issues and maternity issues is being emphasized by the local women • The dependency of the local people on the income from Chilgoza and the need for adequate compensation for the loss of Chilgoza is being demanded by the local women

Gram Panchayat : Moorang

A brief of the meeting with Gram Panchayat Moorang held at village Moorang on 9th December, 2006.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Sh. Prem Kumar, Pradhan.
  - Sh. Rajeshwar Singh, Up-Pradhan.
  - 4 Panchayat Members.

- **Nuziveedu Seeds Ltd.**

  - Sh. Ravinder Jeet Singh, Project Manager.

- Project proponent gave a brief on the layout of the Project including detail of Project components.

- Project proponent requested the Panchayat for issue of NOC for the Project and also handed over a letter dated 9.12.2006 thereof.

- Discussions on the proposed colony at Up-Muhal Ruwang and quarry area falling within the jurisdiction of the Panchayat.

Gist of the meeting with Gram Panchayat Moorang held at village Moorang on 15th December, 2006.

The followings were present in the meeting:-

- **Gram Panchayat**
  - Sh. Prem Kumar, Pradhan.
  - Sh. Rajeshwar Singh, Up-Pradhan.
  - 6 Panchayat Members
- **Nuziveedu Seeds Ltd.**
  - Sh. Ravinder Jeet Singh, Project Manager.

- Detailed discussions on project proponents and their locations.
- Project proponent briefed the location and extent of area required for proposed colony at Up-Muhal Ruwang and Quarry area falling within the jurisdiction of Panchayat.
- Project proponent again requested the Panchayat for issue of NOC for the Project.
- Pradhan Gram Panchayat informed that detailed deliberations on different issues connected with the Project shall be held in the next meeting on 7th January, 2007.

Gist of the meeting with Gram Panchayat Moorang held at village Moorang on 7th January, 2007.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Sh. Prem Kumar, Pradhan.
  - Sh. Rajeshwar Singh, Up-Pradhan.
  - 5 Panchayat Members

- **Nuziveedu Seeds Ltd.**

  - Sh. G. Chowdhariah, Vice President.
  - Sh. Rajesh Gupta, Project Engineer.
  - Sh. V.V. Shamanthak.

- Project components were again briefed by the Project proponent.

- Detailed deliberations held on the issue of NOC for the Project.

- Gram Panchayat constituted a committee of six members to look into the issue of NOC for the Project.

Gist of the meeting with Gram Panchayat Moorang held at village Moorang on 5th May, 2007.

The followings were present in the Meeting:-

- **Gram Panchayat**
  - Sh. Prem Kumar, Pradhan.
  - Sh. Rajeshwar Singh, Up-Pradhan.
  - 8 Panchayat Members
- **Nuziveedu Seeds Ltd.**
  - Sh. Ravinder Jeet Singh, Project Engineer.
  - Sh. Rajesh Gupta, Project Engineer.
  - Sh. V.V. Shamanthak.

- Panchayat put forth following demands for issue of NOC:-

1. Providing Sewerage system for entire Panchayat.
2. Protection/ compensation for damage to Private land.
3. Compensation of Rs. 30Lac for tapping water for proposed colony at Up-Mohal Ruwang from Ruwang Nallah.
4. Rs. 25 Lac for repair of historical Moorang Killa.
5. Rs. 20 Lac for development works of Devta Temple Moorang.
6. Rs. 25 Lac for permanent pedestal bridge over Moorang Khad at location of “Makermong”.
7. Providing 35 street lights in the Panchayat.
8. Rs. 25 Lac for development works of Budh Mandir, Moorang Lenin and Yodh Lenin.

- Project proponent requested the Panchayat to review above demands.
- The next meeting fixed on 20th June, 2008.

Gist of the meeting with Gram Panchayat Moorang held at village Moorang on 20th June, 2008.

The followings were present in the Meeting:-

- **Gram Panchayat**
  - Sh. Prem Kumar, Pradhan.
  - Sh. Rajeshwar Singh, Up-Pradhan.
  - 7 Panchayat Members & Villagers.
- **Deptt. Officials**
  - Sh. H.S. Negi, Range Officer, Akpa Forest Range.
  - Sh. Rajesh Kumar, Kanoongo, Tehsil Moorang.
  - Sh. Dhan Kumar, Patwari, Tehsil Moorang.
  - Sh. Diwan, J.E., PWD.
  - J.E., IPH
  - Representative of Horticulture Department
- **Nuziveedu Seeds Ltd.**
  - Sh. Kishori Lal, AGM.
  - Sh. V.V. Shamanthak.

- Project proponent briefed about the layout of the Projects included detail of Project components.
- Project proponent apprised the extent of Forest land & trees diverted for the Project.
- Videography of the Panchayat area adjacent to Project Colony at Ruwang including water sources was carried out by the above team.

A brief of the meeting with Gram Panchayat Moorang held at village Moorang on 16th February, 2009.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Sh. Prem Kumar, Pradhan.
  - Sh. Rajeshwar Singh, Up-Pradhan.
  - 10 Panchayat Members.

- **NSL Tidong Power Generation Pvt. Ltd.**

  - Sh. B.D. Sharma, Vice President.
  - Sh. Rajesh Gupta, DGM.
  - Sh. V.V. Shamanthak.

- Project proponent initiated the discussions to review Panchayat demands for NOC of the Project.

- No outcome emerged even after detailed deliberations in the matter.

- Next meeting fixed on 29th March, 2009.

A brief of the meeting with Gram Panchayat Moorang held at village Moorang on 29th March, 2009.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Sh. Prem Kumar, Pradhan.
  - Sh. Rajeshwar Singh, Up-Pradhan.
  - Gram Sabha, Moorang.

- **NSL Tidong Power Generation Pvt. Ltd.**

  - Sh. B.D. Sharma, Vice President.
  - Sh. Rajesh Gupta, DGM.
  - Sh. V.V. Shamanthak.

- After detailed deliberations held on various demands putforth by the Panchayat a consensus arrived at vide which Project proponent is to pay Rs. 1 crore (50% at the time of issue of NOC and balance 50% in two equal annual installments)

- Accordingly it was decided by the Gram Sabha to enter into a agreement thereof on 31st March, 2009.

Gist of the meeting with Gram Panchayat Moorang held at village Moorang on 31st March, 2009.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Sh. Prem Kumar, Pradhan.
  - Sh. Rajeshwar Singh, Up-Pradhan.
  - 7 Panchayat Members.

- **NSL Tidong Power Generation Pvt. Ltd.**

  - Sh. B.D. Sharma, Vice President.
  - Sh. Rajesh Gupta, DGM.
  - Sh. Ravinder Singh Negi, Manager (Electrical)
  - Sh. V.V. Shamanthak.

- An agreement for issue ofNOC for the Project signed between project proponent and Gram Panchayat.

- Pradhan Gram Panchayat informed that the NOC for the Project shall be issued on 1st April, 2009.

Gist of the meeting with Gram Panchayat Moorang held at village Moorang on 1st April, 2009.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Sh. Prem Kumar, Pradhan.
  - Sh. Rajeshwar Singh, Up-Pradhan.
  - 7 Panchayat Members.

- **NSL Tidong Power Generation Pvt. Ltd.**

  - Sh. B.D. Sharma, Vice President.
  - Sh. Rajesh Gupta, DGM.
  - Sh. Ravinder Singh Negi, Manager (Electrical)
  - Sh. V.V. Shamanthak.

- NOC for the Project was issued by Pradhan Gram Panchayat.

- An agreement thereof got registered with Tehsildar Moorang.

Gist of the meeting with Gram Panchayat Moorang held at village Moorang on 26th July, 2010.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Sh. Prem Kumar, Pradhan.
  - Sh. Rajeshwar Singh, Up-Pradhan.
  - 7 Panchayat Members.

- **NSL Tidong Power Generation Pvt. Ltd.**

  - Sh. Ravinder Singh Negi, Manager (Electrical)
  - Sh. Arun Dhima, Geologist.

- Project proponent gave a brief of the extent of private land being acquired for the construction of project.

- Videography of part houses, water sources and orchards adjacent to the land under acquisition were carried.

- Next date fixed for balance area on 28th July, 2010.

Gist of the meeting with Gram Panchayat Moorang held at village Moorang on 28th July, 2010.

The followings were present in the Meeting:-

- **Gram Panchayat**

  - Sh. Prem Kumar, Pradhan.
  - Sh. Rajeshwar Singh, Up-Pradhan.
  - 7 Panchayat Members.

- **NSL Tidong Power Generation Pvt. Ltd.**

  - Sh. Ravinder Singh Negi, Manager (Electrical)
  - Sh. Arun Dhima, Geologist.

- Videography of balance houses, water sources & orchards adjacent to the land under acquisition for construction of the Project carried out.

Gist of the meeting with Gram Panchayat Moorang held at village Moorang on 24th February, 2011.

The followings were present in the CDM-Stake Holders Meeting conveyed at Up-Muhal, Ruwang:-

- **Govt. Deptt. Officers**
  - Sh. C.S. Chauhan, Tehsildar, Moorang
  - Sh. Ajeet Kumar, Environmental Engineer.
  - Sh. B.C. Negi, Sub-Divisional Officer, PWD Moorang
  - Sh. Joshi, Range Officer, Forest Range Moorang.
- **Gram Panchayat**
  - Smt. Anjali Negi,
    Chairman, Block Development Committee, Pooh.
  - Smt. Sujata Kumar, Pradhan, G.P. Thangi.
  - Sh. Anoop Kumar, Up-Pradhan, G.P. Moorang.
  - Sh. Jinender Pal Negi, Pradhan, G.P. Rispa.
  - Representatives of all three Gram Panchayats.
- **NSL Tidong Power Generation Pvt. Ltd.**
  - Sh. B.D. Sharma, Vice President
  - Sh. R.K. Agarwal, Sr. DGM.
  - Sh. Pawan Shandil, DGM.
  - Sh. Sandeep Chauahn, Sr. Manager.
  - Sh. Rupesh Parmar, Manager (C)
  - Sh. Ravinder Singh Negi, Manager (E)
  - Sh. Ghan Shyam Thakur, Manager (E)
- **Ernst & Young Pvt. Ltd., Hyderabad.**
  - Sh. Muhammad Mustafa, Associate Consultant.

- At the outset Sh. B.D. Sharma, Vice President, NSL Tidong Power Generation Pvt. Ltd. gave a welcome address to all participates and apprised in detail the layout of the Project highlighting the environmental measures and benefits already extended to the project affected Panchayats.

  - A sum of Rs. 1621.307 Lac paid to Forest Deptt., Fisheries Deptt., Pollution Control Board and Local area Development Committee as per detail given below:-

1.	Compensatory Afforestation	-	266.76 Lac
2.	CAT Plan	-	724.84 Lac
3.	Development of muck disposal site	-	184.269 Lac
4.	Monitoring of Environmental Management Plan by State Pollution Control Board.	-	13.238 Lac
5.	Fisheries Development	-	111.00 Lac
6.	LADA	-	321.20 Lac

  - Another Rs. 440.928 Lac paid to Forest Deptt. towards Net Present Value and Cost of trees.

  - As per clause 5.4.1 of Implementation Agreement signed with Govt. of H.P. on July 28, 2006 (Extract thereof enclosed), The royalty in the shape of free power shall be levied @ 12% of the Deliverable Energy of the Project for the period starting from the date of synchronization of the first generating unit and extending upto 12years from the date of Schedule Commercial Operation of the Project. For the balance Agreement Period of 28years, the royalty in the shape of power will be charges @18% of Deliverable Energy of the Project.

- 39.0546ha forest land for the construction of Project has been diverted by MOEF, Govt. of India on June 18, 2008 besides 3.2011ha private land has been acquired for the Project. This Project involves only 29 Project Affected Families on account of acquisition of land but none of them have become houseless or displaced or adversely affected.

- We are giving preference to the Project Affected eligible contractors for the award of petty contracts as well as employment to the eligible persons amongst project affected families. Other employment opportunities like hiring of vehicles from PAF's are also being extended on preferential basis. He also explained the purpose and precise details of CDM meeting.

- Thereafter Sh. Mustafa Muhamad, Consultant of Ernst & Young Pvt. Ltd. for climate change and sustainability service spoke and apprised the participants in detail about the Clean Development Mechanism (CDM) of the United Nations Frame Work convention on climate change. He also distributed a questionnaire amongst the Stake Holders present in the meeting to express their views and feed back on the Project activities. The feed back given by the Stake Holders is quite encouraging.

- Subsequently Environment Engineer, HP State Pollution Control Board, Rampur Bushahr spoke and informed the participants about adequate Environment measures undertaken by the Project proponent.

- At last a lunch was also served to all the participates.

SUMMARY OF THE CONSULTATIONS AND DISCUSSIONS HELD WITH THE AFFECTED VILLAGERS for 100 MW TIDONG-I HEP

MOORANG PANCHAYAT

Date	14-04-2012
Venue	Gram Panchayat Office at Shilling, Moorang Gram Panchayat
Participants from Village	Mr Ajendra Singh,Pradhan Moorang Panchyat , Up-Pradhan and other representatives of the Gram Panchayat
Participants from NTPGL	Mr Anand Harapanahalli, Sr Manger-EHS Mr G.Sharat Chandra Rao, Manager- Social Mr Dinesh Raj Negi- Coordinator (PAF)
Issues Raised by the Villagers	• Compliance of the promise of regular quarterly meetings with the Gram Panchayats • Compliance of the MOU assurances given in lieu of the NOC issued by the GP • Approval of the R&R Plan and implementation at the earliest • Employment of local people from Moorang by the Sub-Contractors • Monitoring and assessment of the damage to the crops and apple orchards from the pollution emanated from the project construction activity • NOC from Moorang GP for setting up of the Stone Crusher Plant in Rispa village. • Payment of Chilgoza compensation at the earliest.
Issued raised/responses given by NTPGL representatives	• Apprised them about the seriousness of the company in addressing the social and environmental issues under the project and constitution of a management system at the Corporate level to monitor the progress of the various management plans prepared under the project. • On the issue of the MOU it was informed that the company has deposited all the money it has consented to give, it has from time to time been compensating for any other damage arising out of the construction activity • The villagers were informed about the status of the R&R Plan visa vi its preparation and submission to the State Government where the approval is awaited. • On employment to locals it was informed that more than 70% of the employees engaged by NSL are locals.

	• For the monitoring and assessment of damage from pollution to the apple orchards and other crops it was informed that the assessment is being undertaken by the regional PCB and completes at intake point in Lambar and proposed to be initiated soon at Power House area. • On the confidence building measures the locals were appraised of the measures taken by the company and with the support of the people will try to do much more in the near future. • On the compensation for Chilgoza the villagers were informed that the assessment for the loss is being undertaken and details are being shared among the various stakeholders and as soon as possible the issues will be resolved amicably. The other issues raised and discussed by NTPGL representatives included: • The progress of the schemes implemented through the funds disbursed from the Local Area Development Committee. • The quality of the works undertaken and new schemes proposed under LADA • The utilization of the money deposited by NTPGL towards honoring the MOU with the Gram Panchayat. • The overall socio-economic setting of the Moorang Village • The local culture and festivals including *Biasakhi.*
Further activity proposed under E&S initiatives	• The villagers are informed that a detailed need assessment survey to understand the current socio-economic situation of the locals and availability of the community infrastructure and livelihood opportunities will be undertaken in the coming months.
Other activity in the village	• Visited some of the works being undertaken under LADA in various Up-Mohals of Moorang panchayat such as Community Hall, Pucca Pathways in Khokpa, Community centre and internal pathways in Shilling, street lighting facility in Moorang etc • Visited the local Primary Health Centre (PHC) and veterinary centre for monitoring the availability of infrastructure etc • Visited the Buddhist Temple at Lanen up-Mohal for verifying the utilization of funds received under LADA.

Minutes of Meeting with Villagers and Representatives of the 3 Affected GPs of Thangi, Moorang and Rispa in presence of local M.L.A and Chairman of LADA on 01-07-2011

A meeting was held under the Chairmanship of Shri Tejwanth Singh Negi, local M.L.A and Chairman of the LADA, Kinnaur District with respect to the issues raised by the local people and public representatives of the affected GPs of 100 MW Tidong-I HEP. The meeting was attended by the District Officials including Dr Sunil Chudhari, DC, Kinnaur; Shri Sanjay Sharma, AC; Shri Naresh Thakur, SDM and Member Secretary, LADA; and Shri Pankaj Sharma, DSP, Kinnaur.

From NTPGL Shri Sanjay Chaturvedi, CEO; Shri R.L Chauhan, Advisor; Shri B.D.Sharma, VP; Shri Sandeep Chauhan, Senior GM; Shri V.V.Shamntak,AO and Shri A.S.R.Shastri, Representative.

All the 3 Pradhans of affected GPs and members of the GPs and local villagers participated. Mr R.C.Negi President of *Tidong Valley Panchayat Kalyan Samiti ;* Mr Nand Lal Rathore, President of *Paryavaran Samrakshan Avam Viaks Samithi*, Thangi also participated in meeting.

Issues Discussed

The following are the issues raised and discussed along with the response of the representatives of the NTPGL.

Issue	Details of issues raised	Response
Handing over and Possession of Forest Land	Based on Government of India's clearance on diversion of Forest Land the possession/lease rights will be issued as per the State Govt directions.	It was informed that M/s NTPGL has completed all the procedures and an area of 34.62 ha of land is being transferred by Govt of HP wide Letter No Rev D (G) 6-21/2010 dated 12-10-2010.
R&R Plan	It was observed that there is acute delay in preparation and approval	On this issue the Member Secretary, LADA, Kinnaur

Issue	Details of issues raised	Response
	of the R&R Plan for the affected families which will have to be completed at the earliest.	informed to the participants that initially the R&R Plan was prepared and submitted for approval to the Revenue Dept office at Shimla wide Letter No KNR-II-211(G.B) 1010211 Dated 22-03-2010. However the concerned Department intimated that the R&R Plan was not inline with the HPPCL R&R Policy notified through Notification No Rev (PC) A (10)-7/2008 dated 19-01-2009 and directed to revise the Plan accordingly. Subsequently the R&R Plan is being revised and submitted by the this office wide letter no KNR-II-211(G.B) 2010-309 Dated 28-06-2011 for approval and notification.
Un- controlled blasting during construction of roads	It was alleged that the company for the construction of the roads is undertaking continuous and un-controlled blasting which should be stopped. Also the muck and boulder not to be dumped through the steep slopes and adopt the cut and fill method for construction of the roads.	The representatives of the NTPGL informed to the participants that most of the civil works under the project have been awarded and are being executed by the local contractors. Moreover the muck and boulders generated by the project works are being dumped at the designated dumping locations. It was suggested by the Chairman and DC sir to have monitoring on the local contractors for compliance of this practice and directed to see it that the muck and boulders and not dumped into the forest areas.
Assessment of damage to environment due to construction activity	The Pradhan's of Thangi, Morang and Rispa observed that the forest areas are being damaged during construction of the approach roads	The representatives of the NTPGL informed to the participants that the losses incurred by the forest is being compensated and the

Issue	Details of issues raised	Response
	impacting the local agricultural production and affecting forest area.	amounts are being deposited with the forest department. After discussing the issue in great detail it was decided to constitute a committee to assess the losses incurred and submit a report to DC office Kinnaur within 3 months from 15-07-2011. The composition of the committee include: 1. Tehsildar, Moorang- Chairman 2. Concerned Forest Range Officer 3. Beat Officer- Member 4. 3 GPs Pradhans 5. 2 Local people from each of the 3 GPs 6. 2-NTPGL Representatives It was also decided to assess the complete loss of Chilgoza Trees (Neoza). Based on the committee report compensation will be paid by the company. It was also decided to videograph the existing trees. It was assured by the NTPGL authorities that the demands raised will be fulfilled at the earliest and in future also all the contentious issues will be resolved in an amicable atmosphere. The village representatives and other participants also assured

Issue	Details of issues raised	Response
		full cooperation towards the project.
Compensation to land loosers	Compensation for the private land lost on par with the compensation paid for land loss in Kashang/Shongtogh HEP Projects.	The NTPGL authorities informed to the participants that some of the land losers have approached the Honorable Courts on the compensation. It was assured that the company will abide by the directions of the court.
Employment to the locals	As per the agreement made with the 3 affected GPs the local un-employed youth based on eigibility and priority will have to be engaged by the company.	The chairman directed the company officials to comply with the agreements made with the GPs. Also fulfill the directions of the state government to provide 70% opportunity to the locals. In addition it was also directed to undertake CSR activity in the GPs. On the above company representatives informed that a number of locals and project affected family are engaged with the company at various levels. Also a large number of contracts are given to locals and a number of vehicles owned by the local people are engaged for the construction works.

Annexure 7.4

Minutes of Consultations of Project Affected Families and Affected Gram Panchayat Members with IFC

MINUTES OF MEETING

Project ***: 100 MW Tidong HEP***

Agenda ***: Presentation of the Project by NSL, Explanation of AECOM's Role as Independent ESIA Consultant and ESIA Update, IFC Meeting and Consultation with Land Losers, Open Forum and Q&A Session for any Stakeholder to ask questions and raise issues.***

Location ***: Office shed near Powerhouse***

Date / time ***: 19-Apr-11 / 11:00 hrs IST***

Participants ***: Families that lost land (Land Losers), NSL, IFC and AECOM (EIA Consultant), members of the local community, and local elected representatives (see the attached attendance sheet)***

Meeting Facilitated by ***: AECOM***

Minutes taken by ***: AECOM***

Discussion:

The meeting was opened by Mr. B. D. Sharma, NSL VP & Project In-Charge, with an introduction of the project design, including all major components of the project. He further briefed of the cash compensation and economic benefits in figures, provided by the project for the locals, which are listed as follows;

1. Project has deposited Rs. 32.12 million for Local area development works through LADA. Total amount allocated by the project for LADA is 1.5% of the project cost i.e. 80.3 million.
2. All the infrastructure works e.g. road and building, are being executed by the local contractors of the three project affected gram panchayats (Village Councils) namely Thangi, Moorang and Rispa.
3. 1% free power to the State Govt. towards local area development activities for the life time of 40 years of the project as per Govt. of India policy.

4. Preference given for employment to the persons from affected Panchayat by employing 43 persons, which include 11 person from project affected families (i.e. land losers). About 90% of employment has been given to Himachalies.
5. Six inspection vehicles hired from the people of affected panchayts (including one from project affected family) besides one construction equipment (JCB) hired from project affected family.
6. Project proponent has committed the payment of Rs. 50 Millions towards the compensation of direct and indirect impacts of the project. This commitment has been made for obtaining No Objection Certificate (NOC) from respective affected gram panchayats. Out of this amount Rs. 45 Millions have been already been released and balance Rs. 5 Million with Gram Panchayat Rispa, to be released shortly.
7. Rs. 0.3 Million have been released to Gram Panchayat Rispa towards temple repair. Additionally 20 numbers of street lights have been sanctioned for this panchayat.
8. Health facilities being developed for Upstream and downstream workers, including dispensary, medicine and ambulances, will be made available free of cost, to the villagers of the affected panchayats.
9. Project proponent has donated Rs. 0.5 million in 2008, 2009 and 2010 each, towards annual distt. Level “Kinnaur Mahotsav” to preserve and protect the pristine tribal culture of people of Kinnaur.

NSL also stated, and several attendees acknowledged, that previous meetings (e.g., for the CDM) had occurred on site.

Total 3.2011 hectares of private land acquired for the execution of Tidong Hydro Electric Project is lost by 29 families from 3 different panchayats i.e. Thangi, Moorang and Rispa.

Thereafter, Atul Kumar from AECOM, reaffirmed, and the attendees confirmed that they had been previously briefed on project design, impacts and benefits, which were consistent with the details shared by Mr. Sharma. Further, after informing the objectives of the IFC visit which were to meet directly with the Land Losers and hear their opinion of the project and issues they see as key. IFC explained who they were as an institution and stated they were considering an investment in NSL and that Tidong was but one of the projects NSL was active in. The forum was opened for discussion and sharing of observation from all participants, in which following issues were raised and discussed by multiple stakeholders;

- **Dust Generation from Project activities:** The issue was generally accepted by majority of the villagers present in the meeting and informed that their crop productivity may be affected due to dust generated from the project activities inside the project area and on

PWD Road (State road maintained by PWD i.e. Public Works Department , Govt. of Himachal Pradesh). Attendees claimed NSL is not sprinkling the roads as agreed.

In reply to this NSL informed that a tanker has already been deployed for water sprinkling on the roads and further agreed to increase the number of such tanker trips to suppress the dust from project and PWD roads.

- **Impact of blasting for surge shaft road construction:** a small concrete irrigation channel in Moorang village was claimed to have been damaged due to the vibrations from blasting. NSL indicated they would evaluate this claim and address it.

  It is to be noted that the village mooring is located at Right bank of Tidong stream while surge shaft road is on the Left bank and both are at about 1000 metres away from each other. However, project proponent is required to examine the matter in details.

- **Trapped private land in the powerhouse access road:** A patch of land, located in between the fold of power house access road at about 800 meters RD, is being affected by landslides resulting from road construction activity, which may damage the existing Chilgoza trees and the agricultural value of the land.

  Project has agreed to provide necessary measures for protection of said landslides and provide compensation for any impact on crops and/or productivity caused by landslides.

- **Increase in the employment:** The villagers raised a demand to increase the number of jobs available and contracts for local communities. IFC queried why locals were asking for more jobs but at the same time they themselves employed migrant labour (from Nepal, Bihar, and U.P.) The attendees collectively responded and affirmed that they themselves do not engage in manual labour and that they historically employ migrant labour in their orchards /agriculture.

  Currently all the works in the project including rock cutting and tunnel excavation are being executed by the villagers and out of 41 contractors from affected panchayats, 6 are from project affected families and out of 43 employments from these panchayats, 11 are from project affected families and out of 6 vehicles 1 vehicle has been hired from project affected family. Further villagers denied to get employed as workers in the project. It was also widely accepted by the villagers that project proponent is giving due

priority to the affected families for employment and contracts based on their competency.

The affected families acknowledged and confirmed that they were being formally given a relatively larger share of contracts and jobs by the Villages as agreed formally by the population and the Panchayats.

- **Grievance Redressal Mechanism:** It was observed from the discussion that Grievance Redressal mechanism of the project requires strengthening in terms of documentation of structures system, organization and communication to the affected Panchayats and project affected population. Currently locals approach directly to the project-in-charge at their office in Reckong Peo, at a distance of about 40-km from project site. Another mechanism followed by villagers is communicating through their respective panchayat which in turn follows the similar path to approach the project. NSL agreed to establish a formal Grievance Mechanism which is to be based at the project site and communicated to all members of the three affected villages.

- **Street Lighting** – the attendees claimed that NSL had installed fewer street lights than they had committed; NSL stated they would address this and install more lights.

- **Compensation** – an elderly woman claimed she had not been adequately compensated for the land she lost, AECOM has recorded her name as Ms. Sooraj Devi and NSL assured that the matter will be investigated in detail and adequate compensation will be ensured. The final settlement will be intimated to AECOM by NSL for updating ESIA.

- **Shamshan Ghat (Cremation Grounds)** – members of the Rispa Village claimed that road construction along the Old Forest Road was indirectly impacting the forest path, therefore they requested NSL to assist them in construction of a suitable cremation ground 'Shamshan Ghat'.

  M/s NSL assured that the damaged forest path shall be restored and company will assist the villagers in constructing a cremation ground.

- **Temple and Devta Land -** NSL stated that they had, per the wider communities wishes, contributed to the Devta (Bank) Account to offset perceived impacts on Devta Land (land visited by Gods) and has also provided materials and labour to redevelop and

renovate a temple (mandir).

- **Overall Support for the Project –** all attendees affirmed that while they do have these grievances and issues, they are in full support of the project and that despite their court case, over compensation for land, minuted below as discussed, they are in full support of the project and want the project to go proceed and succeed. They are aware there will be limited jobs after construction, but perceive the 1% cash equivalent of power generated per annum that will be provided to the LADC (as per Himachal law) will provide wide ranging benefits to the community.

Details of litigation filed by the Land Losers:

The land required by the project was acquired under the provisions of Land Acquisition Act, 1894 through Land Acquisition Collector to the Govt. of Himachal Pradesh. The money against the acquired land has been disbursed by the government to the land owner and possession of acquired land has been granted to the project. However, the land owners have accepted the compensation under protest, claiming that an increased rate of compensation should be paid for their land. The land owners have also filed litigation against Government of Himachal Pradesh and NSL Power claiming a higher compensation. The position of the land owners includes following concerns;

- Initially govt. informed that the rate of land will be approximately, Rs. 68,000/- per Biswa (1 biswa = 41.8 sq mtrs. approx) as given to the land looser of another hydro electric project (Kashang HEP nearer to District Headquarter Rekong Peo).
- Later it was informed that the land will be acquired at the rate of Rs. 23,000/- per biswa
- However, based on the classification of land, a minimum rate of Rs. 22,000/- per biswa was given towards acquired land.

It is important to mention here that, other villagers and few Panchayat members are of the opinion that since the concerned land is away from the district headquarter, the rates given are not too low.

The land losers later expressed that they are ready for out of court settlement and based on that they will withdraw the case from court. However the villagers jointly agreed that they shall obey the final verdict of the Honorable Court in this regard and that irrespective of the ongoing litigation there is support for the project in general.

It was noted that they do not intend to attempt to stop the project while the court case continues.

Additional requests from Villagers:

During the meeting villagers also raised few requests towards village development. These requests are as follows,

a. Repairing of existing temple and school building in Lumber village.
b. Primary Health Centre to be provided in Lumber village. (Mr. B D Sharma informed that a dispensary is being constructed near the Power House site)
c. Provision of street lights in Rispa village. (The same is being provided as per agreement for NOC, as informed by Mr. B D Sharma, but the villagers requested that the current provision of 20 street lights to be increased to 25)

Conclusion

Villagers widely confirmed that they will be continuing their support to the project execution as long as their grievances are addressed as and when required. They strongly encouraged IFC to lend to NSL and stated that more such projects were needed, including the proposed Tidong II upstream of Tidong I which they are fully aware of.

It was conveyed that the meeting minutes would be made available to attendees by the company at the project site in Hindi.

Participants (Sequence of Attendance Sheet)

Project Affected Families and Villagers

1. Mr. Raju
2. Mr. Kalyan Singh
3. Mr. Radha
4. Mr. Jamna Dass Negi
5. Mr. Jannender P. Singh
6. Mr. Vimal Chandar
7. Mr. Bhudhratan
8. Mr. Madhu Shekhar
9. Mr. Prithe Pal Singh
10. Mr. Yogendar Singh
11. Mr. Vinod Negi
12. Mr. Deepak Choba
13. Mr. Vikrant
14. Mr. Vidhya Rajan
15. Mr. Jai Chand
16. Mr. Satya Sagar
17. Mr. Ajat Rathor
18. Ms. Suraj Devi
19. Mr. Dinesh
20. Mr. Bhupinder
21. Mr. Harish
22. Mr. Ganga Ratan
23. Mr. Sanjay
24. Mr. Bhudhgyan
25. Mr. Videsh
26. Mr. Sanjeev Kumar

NSL Representatives

1. Mr. B. D. Sharma
2. Mr. Sanjay Tripathi
3. Mr. Sandeep Chauhan
4. Mr. R. K. Agarwal
5. Mr. V. V. Shamanthak
6. Mr. Harish Kumar Sharma
7. Mr. Shashi Pal Chauhan
8. Mr. Rupesh Parmar
9. Mr. Ravinder Negi
10. Mr. Yasam Nagarajan

IFC Reprentatives

1. Mr. Soumya Banerjee
2. Mr. Lakhdeep S. Babra

AECOM Representative/Facilitator

1. Mr. Atul Kumar

Attendance Sheet

Date: 14- 19-Apr-2011

Location: Near Power House (Tidong-I) HEP

Agenda: General Discussion with PAP

Sl. No.	Name (नाम)	Landowner (जमीन किसके नाम से लगी है)	Signature (हस्ताक्षर)
1	Raju	Devta Land	
2	Kalyan Sigh	Kalyan Sigh.	
3	Radha		
4	Jamna Dass Negi	J.D. Negi	
5	Jannedar P. Sgh.	(Pradhan)	
6	Vimal Chandar	(Ex. Up Pradha)	
7	Bhudhratan	Thakur Sen	
8	Madhu shekhar	Mahinder Singh	
9	PRITHE PAL. SINGH		
10.	Yogendar Sgh.		
11	Vinod Negi		
12.	Deepak chhba	Jai Sgh. Chhba	

13.	Vikrant	Surjan Bhayat	
14.	Vidhya Rajan	Vidhya Rajan	
15	Jai Chand	J. Singh.	
16.	Satya Sagar	Satya Sagar	
17.	Ajeet Rathor	Late Asha Devi	
18.	Suraj Devi	Suraj Devi	
19.	Dinesh.	Ram Singh.	
20.	Bhupinder	Gobind Sgh.	
21.	~~Bhupi~~ Harish	Sunder Lal	Harish
22.	Ganga Ratan	Ganga Ratan	
23.	Sanjay	Paddm Lal	
24.	Bhudhyan.	Uday Singh.	
25.	Videsh	Videsh Kumar	
26.	~~Chander Sgh~~ Sanjeev Kumar	Chandor Sgh.	

NSL Representation

Sl	Name	Sign
1.	Mr B.D. Sharma	
2	Sanjay Tripathi	
3.	Sandeep Chauhan	
4.	R.K. Agarwal	
5.	V.V. Shanavethak	
6.	Harish Kumar Sharma	
7.	SHASHI PAL CHAUHAN	
(8)	Rupesh Parmar	
(9)	Ravinder Nayi.	
(10)	Yasam Nagaraju	

IFC

1.	Soumya Banerjee	
2.	Lakhdeep Babra	

AECOM

1.	Atul Kumar	

Photographs

Annexure 7.5

Minutes of Consultations With Women of Project Affected Families and Mahila Mandals

Sl. No.	General Information	Role of Women	Decision Making Capacity	Perception about the Project
1	**Name:** Shakuntla Devi **Land Owner**: Jaisingh Chota **Place:** Roowang **Religion:** Buddhist **Tribal:** Yes **No. Of family members***:* 10 **No. Of women in the family***:*4 **Main Occupation:** Agriculture **Estimated Annual Income***:* 2.5 – 3 Lacs	**Daily Schedule:** Agriculture; Household Activities	**Status of Girl Child:** No discrimination **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** Yes **How was the compensation amount used:** Invested in apple cultivation **Who is responsible for money matters in the household:** The male and female member **Presence of women groups:** 1 Mahila Mandal **Women related issues in the Area:** No female doctors **Common health problem:** Gynae problem **Availability of health care facilities:** 1 PHC **Incidences of domestic violence:** None	**Awareness of the Project:** Yes **Impact of the Project:** Better access in terms of roads; employment of a member from the household **Concerns with the Project:** Dust emissions; vibrations caused by blasting **Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** Not yet **Issues with Migrant Labourers:** No **Activities carried out by Project Proponent for the benefit of the village:** Aware about VADA Fund but not about the investments **Expectations from the Project:** Job opportunities for the women in the area
2	**Name:** Manas Devi **Land Owner:** Govind Singh **Place**: Roowang **Religion:** No Information provided **Tribal:** No Information provided **No. Of family members:** No Information provided **No. Of women in the family:** No Information provided	**Daily Schedule:** Household Activities	**Status of Girl Child**: No discrimination **Are girls sent outside for higher studies: Yes** **Whether involved in decision making:** No **How was the compensation amount used:** Built a house **Who is responsible for money matters in the household:** Head of the family **Presence of women groups: Yes** **Women related issues in the Area:** No Information provided **Common health problem: Gyanae** **Availability of health care facilities: PHC** **Incidences of domestic violence**: None	**Awareness of the Project:** Yes **Impact of the Project:** None **Concerns with the Project:** None **Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** No meeting has been held **Issues with Migrant Labourers:** No **Activities carried out by Project Proponent for the benefit of the village:** None **Expectations from the Project:** Training Institutes in sewing, knitting should be opened for the women

	Main Occupation: Agriculture **Estimated Annual Income:** 4000/ month			
3	**Name:** Kanya Devi **Land Owner:** Ram Sain **Place:** Roowang **Religion:** Buddhist **Tribal:** Yes **No. Of family members:** No Information available **No. Of women in the family:** 2 **Main Occupation:** Apple Plantation **Estimated Annual Income:** 2.5 – 3 Lacs	**Daily Schedule:** Agriculture; Household Activities	**Status of Girl Child:** No discrimination **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** Yes **How was the compensation amount used:** Renovation of the house; apple plantation; invested in the bank **Who is responsible for money matters in the household:** Male members **Presence of women groups:** 1 Mahila Mandal **Women related issues in the Area:** None **Common health problem:** Gynae problem **Availability of health care facilities**: yes but not appropriate **Incidences of domestic violence:** None	**Awareness of the Project:** Yes **Impact of the Project:** Jobs have been created **Concerns with the Project:** None **Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** Not yet **Issues with Migrant Labourers:** No **Activities carried out by Project Proponent for the benefit of the village:** Not aware **Expectations from the Project:** Training Institutes in tailoring, knitting should be opened for girls
4	**Name:** Suraj Devi **Land Owner:** Suraj Devi **Place**: Roowang **Religion:** Buddhist **Tribal:** Yes **No. Of family members:** 2 **No. Of women in the family:** 2 **Main Occupation:** Service and Agriculture **Estimated Annual**	**Daily Schedule:** Agriculture; Household Activities	**Status of Girl Child:** No discrimination **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** Yes **How was the compensation amount used:** Bank Deposits **Who is responsible for money matters in the household:** Self **Presence of women groups**: 1 Mahila Mandal **Women related issues in the Area:** None **Common health problem:** No **Availability of health care facilities:** 1 PHC **Incidences of domestic violence:** None	**Awareness of the Project:** Yes **Impact of the Project:** Job awarded **Concerns with the Project:** Blasting affects **Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** Not yet **Issues with Migrant Labourers:** No **Activities carried out by Project Proponent for the benefit of the village:** No **Expectations from the Project:** Group Consultation should be organised to discuss options on matters relating to the area

	Income: 7000/month			
5	**Name:** Anita Negi **Land Owner:** Shyam Bhagat **Place:** Roowang **Religion:** Buddhist **Tribal:** Yes **No. Of family members:** 8 **No. Of women in the family:** 5 **Main Occupation:** Apple Plantation **Estimated Annual Income:** 3 – 3.5 Lacs	**Daily Schedule:** Agriculture; Household Activities	**Status of Girl Child:** No discrimination **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** No **How was the compensation amount used:** No information provided **Who is responsible for money matters in the household:** Male members **Presence of women groups: yes** **Women related issues in the Area:** No information provided **Common health problem**: No **Availability of health care facilities: Not good** **Incidences of domestic violence:** None	**Awareness of the Project:** Yes **Impact of the Project:** Not much has changed **Concerns with the Project:** Dust emissions; vibration caused by blasting **Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** Not yet **Issues with Migrant Labourers:** No **Activities carried out by Project Proponent for the benefit of the village:** Not aware of any **Expectations from the Project:** None
6	**Name:** Suresh Kumari **Land Owner:** Tanjim Nargu **Place:** Roowang **Religion:** Buddhist **Tribal:** Yes **No. Of family members:** 7 **No. Of women in the family:** 3 **Main Occupation:** Agriculture **Estimated Annual Income:** 2 Lacs	**Daily Schedule:** Agriculture; Household Activities	**Status of Girl Child:** Equal **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** Yes **How was the compensation amount used:** Apple Plantation **Who is responsible for money matters in the household:** Male member **Presence of women groups:** 1 Mahila Mandal **Women related issues in the Area:** No **Common health problem:** No **Availability of health care facilities:** 1 PHC **Incidences of domestic violence:** None	**Awareness of the Project:** Yes **Impact of the Project:** No information **Concerns with the Project:** None **Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** Not yet **Issues with Migrant Labourers:** No **Activities carried out by Project Proponent for the benefit of the village**: Not aware **Expectations from the Project:** More jobs should be created in the area
7	**Name:** Puran Bhagti **Land Owner:** Indu Bhagat and Vidya Bhagat	**Daily Schedule:** Household Activities	**Status of Girl Child:** No discrimination **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** Yes **How was the compensation amount used:**	**Awareness of the Project:** Yes **Impact of the Project:** Use of the dispensary **Concerns with the Project:** Dust emission;

	Place: Lizang **Religion:** No information **Tribal:** No information **No. Of family members:** 5 **No. Of women in the family:** 3 **Main Occupation:** Apple Plantation **Estimated Annual Income:** 3-4 Lacs		Renovation of the house; Apple Plantation; Bank Investment **Who is responsible for money matters in the household:** Male members **Presence of women groups:** No **Women related issues in the Area: No** **Common health problem: Gynae** **Availability of health care facilities:** None **Incidences of domestic violence:** None	vibration from blasting **Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** Not yet **Issues with Migrant Labourers:** None **Activities carried out by Project Proponent for the benefit of the village:** To create SHGs for women **Expectations from the Project:** School up to 5th Standard should be opened in the area; Healthcare camps should be conducted
8	**Name:** Vandana Rathore **Land Owner:** Kalyan Singh **Place:** Roowang **Religion:** Buddhist **Tribal:** Yes **No. Of family members:** 7 **No. Of women in the family:**5 **Main Occupation:** Apple Plantation **Estimated Annual Income:** 4-5 Lacs	**Daily Schedule:** Agriculture; Household Activities; Livestock	**Status of Girl Child:** No discrimination **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** Yes **How was the compensation amount used:** Renovation of the house; Apple Plantation **Who is responsible for money matters in the household:** Both male and female members **Presence of women groups:** 1 Mahila Mandal **Women related issues in the Area: no** **Common health problem:** Gynae problem **Availability of health care facilities:** 1 PHC **Incidences of domestic violence:** None	**Awareness of the Project:** Yes **Impact of the Project:** Dust Emission; Noise has increased **Concerns with the Project:** Dust Emission; Temperature has increased **Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** Not yet **Issues with Migrant Labourers:** Less seat on buses while travelling **Activities carried out by Project Proponent for the benefit of the village :** Not aware **Expectations from the Project:** Job Opportunities; establishment of schools; computer institutes
9	**Name:** Gawan Chetan **Land Owner:** Gawan Chetan **Place**: Roowang	**Daily Schedule:** Agriculture; Household Activities	**Status of Girl Child:** No discrimination **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** Yes **How was the compensation amount used:**	**Awareness of the Project:** Yes **Impact of the Project:** Dust emissions; effect on apple plantation **Concerns with the Project:** Dust emission

	Religion: Buddhist **Tribal:** Yes **No. Of family members:** 4 **No. Of women in the family:** 1 **Main Occupation:** Agriculture **Estimated Annual Income:** BPL Card Holder		Apple Plantation **Who is responsible for money matters in the household:** Equal Participation between male and female members **Presence of women groups:** 1 Mahila Mandal **Women related issues in the Area:** No issues **Common health problem:** Gynae Problem **Availability of health care facilities:** 1 PHC **Incidences of domestic violence:** None	**Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** Yes **Issues with Migrant Labourers:** No, preference should be given to local labourers **Activities carried out by Project Proponent for the benefit of the village:** Not aware **Expectations from the Project:** Preference should be given to local labourers
10	**Name:** Radhika **Land Owner:** Premlal **Place**: Lambar **Religion:** Buddhist **Tribal**: Yes **No. Of family members:** 10 **No. Of women in the family:** 5 **Main Occupation:** Agriculture; Service **Estimated Annual Income:** 2-3 Lacs	**Daily Schedule:** Agriculture; livestock; Household Activities	**Status of Girl Child:** No discrimination **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** Yes **How was the compensation amount used:** Apple Plantation; Invested in bank **Who is responsible for money matters in the household:** Male members **Presence of women groups:** 1 Mahila Mandal **Women related issues in the Area: None** **Common health problem:** Gynae **Availability of health care facilities:** No **Incidences of domestic violence:** None	**Awareness of the Project:** Yes **Impact of the Project:** Roads have been constructed **Concerns with the Project**: Labours use fuel wood and as a result there is scarcity for the local population; Vibration during blasting; Dust Emission **Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** Yes **Issues with Migrant Labourers:** No **Activities carried out by Project Proponent for the benefit of the village:** Not aware **Expectations from the Project:** Construction of a Devi Temple and Kumbhi Rakshan
11	**Name:** Geeta Devi **Land Owner:** Amar Singh **Place:** Roowang **Religion:** No	**Daily Schedule:** Agriculture; Household Activities	**Status of Girl Child:** No discrimination **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** Partially **How was the compensation amount used:**	**Awareness of the Project:** Yes **Impact of the Project:** No information provided **Concerns with the Project:** Dumping sites for waste products

	information available **Tribal:** No information available **No. Of family members:** 6 **No. Of women in the family:** 4 **Main Occupation:** Agriculture **Estimated Annual Income:** 1 lac		Renovation of House **Who is responsible for money matters in the household:** Male member **Presence of women groups:** No information provided **Women related issues in the Area**: No information provided **Common health problem:** No **Availability of health care facilities: PHC** **Incidences of domestic violence:** None	**Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** Not yet **Issues with Migrant Labourers:** No **Activities carried out by Project Proponent for the benefit of the village:** Not aware **Expectations from the Project:** Job opportunity needs to increase for the local population
12	**Name:** Priya Negi **Land Owner:** Daleep Kumar **Place**: Roowang **Religion:** No information **Tribal:** No information **No. Of family members:** 4 **No. Of women in the family:** 3 **Main Occupation:** **A**griculture **Estimated Annual Income:** 15,000-20,000/ month	**Daily Schedule:** Agriculture; Household Activities	**Status of Girl Child:** Good **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** Yes **How was the compensation amount used:** Renovation in Houses **Who is responsible for money matters in the household:** The elder female member **Presence of women groups:** 1 Mahila Mandal **Women related issues in the Area:** None **Common health problem:** Gynae **Availability of health care facilities:** 1 PHC **Incidences of domestic violence**: It has been decreased over the years	**Awareness of the Project:** Yes **Impact of the Project**: Not much has changed **Concerns with the Project:** No **Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** Not yet **Issues with Migrant Labourers:** No **Activities carried out by Project Proponent for the benefit of the village:** None **Expectations from the Project:** Training Centres in tailoring, knitting should be established for women
13	**Name:** Laxmi **Land Owner:** Gyan Keerti Place: Lizang **Religion:** Buddhist **Tribal:** Yes	**Daily Schedule:** Agriculture; Household Activities	**Status of Girl Child:** No discrimination **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** Yes **How was the compensation amount used:** Apple plantation; invested in buying land in Chandigarh	**Awareness of the Project:** Yes **Impact of the Project:** Dust emission; dumping of muck; loss of forest land due to muck disposal **Concerns with the Project:** Loss of trees **Awareness of the Grievance Redressal**

	No. Of family members: 6 **No. Of women in the family:** 2 **Main Occupation:** Agriculture **Estimated Annual Income:** No information provided		**Who is responsible for money matters in the household:** Male member **Presence of women groups:** None **Women related issues in the Area:** Allergic and Gynae problems **Common health problem:** Gynae **Availability of health care facilities:** None **Incidences of domestic violence:** None	**Mechanism:** Yes **Use of Grievance Redressal Mechanism:** No **Issues with Migrant Labourers:** No **Activities carried out by Project Proponent for the benefit of the village:** Money has been issued for building of a Temple; separate fund has been allotted for community kitchen and setting up of a Mahila Mandal **Expectations from the Project:** Maintain ecological balance; hold health camps; build more schools in the area
14	**Name:** Techan Lamo **Land Owner:** Rangsal Giachho **Place**: Roowang **Religion:** Buddhist **Tribal:** Yes **No. Of family members:** 7 **No. Of women in the family:** 6 **Main Occupation:** Agriculture **Estimated Annual Income:** 40,000 – 50,000 (approx.)	**Daily Schedule:** Agriculture; Household Activities	**Status of Girl Child:** No discrimination **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** No **How was the compensation amount used:** In maintaining the house **Who is responsible for money matters in the household:** Male member **Presence of women groups:** Community women work towards awareness of alcoholic consumption and cleanliness drive **Women related issues in the Area:** None **Common health problem:** v **Availability of health care facilities:** 1 PHC **Incidences of domestic violence:** No	**Awareness of the Project:** Yes **Impact of the Project:** Not much has changed **Concerns with the Project:** Blasting; Debris are placed near the land **Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** Not yet **Issues with Migrant Labourers:** No **Activities carried out by Project Proponent for the benefit of the village:** None **Expectations from the Project:** Representatives of the village should be involved in the all decisions relating to project activities in the area
15	**Name:** Chering Lamo **Land Owner:** Yoginder Singh **Place**: Roowang	**Daily Schedule:** Agriculture	**Status of Girl Child:** No discrimination **Are girls sent outside for higher studies:** Yes **Whether involved in decision making:** No **How was the compensation amount used:**	**Awareness of the Project:** Yes **Impact of the Project:** No information provided **Concerns with the Project:** None

	Religion: Buddhist **Tribal:** Yes **No. Of family members:** 3 **No. Of women in the family:** 1 **Main Occupation:** Agriculture **Estimated Annual Income:** No information provided		No information provided **Who is responsible for money matters in the household:** Male member **Presence of women groups: yes** **Women related issues in the Area:** No **Common health problem:** None **Availability of health care facilities:** No information provided **Incidences of domestic violence:** None	**Awareness of the Grievance Redressal Mechanism:** Yes **Use of Grievance Redressal Mechanism:** Not yet **Issues with Migrant Labourers:** No **Activities carried out by Project Proponent for the benefit of the village:** Not aware **Expectations from the Project:** None

Annexure 8.1

Generic Grievance Redress Form

Generic Grievance Form

Date of Incidence: _____

Recorded Verbally: ☐

Written Complaint: ☐

Attachments, If Any: _____

_____

Reference No.	
Full Name	
Contact Address	
Incidence / Grievance	
Description of the Incident or Grievance	
What is current status of problem?	
Anything more you want to add.	
Suggestion	
What do you propose as good solution to it?	

Complaint forwarded to:

COMMUNITY DEVELOPMENT PLAN

FOR

100 MW TIDONG -1 HYDRO ELECTRIC PROJECT,

KINNAUR, HIMACHAL PRADESH, INDIA

March, 2013

Prepared by AECOM India Private Limited for NSL Renewable Power Private Limited (NRPPL), Hyderabad

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List of Abbreviation

ADB	Asian Development Bank
CAT	Catchment Area Treatment
CDP	Community Development Plan
CLO	Community Liaison Person
CSR	Corporate Social Responsibility
DC	Deputy Commissioner
EHS	Environment, Health and Safety
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
GoHP	Government of Himachal Pradesh
INR	Indian Rupee
IFC	International Finance Corporation
LADA	Local Area Development Authority
LADC	Local Area Development Committee
LADF	Local Area Development Fund
MLA	Member of Legislative Assembly
MoEF	Ministry of Environment and Forests
NPV	Net Present Value
NRPPL	NSL Renewable Power Private Limited
NTPGPL	NSL Tidong Power Generation Pvt. Ltd
PAA	Project Affected Area
PAZ	Project Affected Zone
RAP	Resettlement Action plan
R&R	Rehabilitation and Resettlement
SPV	Special Purpose Vehicle

1. INTRODUCTION

1.1 Background

NSL Renewable Power Private Limited (NRPPL) a Hyderabad based private energy group as part of setting up of its Hydro Power projects is in the process of developing a 100MW Tidong-I Hydro Electric Project in District Kinnaur, Himachal Pradesh, India. In order to ensure close monitoring and execution of the project, a Special Purpose Vehicle (SPV) has been created which is known as NSL Tidong Power Generation Pvt. Ltd (NTPGPL).

The proposed project is part financed by International Finance Corporation (IFC) and now NRPPL is exploring the possibility of funding from Asian Development Bank (ADB) and as per ADB's SPS, 2009, this project is identified as Category 'A' for environmental aspects and Category 'B' for social attributes. All the safeguard documents such as Environment Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) are prepared and updated as per the ADB's SPS, 2009 and for a comprehensive understanding on all infrastructural development and social responsibilities activities taken up under the project the present Community Development Plan (CDP) Report is prepared.

1.2 The Project

The Project site is situated in Thangi, Moorang and Rispa Panchayats under Moorang Tehsil[1] of Kinnaur District in the State of Himachal Pradesh. The administrative headquarter of Kinnaur District is at Reckong Peo, whereas the Tehsil headquarter is at Moorang. The site area is about 278 km from Shimla (the State capital), 250 km on National Highway-22 up to Moorang and 13km on the state road up to village Thangi. The location map of the project is given in Figure 0.1.

The project is proposed on the Tidong Khad, a tributary of river Sutlej. It is a run-of-the-river scheme proposed to harness the hydro potential of Tidong Khad. The barrage of the project is at Lambar village and powerhouse at Rispa village. The Project consists of a 10 m high concrete barrage at about 9.8 km upstream from the confluence of Tidong and Sutlej River, a surface desilting basin on the left bank of the river, a 8.46 km long head race tunnel and an underground surge shaft of 8.0m diameter (u/g) with inclined pressure shaft. The power house is surface type on the left bank of Tidong Khad near the village Lambar. The power house shall house two units of 50 MW each to produce 100 MW of power.

The total land acquired for setting up of various components of the project is 42.2557 ha of which 3.2011 ha constitutes private land and 39.0546 ha constitutes forest land. The private land involved in the project falls in three villages of three different Panchayats namely, Roowang under Moorang Gram Panchayat, Lizang under Rispa Gram Panchayat and Lambar under Thangi Gram Panchayat. The private land is acquired under Land Action Act 1894. A total 28 households are losing part of their agricultural land. One affected land parcel under Lizang village of Rispa Panchayat belongs to

[1] Taluka or tehsil is a unit of local government that covers several villages.

the local Mandir Devta Kuldev (Local village Deity). After due assessment of the loss, the compensation for the private land and other attachments was paid to the land owners. In addition a Resettlement and Rehabilitation Scheme for the Project is developed by the Deputy Commissioner, Kinnaur and submitted for the approval of the State Government. A detailed Resettlement Action Plan based on this scheme is prepared and will be implemented upon the approval of the State Government.

Figure 0.1: Location map of Tidong –I HEP Project

1.3 Benefits of the Project

The project has several benefits to the immediate neighborhood community and society at large. As electricity is a key input for socioeconomic development process once the project is operational, it ensures efficient provision of electricity which not only contributes to poverty reduction indirectly through economic growth, but also central to the basic human needs of health and education.

The key direct positive economic and social benefits to the local community in general and project affected community in specific that result from the proposed project include generating local employment, generate contracting opportunities, provide good access roads and health facility at site during emergencies. In addition, the local community will be benefited from several grants being given to State Government under Local Area Development Fund (LADF) scheme, the Corporate Social Responsibility (CSR) initiatives by NTPGPL and the other direct financial support to the community for welfare activity.

1.4 Need for CDP

The project received environmental clearance in 2007 and construction started in mid, 2008. In addition to the compensation and other rehabilitation measures for the directly affected people due to land acquisition, a number of community development and social responsibility activities are taken up for the people of project affected panchayats and project affected area. Most of these

activities are planned and implemented during the construction stage and prior to commissioning of the project. These activities are executed at Government level as well as at NTPGPL level.

For a comprehensive understanding a Community Development Plan is required to describe the approach that the project is taking with respect to community initiatives taken up by NTPGPL and serves as an important part of the social management process in translating the commitments into guidelines for implementation. This report is an outcome of the review of the ongoing development activity, the need assessment process adopted and the consultations with various groups in the project villages. The process adopted and community development activity taken up will be enriched by on-going and periodic need based assessments carried out by NTPGPL.

1.5 Report Layout

The layout of this report constitutes the following sections:

1) Introduction;
2) Local Area Development Activity;
3) Corporate Social Responsibility Activity;
4) Development Funds to Gram Panchayats;
5) Development Activity After Commissioning of the Project;
6) Implementation and Monitoring Arrangements; and
7) Conclusions and Recommendations

2. LOCAL AREA DEVELOPMENT ACTIVITY

2.1 General

As per the Hydro Power Policy, 2006 of Government of Himachal Pradesh and as agreed in the Project Implementation Agreement 1.5% of the project costs will be contributed towards community development activity including income generation and welfare schemes, creation of additional infrastructure and common facilities etc on a sustained and continued basis over the life of the project in project affected areas. The funds will be utilized under Local Area Development Activity (LADA) as per the initial guidelines issued wide notification MPP-F-(10) 15/2006 dated 16.9.2009 revised and new Guidelines issued wide notification no-MPP-F (10)-24/2011 Dated Shimla-17112, 5th October 2011. The present section details on the mechanism established to oversee the utilization of the above funds, the executing and monitoring authority for the same and the status of disbursement and utilization of the funds till September 2012.

2.2 Objectives of LADA

As per the above said guidelines the main aims and objectives of LADA are:

- To address the impact on the environment, existing infrastructure, individual and community resources.
- To ensure visible additional benefits to local communities in the project area as part of the cost of a project.
- LADA in addition to Environment Management Plan (EMP), Catchment Area Treatment (CAT) Plan, Compensatory afforestation, Net Present Value (NPV), Rehabilitation and Resettlement (R&R), compensation for damage to crops from pollution.
- The people of the affected areas should be aware of the allocations plan the local development activity well in advance so that local communities develop an interest in expeditious completion of projects

2.3 Local Area Development Fund

For managing the local area development activity from above contributions a Local Area Development Fund is being setup for the Tidong-I Project. The total amount is divided into installment and based on the demand notice it is contributed on an annual basis. The total amount to be contributed to LADF @ 1.5 % of the total project cost of Rs 535.15 Crores is INR 80.30 Million. The total amount contributed by NTPGPL till end of September 2012 is INR 54.60 Million. The year wise contribution is presented in Table 2-1.

As utilization of previously contributed amount was not satisfactory the contribution for 2012 was reduced. However the remaining contribution will duly be made based on demand notice and before commissioning of the project. The project cost considered at present is based on estimates provided

in Detailed Project Report but final project cost would be decided based on Cost on Delivery to be decided after construction of the project. Any balance amount if accounted will be deposited to LADF within one year after commissioning of the project.

Table 2-1: Year wise Contribution to LADF (till Sept 2012)

Sl No	Year	Amount Contributed (INR Million)
1	2009	16.00
2	2010	16.00
3	2011	16.00
4	2012	6.60
	Total	54.60

2.4 Local Area Development Committee (LADC)

For the effective implementation at the State Level in Himachal Pradesh the LADA is being supervised by a Nodal Agency i.e., Directorate of Energy and monitored by State Level Committee through Special Secretary (MPP and Power) to the Government of Himachal Pradesh. As per the guidelines of LADA at the project level a Local Area Development Committee under the Chairmanship of Deputy Commissioner, Kinnaur is initially formed for the Tidong-I Project in 2008. However, through an amendment in February 2012 the LADC of all Hydro Electric Project's in District Kinnaur are Chaired by the local Member of Legislative Assembly (MLA) and Deputy Commissioner, Kinnaur will be Vice Chairman of the Committee. The following is the composition of the LADC for Tidong-I project .

- Local Member of Legislative Assembly - Chairman
- Deputy Commissioner of Kinnaur District –Vice Chairman
- Sub Division Level Officers of Public Works, Irrigation and Public Health , Forest, Rural Development, Health and Horticulture Departments
- Chairman and Vice-Chairman of Zilla Parishad
- Chairman and Vice-Chairman of Panchayat Samithi
- Pradhan (s) of all affected Gram Panchayats in Project Affected Area
- Representative of NTPGPL – Member Secretary

The LADC conducts regular meetings and initially the LADC meetings in the year 2008-2009 were conducted on a monthly basis to review the progress made and to approve schemes for implementation. Presently the LADC meetings are conducted every quarter or half yearly as per the convenience of the Chairman and others. In these meetings, Pradhans of all three panchayats based on the need present development schemes which are assessed and sanctioned. Once an activity is agreed, funds are earmarked and released accordingly in installments based on the construction progress of the activity.

2.5 Geographical Area and Nature of Development Activity

The geographical area where the development activity from above contribution will be undertaken include Project Affected Area (PAA) means the area where actual components including muck dumping, mine/quarry area, infrastructure including roads, project dedicated colony, offices, construction facilities, welfare facilities are located. Of the total contribution 70% of the funds will be utilized in PAA.

In addition to PAA development activity in Project Affected Zone (PAZ) will also be taken up and for the proposed project based on its capacity (100 MW) all the adjoining Panchayats to PAA are considered for development activity and remaining 30% of the funds contributed will be utilized in these area.

The nature of Local Area Development Activity that can be taken up in the above discussed geographical area include creation of new infrastructural facility such as drinking water/irrigation/school buildings/health centres/pucca roads/pucca paths, markets, bus stand, solid waste disposal, sanitation, community centres, Panchayat Bhawan, creation of income generating assets for Panchayat, creation of community places of worship, cremation/burial and renovation/special repairs/maintenance of existing infrastructure i.e. buildings like schools/health sub centres/community halls/roads/ paths/ water supply and irrigation schemes/ places of worship etc.

2.6 Disbursement and Utilization of LADF

The disbursement and utilization of the funds contributed is in progress and priority is given to the 3 affected Gram Panchayats of Thangi, Moorang and Rispa. Till September 2012, of the total contributed INR 54.60 Million the total amount sanctioned under LADA is INR 17.20 Million and amount disbursed/utilized is INR 8.10 Million. The panchayats wise amount sanctioned and disbursed/utilized is presented in Table 2-2.

Table 2-2: Gram Panchayat wise Amounts Sanctioned/Disbursed till end September 2012

SL. No.	Gram Panchayat	Total Amount Sanctioned (INR Million)	Amount Disbursed/ Utilized (INR Million)
1	Moorang	10.30	0.58
2	Rispa	2.80	0.35
3	Thangi	4.00	0.20
	Total	17.20	0.81
% to total amount deposited so far		31.50	14.8

A summary of the major development activity completed, in progress or which is sanctioned and yet to be started is presented in Table 2-3.

Table 2-3: Summary of Community Development Works Completed, In Progress (till Sept 20012)

Sl No	Type of Works	Status of works			Total
		Completed	In Progress	Yet to Be Started	
1	Retaining/Protection Walls for local Temples and play grounds	3	2	1	6
2	CC Pathways and Span Bridges	2	7	1	10
3	Community Buildings	1	3	1	5
4	Temple Constructions /renovation and Upgradations	0	3	1	4
5	Solar Street Lights	1	0	0	1
6	Community Toilet, Drains/Side Drains	0	1	2	3
7	Irrigation Water Storage and Pipeline	1	0	0	1
8	Shopping Complex	0	0	1	1
9	Multipurpose Community Building	0	0	1	1

Almost all the works sanctioned under LADA are executed by the Gram Panchayat themselves. They engage the civil works contactors and under their supervision and monitoring the works are completed. After completion of the works the concerned Assistant Engineer under LADC inspects the works and releases the funds accordingly. In case of works that require technical expertise the concerned line departments executes the works for example setting up of Solar Street Lights is undertaken by a specialized government agency Himurja.

As given Table 2-2 the utilization of the LADF fund in relation to the contribution made so far is quite low. Of the total funds contributed till September 2012 just about 32% is sanctioned and 15% utilized. Some of the reasons for such a slow progress as reported include the cancellation of earlier sanctioned schemes, the delay in preparing the estimates for new schemes, the delay in execution process and the delay in disbursement of funds for the completed works. Although NTPGPL is not directly responsible for the slow progress to address this issue as a Member Secretary in LADC it should play a more active role in selection of schemes, in sanctioning of the schemes and disbursement and utilization of LADF, which may expedite the process of community development activities under LADA.

The panchayat wise details of activity completed/in-progress, activity that are sanctioned for which estimates are prepared, works yet to be initiated and the amount of money spent for completed/ongoing works is presented in following sections.

2.6.1 Activities undertaken in Moorang Gram Panchayat

A number of activities have been taken up and completed in all the habitation under Moorang Panchayat and details of work completed, in progress and yet to start are provided in Table 2-4.

Table 2-4: Status of Work Undertaken in Moorang Gram Panchayat through LADF

Sl. No.	Type of Development Work	Location in Panchayat	Sanctioned Amount (Rs)
Activities Completed			
1	Solar Street Lights	Moorang Jhulla	300000
2	Retaining Wall	Bodh Temple, Shilling	200000
3	Retaining wall	Shukimetan temple , Thwaring	585595
4	CC Path	PWD Rest House to house of Dharampal, Shilling	150000
5	Concrete wall and community ground	Yadlanen, Gramang	400000
6	CC Path	Tamlingden, Shilling	150000
7	Steps to Moorang Fort	Moorang Fort, Moorang Upmohal	205000
8	Transformer (60kv)	Khokpa	402275
		Sub Total	2392870
Activity In Progress			
9	Span	Namulka, Gramang (Additional Rs 35000 requested)	235000
10	Community Bhawan	Skimten, Shilling (Additional Rs 1 Lakh requested)	582900
11	CC Path Widening	Naspaden to Yoddara, Khokpa	200000
12	Community Bhawan	Khokpa	700000
13	CC Path	Makirmang to Machmed at Moorang	200000
14	Drain Pipes	Dhobhighat Karjang, Gramang	400000
15	Temple	Mahasu Mandir, Gramang	600000
16	Rooms	Satyanarayan Mandir at SC Colony, Gramang	200000
17	Maingate/stoop repair	Moorang	400000
18	CC Path	Chhokhonikhad Karva, Shilling School	300000
19	CC Path	Link road Moorang to Shiv Singh Garden, Moorang	594918
20	CC Path	Champa Devi house to Shukimten, Thwaring	300000
21	Community Bhawan	SC Colony Susra, Gramang	400000
22	Temple	Bodh Temple at Gramid, Gramang	1000000
23	Fencing Work	Homeguard Building , Shilling	150000
		Sub Total	6262818
Activity Yet to Start			
24	Community Bhawan	Shilling	500000
25	Store	Jangi	300000
26	Side Drain	SC Colony Karjang, Gramang	400000
27	Temple	Narain Temple at SC Colony, Gramang	300000
28	Rooms	Roofing for Mahila Mandal Shilling	200000
		Sub Total	1700000
Activity sanctioned and yet to be estimated			
29	Nala foot Bridge	Makergang, Moorang Upmohal	

Sl. No.	Type of Development Work	Location in Panchayat	Sanctioned Amount (Rs)
30	Basket Ball Court and Play Gorund Fencing	GSSS , Shilling	
31	Study Centre	Chiagden Ling, Thowring	
32	Boundary wall and Retaining Wall	Boudh Temple Lanen, Gramang	

CC Pathways in Khokpa (Left), CC Pathway Moorang Fort under LADA (right)

New Community Building in Khokpa (Left) and New Community Building in Shilling, Moorang Panchayat under LADA (Right)

Retaining Wall at Temple (Left) and Community Hall with Temple (Right) in Moorang under LADA

Solar Street Lighting (Left) and CC Pathway in Shilling (Right) of Moorang Panchayat under LADA

2.6.2 Activities undertaken at Rispa Gram Panchayat

The status of work completed, to be undertaken and budget to be estimated in Rispa Gram Panchayat has been presented in the following Table 2-5.

Table 2-5: Status of Work Undertaken in Rispa Gram Panchayat through LADF

Sl. No.	Development Work	Location	Sanctioned Amount (Rs)	Remarks
1	Temple	Naginji Temple at Skibba	2172000	Cancelled for Shopping Complex construction and the estimates for the same is under preparation.
2	Irrigtaion Water Storage Tank and Pipeline	Ristumaya and Ristumaya to Gorarden, Rispa	700000	Completed
3	Kitichen and Toilet	Rispa Village Deota /Budh Temple , Rispa	--	To be estimated

2.6.3 Activities undertaken at Thangi Gram Panchayats

The status of work completed, to be undertaken and works for which budget is to be estimated in Thangi Gram Panchayat has been presented in the following Table 2-6.

Table 2-6: Status of Work Undertaken in Thangi Gram Panchayat through LADF

Sl. No.	Name of Development Work	Location	Sanctioned Amount (Rs)	Remarks
1	CC Path	IPH Rest house to Watershed tank		Cancelled for Multipurpose building
2	Community Building	Thangi	1736400	In Progress; Additional amount requested in October 2010
3	Ukheng Santhang	Pibber		Cancelled for Multipurpose building
4	Span and Steel Bridge	Nenadhar		Cancelled for Multipurpose building
5	Mulit Purpose Community Building near School	Thangi	2000000	Work yet to be started and estimate will be revised to the tune of Rs 1 to 1.5 Crore.
6	Common Septic Tank for Toilets	Ghatla	300000	Completed
7	Bridge	Pibber		Cancelled for Multipurpose building
8	Girder Bridge	Badsaring		Was suppose to be estimated but the location not in Thangi GP
9	Basket Ball court and fencing	GHS Thangi		Cancelled for Multipurpose building
10	Transformer	Thangi		to be estimated

Community Building under Construction in Thangi Panchayat

Community Septic Tank completed at Ghatla in Thangi Panchayat

3. CORPORATE SOCIAL RESPONSIBILITY ACTIVITY

3.1 General

NSL Tidong Power Generation Private Limited has demonstrated its commitment to CSR by effectively implementing a wide range of CSR initiatives in a transparent and participatory manner. The company's CSR activities aims "to contribute to social, health, economic and cultural development of the community where the operations of the company take place for a better and environmentally sustainable development of all the stake-holders".

3.2 Objectives of CSR

The company has formulated a set of objectives and identified core areas of intervention for an impact-oriented implementation of CSR policy. The objectives of CSR are as follows:

1. To improve the economic, health and social status of men and women where the operations of the company take place.
2. To sustain and support health, social, economic and entrepreneurship activities with the active participation of local communities and to create opportunities to take ownership of CSR programs.

3.3 Core Areas of Intervention

NTPGPL CSR activities has been undertaken on account of contribution to the community through employment practices, ethical conduct, knowledge sharing, technology sharing etc. The core sectors of intervention of CSR activities pertain to:

- Education and Capacity Building
- Health and Family Welfare
- Sustainable Development
- Infrastructural Development
- Contributions and Cultural Promotions

3.4 Need Assessment and Consultation

Consultations were held with the local communities on a periodic basis in an effort to identify community needs and priorities for designing and implementing community development initiatives. The participatory consultative processes involved village level open meetings, transect walks and visits to personally ascertain the status of infrastructure and other facilities that are available in each of the villages in the project area. The development priorities are also drawn from the issues and concerns raised by the communities during the EIA, ESIA, RAP preparation process. The needs and priorities are significantly influenced by the type of geographic terrain and agro-climatic setting prevailing in the project area. The priority may change with every passing year based on the climatic

conditions. The need assessment in such a scenario is not an one time activity but it requires periodic situational assessment and consultations.

Panchayat Level Meetings by NTPGPL's E&S Team members in Moorang (Left) and in Rispa (Right)

Panchayat Level Meetings and visit to Thangi (Left) and Women Group Meetings in Rispa (Right) by NTPGPL's E&S Team members

Based on the core areas identified and periodic assessments broadly the CSR activity are categorized into infrastructure development activity, social responsibility activity and other employment/economic opportunities and facilities for the local community. The details of activities undertaken or proposed under each of these categories is presented in following sections.

3.5 Infrastructural Development Activity under CSR

In addition to the infrastructure development works implemented by the LADC by utilizing the LADF for the Project NTPGPL has also built or proposed to undertake more infrastructure development works in the vicinity of the Project Area that will benefit the local population. These works executed by NTPGPL are proposed to be completed during the construction stage and before commissioning of the project. The geographic spread of these initiative is confined to the 3 project affected Gram Panchayats of Thangi, Moorang and Rispa. The works are finalized by the community in co-ordination with the NTPGPL authorities and are considered essential by the community. The list of

works completed and yet to be undertaken along with relevant budgetary estimates are presented in Table 3-1.

Table 3-1: Status of Community Infrastructure Work under CSR (Till Sept' 2012)

Sl No	Name of Activity	Lumpsum Estimated Cost (Rs)	Amount Utilized(Rs)	Activity Status (till end of September 2012)
1	Setting up of 25 Street Lights in Rispa	800000	589524	In Progress
2	Construction of Drinking Water Scheme in Rispa	850000	850000	Completed
3	Construction of Temple in Rispa	300000	300000	Completed
4	Construction of Road in Skibba under Rispa	300000		Yet to be started
5	Renovation of Temple in Moorang	50000	50000	Completed
6	Setting up of 30 Street Lights in Thangi	800000		Tenders are invited
7	Construction of Steel Bridge at Thangi	1000000		Yet to be started
	Total	4100000	1789524	

From the above Table it is seen that from the total proposed budget of INR 4.10 million so far INR 1.78 Million is already utilized and for works which are yet to be completed the detailed design are under preparation and tenders are invited and the works are planned to be completed during the next 3 years and before the commissioning of the project.

New Temple Constructed in Rispa village under CSR Activity

3.6 Social Responsibility Activities

The basic objective of the social responsibility activity for the Tidong-I Project is to protect the cultural heritage of the local area and generate a sense of affinity, familiarity and confidence, not alienation, in the population living in the project area. Further it also to acknowledge constructive role of the local population through technical training inputs, participatory research programs, demonstration of trying out the adaptation and penetration of innovative technologies that lead to lesser dependence on natural resource in support of animal husbandry, agriculture and horticulture. Involve the society in the programme so as to ensure acceptability of the project and make them feel as their own program. The proposed focus areas under this component are arrived at after due consultations with the local community and based on their felt need for the same. The focus areas and the corresponding nature of activity to be taken up is presented in Table 3-2.

Table 3-2: Focus Areas for Social Responsibility Activity

Sl no	Focus Area	Nature of Activity
1	Local Culture and Tradition	Support to Lavi Mahotsav (Kinnaur Festival) at Kinnaur and others local festivals and cultural organizations
2	Educational Activity	Assistance to local School/College, Scholarships to meritorious students, facility in schools etc
3	Sports Activity	For conducting Sports in project villages
4	Public Health Support	Health awareness program, Distribution of First Aid Box to local schools, HIV/AIDS camps, Reproductive child health awareness
5	Gender Activity	Distribution of Knitting Machines, material and training for women groups
6	Eco Restoration and Conservation	Awareness program in Schools, colleges and awareness on conservation practices for Chilgoza, medicinal plants in villages
7	Water conservation and harnessing	Awareness on water conservation and harnessing practices in Schools, colleges and villages
8	Animal Husbandry	Awareness program in villages on livestock development, breeding practices etc
9	Horticultural and Medicinal Plants	Awareness on fruit trees, value addition, market etc
10	National Integration	Promotion of National integration by way of sponsoring National and other Events , Advertisements on national events
11	Philanthropy	Donations for local voluntary associations and charity organizations
12	Public Information System	Awareness on Government development programmes and facilities

Need assessment consultation with Women Groups by Consultant and NTPGPL E&S Team in Moorang Panchayat (Right) and Rispa Panchayat (Left)

3.6.1 Activity Completed in the last 4 years

Over the past four years, NTPGPL has implemented a range of social responsibility interventions in the project areas on a priority basis. The focus has been more to safeguard the interest of the locals and protect their distinct traditional identity by way of promotion of culture and contributions towards organizing cultural festivals, national events and sports events. For this in addition, to giving support to the affected Gram Panchayats, the other agencies at the District and State Level are also supported with necessary financial assistance. The requests from elected representatives and government officials for sponsoring state events are also honored by the NTPGPL with appropriate contributions. The total amount spend towards the social responsibility activity under CSR (excluding the infrastructural development activity) till the end of September 2012 is Rs 23,98,498/-. The year wise spending is presented in Table 3-3.

Table 3-3: Year wise spending for Social Responsibility Activity at Tidong I

Sl No	Year	Amount Spent (Rs)
1	2009	753200.00
2	2010	672600.00
3	2011	599726.00
4	2012	372972.00
	Total	2398498.00

The details of the activity completed and amount spent in the three panchayats and other agencies is provided in Table 3-4.

Table 3-4: Social Responsibility Activities Completed

Sl No	Focus Area	Details	Amount (Rs)
1	Culture and Tradition	Support to Lavi Mahotsav (Kinnaur Festival) at Kinnaur for last 4 years	1600000
2	Culture and Tradition	Support to Bodhgaya Prabandhak Committee, Kinnaur	200000
3	Education	Assistance to local School/College	53000
4	Sports	For conducting Sports in project villages	101100
5	Health	Distribution of First Aid Box to local schools	29972
6	National Integration	National and other Events	115000
7	Philanthropy	Donations for other local associations	113801
8	National Integration	Advertisements on national events	185625
		Total	2398498

Local people participating in NTPGPL sponsored annual Lavi Festival/Kinnaur Festival at Reckong Peo

Traditional Dance during the Lavi Festival Cultural programmes as part of Lavi Festival

Local people participating in the fair during Lavi Festival at Reckong Peo

Distribution of First Aid Box by NTPGPL's E&S Team members in Primary School

NTPGPL supported Annual School function in Reckong Peo, Kinnaur District (Right) and NTPGPL Project Management and E&S Team Participating in Annual School function at Reckong Peo, Kinnaur District

NTPGPL supported Annual School function in Nichar (Right) NTPGPL Project Management and E&S Team Participating in Annual School Events at Nichar (Left)

NTPGPL Staff celebrating World Environment Day through plantation drive (Lrft) and NTPGPL's Project Management addressing workers on World Environment Day (Right)

3.6.2 Budget and Utilization for Proposed Activity

As discussed earlier a number of activity are proposed under the social management initiative and as part of the effective planning and execution appropriate budgetary estimates are considered for the same. The total estimates under each focus area and funds utilized so far are presented in Table 3-5.

Table 3-5: Estimated Budget and Utilization for Social Responsibility Activities

Sl no	Focus Area	Lumpsum Estimated Cost (Rs)	Amount Utilized Till Sept 2012 (Rs)
1	Local Culture and Tradition	2500000	1800000
2	Educational Activity	300000	53000
3	Sports Activity	300000	101100
4	Public Health Support	500000	29972
5	Gender Activity	250000	Proposal prepared.

Sl no	Focus Area	Lumpsum Estimated Cost (Rs)	Amount Utilized Till Sept 2012 (Rs)
6	Eco Restoration and Conservation	600000	--
7	Water conservation and harnessing	1200000	--
8	Animal Husbandry	200000	--
9	Horticultural and Medicinal Plants	500000	--
10	National Integration	400000	300625
11	Philanthropy	150000	113801
12	Public Information System	200000	--
	Total	7100000	2398498

From the above table it is noted that of the total estimated budget of INR 7.10 Million an amount of INR 2.39 Million is already spent and utilized. The remaining funds will be utilized in the next 3 years before commissioning of the project.

As specified above and as part of the women empowerment and gender support activity after a detailed assessment and consultation with the women groups a proposal for providing Hand Knitting Machines and raw material for women groups in 3 project villages is prepared. The approval of funds is in process and the program is proposed to be implemented by second quarter of 2013.

Presently priority is given for the optimum utilization of the LADA funds provided under the project and the focus of the Gram Panchayats at this stage is towards executing the sanctioned works and get approval for new schemes for timely utilization of the allotted funds. Therefore the on-going social responsibility activity discussed above will be continued and the preparation of proposals for various activities which are yet to be initiated including awareness programmes under other focus areas is in process and will be completed and implemented periodically before commissioning of the project.

3.7 Direct and Indirect Employment Opportunity in Project

As part of the CSR and in compliance with the Government of Himachal Pradesh (GoHP) Hydro Power Policy,2006 and project Implementation Agreement the NTPGPL is providing a number of direct and indirect employment opportunities to the immediate local community from the project affected villages. A majority of the project management level staff are domicile of Himachal Pradesh. Majority of the project affected families who have lost their land in the land acquisition are provided with direct employment. In addition to the project management staff NTPGPL so far has provided 38 jobs at subordinate levels to the locals from the 3 project affected villages. Of the eligible 22 project affected land loser families 14 families have been provided with direct employment including a women.

In addition the Project Authorities by way of providing secondary employment have assisted the local community from affected panchayats and affected family by awarding petty contracts. The locals are given a total priority for the engagement in support activities like hiring of vehicles/drivers, security guards, casual workers etc. Further the Project Authorities have advised their contractors to

engage eligible persons from local villages on a preferential basis wherever possible during construction stage. NTPGPL so far has provided contractual works worth INR 150 Million to 42 locals and out of this, 4 persons belong to land losers families. Out of the 42 locals 2 of them are women.

The provision of the above direct and indirect employment and economic opportunities to locals is an ongoing process and will be continued on a need basis both during construction and operation stage of the project.

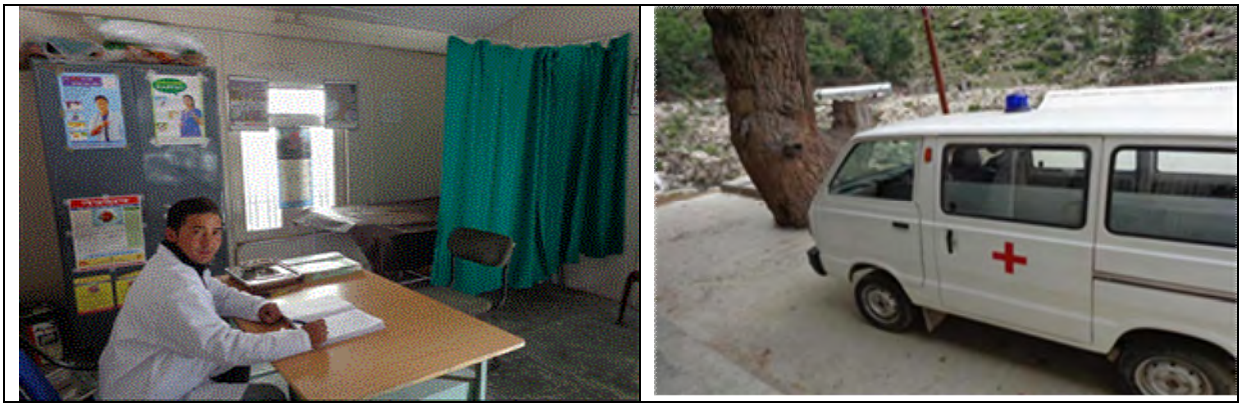
3.8 Health Facility under the Project

An important benefit to the local community is seen from the health facility setup at the project site. For Tidong-I project two health centers are setup one at intake site and another at powerhouse site. The two centers are manned by professional medical practitioners/pharmacists. To provide special attention to women a lady assistant pharmacist is also made available at this centre. The centers provide all the necessary medicines at free of cost and required first aid in an emergency not only to the project staff/workers but also to the local community. The local people including women frequent these centers during any general illness and injury related cases.

In addition, to address any cases of emergency due accidents or serious medical problems two ambulances provided at the respective centers. As said above these facilities is also made available and used not only by the project staff/workers but also to the local community. The health team conducts regular health checkup's and awareness programmes for the project staff/workers in which the local's are also invited and made to participate to avail the benefits.

Health Centre at Powerhouse site used by Local Community (Left) and Ambulance provided at Powerhouse site used by Local Community (NTPGPL Health Team) (Right)

Health Center at Intake Site used by Local Community (Left) and Ambulance provided at Intake Site used by Local Community (Right)



HIV Awareness campaign conducted by NTPGPL's Health Team and regional Hospital, Reckong Peo (Left) and Participants in HIV Awareness campaign (Right)

Health Checkup for project staff and local community - Local police participating (Left) and Local community participating in Health Checkup's (Right)

4. DEVELOPMENT FUNDS TO GRAM PANCHAYAT

4.1 General

In addition to the development activity through LADA and CSR initiatives NTPGPL has provided direct financial support to the 3 affected Gram panchayats of Thangi, Moorang and Rispa. The detail of the support provided is presented in this section.

4.2 Direct Funds to Gram Panchayats

NTPGPL based on the local demands and for addressing any direct and indirect impacts at the community level from diversion of government/forest land for the project and project construction activity on mutual acceptance has provided direct financial support to the 3 affected Gram Panchayats. These funds are meant to be used for development works in the habitations in respective Gram Panchayats. The funds are disbursed in the form of installments in the last 3 years and all the agreed amounts are totally disbursed to the panchayats. A total of INR 51.80 Million is provided till the end of December 2012 to the 3 affected panchayats and details are presented in Table 4-1.

Table 4-1: Details of Direct Funds to Gram Panchayats

Sl No	Name of Gram Panchayat /Village	Amount Provided (INR Million)
1	Moorang GP	10.00
2	Rispa GP	20.00
3	Thangi GP	20.00
4	Lambar village under Thangi GP	1.80
	Total	51.80

4.3 Utilization of Funds to Gram Panchayats

As per mutual understanding with NTPGPL and agreement the Gram Panchayats will have complete control over the utilization of the funds. Most of the above funds in all three panchayats, is reportedly distributed among the households living under the respective panchayat. The Gram Panchayat while distributing the money suggested to the households to utilize the money for construction of new toilet facility/ upgrade the existing facility. The panchayats reportedly passed appropriate resolutions and all the decisions taken for utilization of the above funds are taken unanimously by the community. A small amount from the above funds is reportedly kept with the Gram Panchayat to address any community requirement/emergency. In case of Lambar village under Thangi Panchayat the funds are provided very recently and the community is yet to utilize the same. As per initial discussions they are interested in upgrading the existing community infrastructure such as Temple, School etc.

5. DEVELOPMENT ACTIVITY AFTER COMMISSIONING OF PROJECT

5.1 General

The on-going and proposed community development activity discussed in the earlier sections is meant to be undertaken during the project construction period and to be completed before commissioning of the project. NTPGPL as a proactive measure has also planned and allocated sufficient funds for the community development/social responsibility activity proposed to be taken up during operation stage and after the commissioning of the project. The commitments to this effect are integrated in the Resettlement and Rehabilitation Scheme for Tidong-I prepared by Deputy Commissioner (DC), Kinnaur. This scheme is prepared in due consultation with all the stakeholders including NTPGPL and affected Gram Panchayats. The scheme is in process of approval of the Government of Himachal Pradesh.

5.2 Community Development Works After Project Commissioning

During operation stage and after commission of the project NTPGPL proposes to continue its support towards community development activity through up-gradation/maintenance of existing facility/newly developed infrastructure facility. The program will be implemented through DC, Kinnaur who after due assessment through the LADC will sanction schemes in affected village. For this an amount of INR.1.5 Million will be spent annually for entire project life of 40 years.

Some of the indicative development areas that will be considered for upgradation/ maintenance include the following:

- Approach Roads
- Internal Roads
- Mobile Health Centre/Van
- Drinking Water supply schemes
- Community/Welfare Centers
- Facilities/Furniture/Lab Equipment etc for Schools
- Play Ground
- Sanitation Facilities
- Street Lighting
- Agriculture/horticulture camps and facilities.

5.3 Social Responsibility Activity after Project Commissioning

5.3.1 Marriage Grants for Orphans

As part of its social responsibility NTPGPL will provide marriage grants to the orphan children of the affected area. Under this, fatherless & motherless girls and boys of the affected area will be paid an amount of INR 1,00,000/- at the time of their marriage. Only fatherless girls of the affected area will be paid an amount of INR 51,000/- at the time of their marriage by the Project Authority. This grant

will be provided on a need basis and due priority will be given to project affected family under the project. Although the above grants will be provided on need basis, a maximum amount of INR. 0.5 Million per annum will be provided under this grant for entire project life of 40 years.

5.3.2 Merit Scholarships to Boys and Girls

With a view to improve educational standards in the Project Affected Area NTPGPL intends to initiate merit scholarships to help the wards of Project Affected Families/area. The scheme aims at enhancing educational standards and employability of the youth and minimizes dropouts of meritorious but financially unsound students. After approval of the Scheme appropriate guidelines in coordination with the DC, Kinnaur will be developed for implementation of this provision. While developing the relevant guidelines for extending this benefit due consideration will be given towards prioritization/selection separately for male/female based on merit as well as poverty levels of the family and priority to the wards of project affected family under the project. For implementation of this activity an amount of INR 0.7 Million per annum will be provided for entire project life of 40 years.

6. IMPLEMENTATION AND MONITORING ARRANGEMENTS

6.1 General

As discussed in Section 2 of this report the primary community development activity implemented under LADA is undertaken through a LADC constituted under the Chairmanship of local MLA and NTPGPL as the Member Secretary. The LADC conducts regular meetings and monitors the implementation of the program. For initiatives under CSR and others NTPGPL has setup appropriate implementation and monitoring arrangements as part of its overall environmental and social management system for the project. The details on organizational arrangements for managing community development activity at various levels are presented below.

6.2 NRPPL Level

At NRPPL level, an Environment and Social Management group is established and headed by a Head-EHS who is supported by a Manager-Social who will look after all the community development and CSR issues. This group reports to the Chief Executive Officer of NRPPL and Head of Hydro Projects. The Manager-Social is stationed at Corporate Office but travels extensively to site as and when required and interacts with project team at site regularly. He is responsible for all CSR activities and preparation and review of social and community development programs. He conducts community meetings and undertake need assessments. He is also responsible for training the staff and workers to prevent social conflicts with local population.

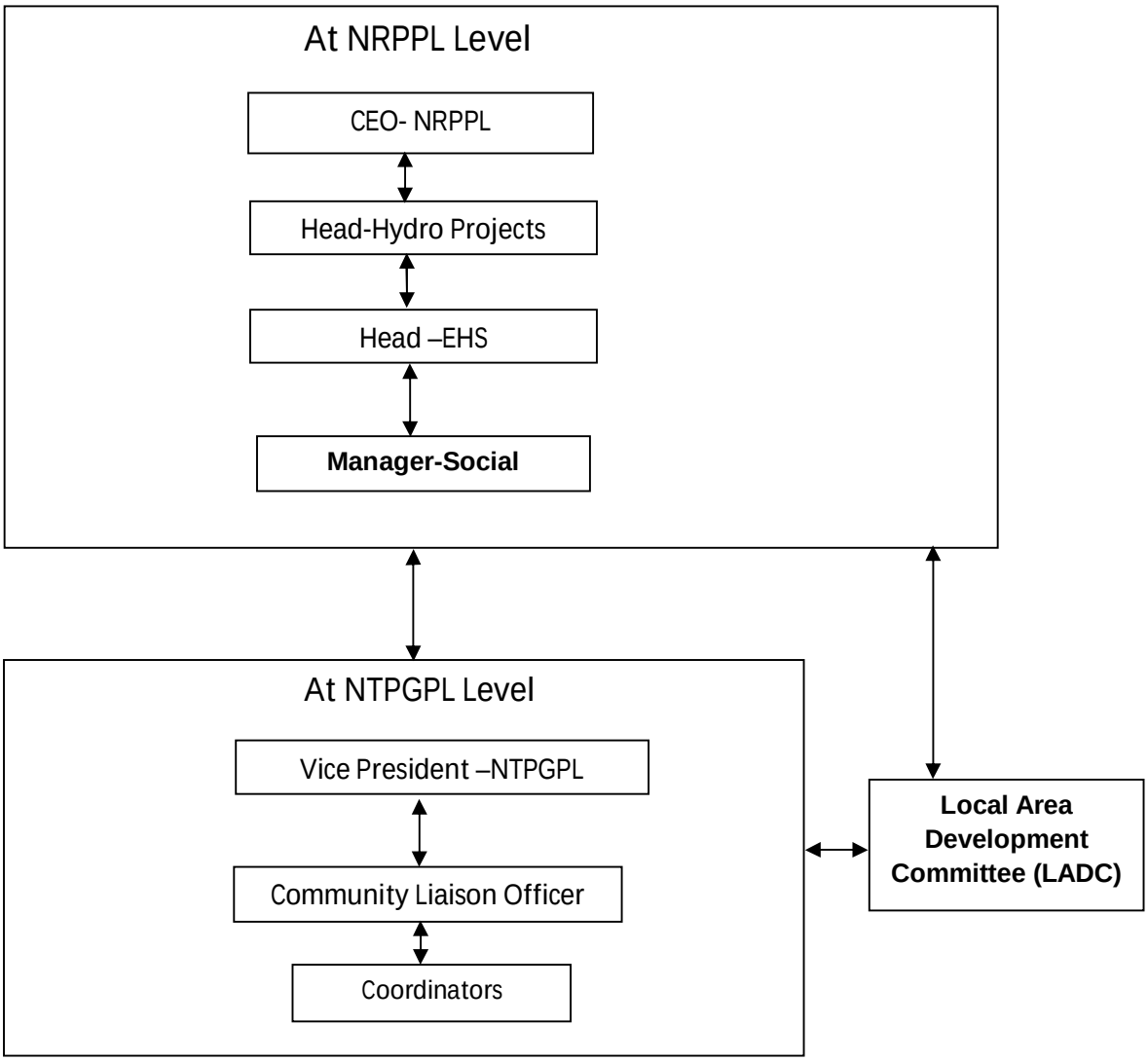
6.3 NTPGPL Level

At the project level, a Project Environment and Social Group has already been setup at the project site. This group is headed by the Vice President for the Project and supported by a Manager-Environment Health and Safety (EHS) and a Community Liaison Officer (CLO). The CLO is informally supported by coordinators who are from project affected villages. This group reports to Environment and Social Management Group at NRPPL on a day to day basis on the progress of all the environment and social issues including CDP implementation. The CLO is stationed at Reckong Peo and work in close coordination with Manager -Social at NRPPL level. His responsibilities include:

- Liaisons with state government departments and project stakeholders
- Regular interactions with Panchayats and establishes rapport with the community and hold public consultation and disclosure sessions as required
- Following up with Panchayats and regulatory authorities over LADA grants and their utilization
- Implementation, monitoring and updating of CDP activities
- Documentation and reporting of CDP activity
- Implementation of R&R plan
- Facilitation of the project team on community grievance redressal

The organisational arrangement for implementation of Community Development Plan is given in Error! Reference source not found.6-1.

Figure 6.1: Organization arrangement for implementation of Community Development Plan



In order to effectively address the responsibilities CLO with the support of coordinators and other senior management will co-ordinate with the Gram Panchayats and other local groups such as women groups, youth association, community associations and enhance the ongoing programmes in these villages.

As part of the on-going implementation process for CSR activity he will prepare specific and detail proposal in consultation with the above discussed village group/ agency. Any requests by specific groups should also have an approval from the concerned Gram Panchayat. After appropriate consultations and deliberations with all stakeholder's he will prepare a micro plan constituting the following details:

- Details of the intended beneficiaries

- Potential benefits, and methods of measuring them
- Implementation details like role and responsibilities of the project proponents, community and the GP.
- Time frame for implementation
- Safeguards to ensure transparency and participation
- Indicative budget
- Ways to link the proposed activity with on-going government programmes/ government agencies
- Internal and external monitoring mechanisms by the community members and the project proponents respectively.

The completed micro plans will be submitted to NRPPL for review and approval for implementation.

6.4 Monitoring and Evaluation

The monitoring and evaluation of CDP implementation will provide tangible evidence to demonstrate whether the programme is being effectively implemented and that it's desired intent- that of improving the social benefits is being achieved. As the onus of CDP implementation would largely be on the GP/community, monitoring by NTPGPL is essential to monitor that the activities are being implemented within the prescribed time frame and are likely to produce desirable results. Monitoring is also undertaken by LADC which is the principle administrator for the LADA implementation. A monthly monitoring by the NTPGPL is recommended so that they are able to identify the gaps and make an effort to bring it back on the right track.

One of the main roles of NTPGPL Environment and Social Management Group will be to see proper and timely implementation of all activities in CDP. Monitoring will be a regular activity and Community Liaison Officer at this level will see the timely implementation of CDP activities and will prepare reports on the progress of CDP Implementation. At NRPPL level it will collect information from the project site and assimilate in the form of Quarterly Report to assess the progress and evaluate the results of CDP implementation. External monitoring and evaluation of the CDP implementation will be covered under the on-going Quarterly EHS and Social Audits conducted by reputed consultants.

6.5 Record Keeping

The records pertaining to all correspondence on CDP such as the minutes for each meeting held and attended, the representations and requests received, the report of the need assessment, the details of implementation or asset purchased, the documentation of the events and others will be compiled and reported periodically. The records also include the minutes of LADC meetings, copies of all correspondence pertaining to an activity, approval documentation and monitoring and evaluation reports. The progress reports will be submitted on quarterly basis.