

Environmental and Social Monitoring Report

Project Number: 44914-014
Quarterly Report 2017 (April – June 2017)
June 2017

Pakistan: Patrind Hydropower Project

Prepared by Star Hydro Power Limited for the Asian Development Bank.

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147 MW PATRIND HYDRO POWER PROJECT

**Environmental & Social Monitoring Report
April to June 2017**



**STAR HYDROPOWER
LIMITED**

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Acronyms

ADB	Asian Development Bank
AJK-EPA	Azad Jammu & Kashmir Environmental Protection Agency
KPK	Khyber Pakhtunkhwa
CDP	Community Development Plan
EH&S	Environmental Health & Safety
EPCC	Engineering Procurement Contracts Contractor
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GRC	Grievance Redress Committee
IEE	Initial Environmental Examination
IDB	Islamic Development Bank
IFC	International Finance Corporation
ILO	International Labor Organization
KEXIM	Export Import Bank of Korea
NEQS	National Environmental Quality Standards
NTP	Notice to Proceed
PAPs	Project Affected Persons
PS	Performance Standard
RAP	Resettlement Action Plan
SHPL	Star Hydropower Limited

INTRODUCTION

i. Background

The Patrind Hydropower Project is run of river project located on the boundary of Khyber-Pakhtunkhwa and Azad Jammu & Kashmir. The purpose of the Project is to provide zero-emissions renewable electricity to the grid and also provide local and global environmental benefits as well as strong local socioeconomic benefits. The project has the total capacity of 147 MW. The project is being financed by multilaterals like IFC, ADB, IDB and KEXIM.

ii. Objectives:

The purpose of this Quarterly Environmental & Social Performance Report is to describe EPC contractor's compliance with the environmental and social performance requirements of IFC/ADB (including implementation of the Environmental Management Plan) and to assess any corrective actions implemented/proposed. This includes:

- A description of all significant health, safety, environmental and social activities and events that occurred during the reporting period.
- Provision of additional information about activities (i.e., status of permits or other approvals, ongoing public consultation etc.).
- Quantitative performance monitoring data summaries in comparison to appropriate ADB and IFC policies, guidelines and national requirements.
- An explanation of any cases of non-compliance with lender's guidelines or applicable regulatory limits that have occurred, identifying the cause and the corresponding corrective measures planned or underway to prevent future occurrences.
- Resettlement Action Plan activities and progress on the implementation of project within the Sustainable Development Strategy Framework

PROJECT NAME AND SUMMARY INFORMATION

a) Project/Business Name

Patrind Hydropower Project

b) Status of Construction

The Notice to Proceed (NTP) for main works was issued by the Company to EPC Contractor on December 26, 2012. Construction Works were completed 100% in March 2017.

c) Location of project

Village Patrind, District Muzaffarabad, Azad Jammu and Kashmir

d) Nature

Run of river Hydropower Project.

e) Scale/size

147 MW

f) Date of construction/operation commencement

Preliminary works commencement: September 2011

Main works start after issuance of NTP: December 2012

g) Name, designation and signature of person responsible for preparing/ reviewing the report

<p>Prepared By:  Designation: Manager HSE</p>	<p>Reviewed By:  Designation: Deputy Chief Executive Officer</p>
<p>Approved By:  Designation: Chief Executive Officer</p>	

RELEVANT ENVIRONMENTAL PERMITS OR COMPLIANCE CERTIFICATES

a) Summary of permit conditions and media covered:

Following conditions were imposed by EPA-AJK during the construction phase of the Project. The status of compliance with the conditions is presented in below table:

Condition	Status of compliance
Ensure compliance to NEQS and undertake mitigation measures suggested in the EIA report & EMP. Constitute Environmental/Post EIA Monitoring Committee and submit monitoring reports on quarterly basis and provide the copy of this approval and EIA report to the contractor for information and compliance activities.	Environmental Monitoring Unit was established and mobilized on site after the issuance of Notice to Proceed to the EPC Contractor. Quarterly E&S Monitoring reports are being submitted to the EPA AJ&K. Post EIA monitoring was undertaken by EPA AJK during the month of December 2016. Approval and EIA report is part of EPC contract.
Compensate PAPs for loss of agricultural land, crops, property, and usage right etc. in accordance with the rates that agreed upon and adopt appropriate mechanism for RAP grievance redress. Employ local peoples for all unskilled jobs and implement CDP sooner than later. Ensure all public utilities such as water supply pipes, power phone line be not disturbed by the execution of the project.	Owners have been compensated for the loss of agricultural land, trees and property as per the market rates/replacement cost. For unskilled jobs local workers from affected communities (Alda, Patrind, Tarcheela, Boi, Sarati Shoran and Deedal) are being employed and for skilled jobs locals are being hired on priority basis as per the requirement and the qualification. During civil works special care is being taken not to disturb any of the public utilities.
Ensure occupational and community health and safety backed by a comprehensive emergency response plan. Adopt controlled techniques in accordance with Pakistan explosive act and also make sure the safety & security of wild animals and their habitats at the project site and in its environs with the prior consultation and adhering to the guidelines of forestry and wild life departments strictly.	Emergency response procedures are in implementation. Provision of PPEs, education sessions, availability of medical facilities, installation of sign boards and close supervision by EPCC & OE HSE staff are ongoing activities to ensure Occupational health and safety on project sites. Blasting activities were carried out in accordance with Pakistan Explosive Act. Monitoring of Fish fauna and flora has been undertaken during quarter.
For compliance of regulation 13, 14, 17 & 18 of IEE/ EIA regulations 2000 which enunciate the conditions for approval. Confirmation of compliance, entry, inspection and monitoring of the proposed project. The site to install the asphalt plant and other machinery would be selected in consultation with the agency (AJK- EPA). The findings of quality analysis on regular basis should positively be shared. Also, the spoil should be dumped at pre identified location.	Quality monitoring reports are being shared with EPA- AJK. Spoil was always dumped on approved sites. Installation of batching plant has been undertaken with consultation of EPA-AJK.

Communicate any change in the approved project to AJK-EPA and that would be commenced after obtaining the approval. The approval shall stand null and void if the conditions mentioned herein before are not fully complied with. It does not absolve the proponent of the duty to obtain any other approval or clearance that may be required and can be withdrawn at any time with any prior notice if deemed necessary in the public interest.	For the changes in the design of the weir site layout and Addendum to the EIA report was submitted to both the EPAs i.e. EPA AJ&K and KP covering the changes to be made in the design which was subsequently approved by both the EPAs on November 19, 2014.
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Most of the conditions are common in both approvals with few exceptions of following issued by EPA KPK:

Condition	Status of compliance
Water in the pond created by construction of Patrind weir should be maintained at El.765m.amsl. Safety zone/adequate engineering measures should be provided to overcome fears of the residents regarding effects of pond to their houses. The level difference of 2 meter from 765m.amsl to 767m will act as safety zone so the owner of the land and housing structures falling within the zone should be compensated as per laid down procedure of compensation of the government.	The operation level of the Project is at 765 masl. The Company acquired the land at the level of 767 masl as per the condition of the EPA. The additional 2 meters shall act as safety zone and the owners were compensated as per the procedure.
The project management should contribute towards the repair of the road to be used during construction and operation activities of the project. The trees supposed to be submerged should be counted in the presence of all stake holders i.e. owners land collectors /patwari representing revenue department representative of EPA and forest/agriculture department. After the determination of exact number type and ownership of the trees be finalized and paid as per laid down procedure of the government	The owners have been compensated for the trees supposed to be acquired due to the land acquisition. The trees were counted in the presence of all stake holders i.e. owners land collectors /patwari representing revenue department representative of EPA and forest/agriculture department. Uneven section of project access road passing through Sarati village has been repaired with graders. Damaged portion, will be repaired if any. The maintenance of the access roads near the project area is part of Social uplift plan
Minimum flow of 2 cumecs in the downstream of weir in Kunhar River should be kept and provision for 10% extra of this amount of water for emergency in downstream should also be kept in plan. No extension would be permitted in the future in existing hydropower project without prior approval of the EPA /government of Khyber Pakhtunkhwa	Shall be applicable during the operation phase of the Project
Separate NOC is required for batching/crushing Plant	NOC was obtained from EPA KPK for installation of two batching plants near the weir site

b) Relevant Government Agencies

As the Project is located on the boundary of Khyber Pakhtunkhwa and Azad Jammu & Kashmir, Star Hydro Power Limited (the “Company”) had to seek approval of Environmental Impact Assessment (EIA) from following two Environmental Protection Agencies (EPAs).

- i. EPA Azad Jammu and Kashmir
- ii. EPA Khyber Pakhtunkhwa

c) Issuance dates and duration of validity

Issuing Authority	Issuance Date	Duration of Validity
EPA-AJK	10-08-2010	3 years
EPA-KPK	14-04-2011	Project construction phase

d) Renewal Requirements:

As per AJK-EPA review of IEE and EIA Regulations, 2009 “Once the Environmental Approval is accorded in favor of the proponent, shall be valid for the period of 3-years from the date of issuance. However, if construction is commenced during the 3-years period, the approval shall stand extended "automatically" for a further period of 3-years from the date of expiry of initially issued Approval”.

INCIDENTS OF VIOLATIONS OR NON-COMPLIANCE

HSE compliance monitoring has been undertaken regularly during the reporting quarter. To ensure implementation of recommended procedures, regular liaison was maintained with the EPC contractor, OE and subsequently with the site construction teams and sub-contractors. Additional efforts were made to ensure remedial and corrective actions highlighted by the Company and OE to mitigate HSE issues.

Incidents of violations and non-compliances by EPCC and its sub-contractors were included in daily, weekly and monthly reports. To prevent incident and mitigate risks, during the quarter, close supervision by HSE team has been carried out. Following non conformities were highlighted by OE through correspondence and during formal or informal meetings. Remedial measures and corrective actions have been undertaken mitigation measures:

As an integral part of our Environment Management Plan and as mitigation measure to the removal of vegetation during construction phase Daewoo E & C carried out tree plantation on

slopes on right and the left bank of Kunhar river at weir site. This plantation will not only compensate the removal of vegetation in need for construction but will help these slopes reclaim naturally and help control of soil erosion.



a) Un-safe Act & Un-safe Conditions

To mitigate risks of accidents UA/UC Observation Card System is also in place to ensure maximum safety on site. To sensitize all staff/workers and to get information and feedback about site HSE issues, boxes holding UA/UC cards have been placed on prominent locations.

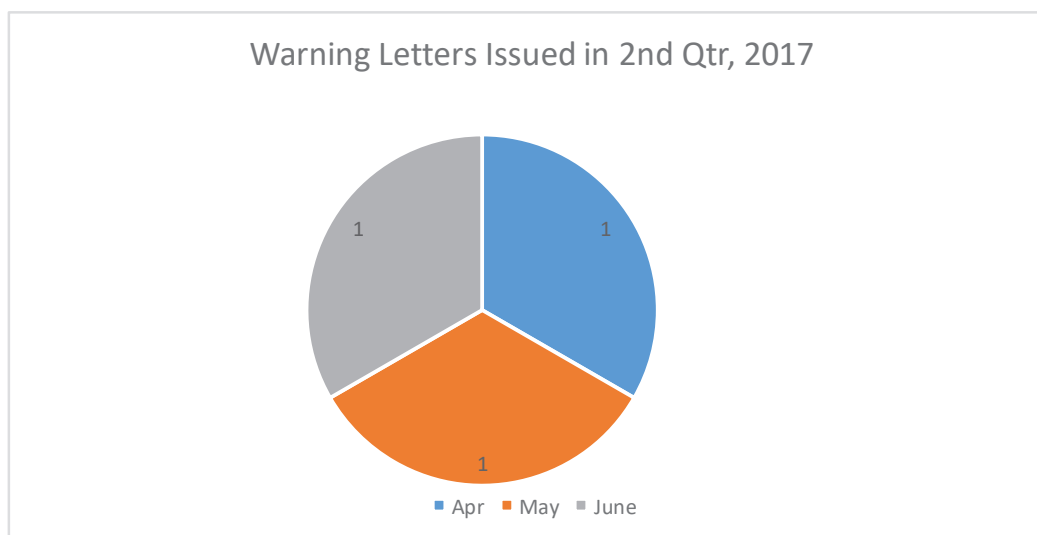
b) Warning Letters for Non-compliances

Warning letters have been issued depending on nature and severity of violation during reporting period. Verbal warning is given for the first time on minor violations. If any employee fails to abide by HSE policies after verbal warning a written warning letter is issued. 03 warning letters were issued for incident for violations of HSE procedures. List of warning letter is given in the table below.

As per EPCC's standard procedure, after three warnings employee would not be able to continue his/her job. However, before removal it is important to ensure that individual has been informed / trained and provided with the necessary PPEs.

WARNING LETTERS

Sr.	Name	Date			Site	Company	Designation	Reasons
		Day	Month	Year				
01	Iqbal	04	04	2017	Powerhouse Site	Daewoo E & C	LTV Driver	Unsafe Behavior
02	M. Saleem	15	05	2017	Powerhouse Site	Daewoo E & C	Labor	Without Helmet
03	Shakar	07	06	2017	Powerhouse Site	Daewoo E & C	Supervisor	Unsafe Behavior



Warning Letters Issued During Quarter

INCIDENTS OF ENVIRONMENTAL AND SAFETY ACCIDENTS

a. Environmental Accidents and Mitigation

- No major environmental incident occurred during the reporting quarter on both the sites. However, minor soil contamination due to inappropriate handling of oil was observed.
- According to the nature of work inspections have continuously been carried out during the reporting period to reduce the risk of accidents and impacts on environment and for proper maintenance of machineries and other equipment's.

b. Health and Safety Accidents and Mitigation

Incidents are recorded for all workers/staff working for subcontractors and on rented vehicles/machinery.

Summary of health and safety incidents during quarter is in the table given below.

Incident	Frequency	Description	Media or Community Reaction
Fatality	None	None	None
Medical Treatment Case	0+0+0	None	None
Near Miss	0+0+0	None	None
First Aid	0+0+0	None	None
Fire Incident	0+0+0	None	None
Property damage/environmental incident	0+0+0	None	None
Medical Checkup / Examination / Treatment	0+0+0	None	None

EXTERNAL MONITORING /INSPECTION

Sites HSE internal inspection has remained an ongoing activity. Star Hydro and Technical advisor Mott MacDonald also visited site, other visits from Daewoo head office approaching time to time and inspecting sites.



INTERNAL INSPECTIONS CONDUCTED DURING REPORTING PERIOD

To mitigate safety incidents, machinery, equipment and electrical appliances are being inspected to ensure fitness through color coding system. List of inspections done during the quarter are attached as **Annex- 1**.

According to the nature of work being carried out on construction sites, inspections have continuously been carried out during the reporting period to reduce the risk of accidents and impacts on environment and for proper maintenance of machineries and other equipment regularly.

Following inspections have been undertaken during quarter;

- Heavy equipment inspection
- Batching Plant Inspection

- Site Overall Inspection
- Fire Extinguisher Inspection
- Health and Hygiene Inspection
- Gaseous concentration Inspection



MITIGATION MEASURES

To ensure health and safety of both staff and labor on project area, following were some of the prominent activities EPCC undertook during the quarter:

1. All the workers have been provided with necessary Personal Protective Equipment (PPE) comprising of helmets, safety shoes and safety jackets and ankle belts to prevent injuries.
2. Warning letters have also been issued to the personnel found to perform activities that are against the rules and regulations of the HSE
3. Safety campaigns and awards are distributed to encourage and develop safe work behavior in labor and staff
4. To mitigate safety incidents, machinery, equipment and electrical appliances are

being inspected to ensure fitness

5. Regular trainings/education sessions for staff and labor
6. Water sprinkling on project access road for community health and safety.

Permit to work (PTW)

Permit to work have been issued during the quarter for the following activities.

- 1- Welding/ Open Flame Work
- 2- Excavation
- 3- Lifting
- 4- Explosive issue
- 5- Blast
- 6- Work at height

LABOR RELATIONS AND CONDITIONS

(i) Nature of labor dispute or grievance

No labor dispute or conflict with local community was observed or reported during quarter. Complaints box are positioned on each site on detectable location for the ease of labor in submitting complaints. Complaint log is attached as **Annex-7**.

(ii) Legal requirements, Permit conditions and renewal requirements

During the reporting period, requirements related to labor's contracts, permits and other conditions remained constant and no change was observed.

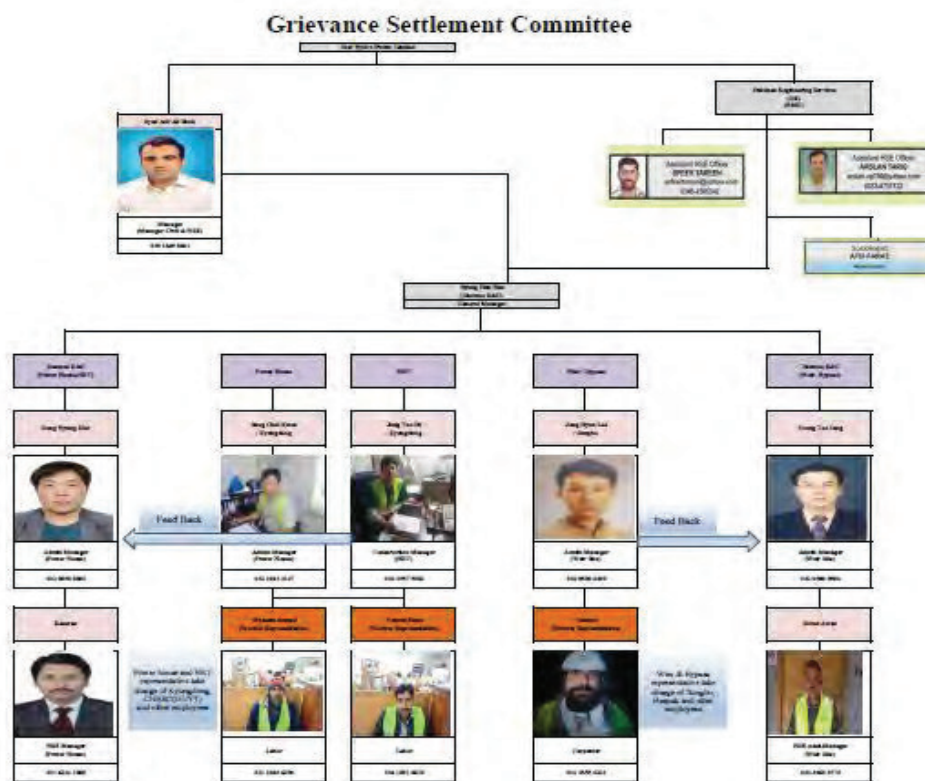
EPCC and sub-contractors are providing insurance coverage in case of accident and death. Furthermore, a deduction is being made from salaries for Employees Old Age Benefits Institution (EOBI) as social security on KPK side.

(iii) Authorities in charge of investigation/recording

In case of any labor incident, site Construction Manager and HSE staff is responsible to record, investigate and address it appropriately.

To address any dispute or work related complaint received from staff /workers. Internal Grievance Redress Committee (GRC) comprising four representatives from labor one from each subcontractor, Planning Manager, Admin Manager and HSE Manager is mandated to investigate the matter in an unbiased manner and resolve it amicably so that

the concerned party or individual may be satisfied and a friendly / peaceful environment is reinstated at project site.



(iv) Corrective actions, deadlines, identification of responsible parties.

SHPL, OE and EPCC's HSE departments continuously indicates corrective actions for further compliance by construction team.

(v) Labor relations and living conditions for construction labor force

Safety measures such as fire extinguishers and emergency contact numbers have been placed on main locations. Fire alarm system has been installed on main campus lower site and will be installed on new accommodations as well. Ambulance drivers are aware of all accommodations to have prompt access in case of any emergency. Following standards are implemented for adherence of local Labor standards:

- Government of Pakistan Labor Policy 2010.
- Standards for labor health and safety are executed according to EPC Construction Contract.
- EPC has made all necessary arrangements for payment, housing & feeding.
- The living conditions are up to merit with all necessities.

- Prefer to hire unskilled /skilled staff and labor from AJ&K or KP.

Compliance status based on applicable National and International laws/ regulation on labor including ILO core labor standards

As per conditions stipulated in the Project construction contract between Company and EPC contractor those have been made in light of National and International laws and standards, implementation during the quarter has been observed accordingly. Statuses of compliance with these laws are given in the table below;

Table: Compliance Status with International and National Labor Laws/Regulations

CONTRACTUAL TERMS/ CONDITIONS	STATUS OF COMPLIANCE DURING QUARTER
ENGAGEMENT OF STAFF AND LABOR	
Except as otherwise stated in the Project Requirements, the Contractor shall make arrangements for the engagement of all staff and labor, local (People living in project vicinity) or otherwise, and for their payment, housing, feeding and transport.	EPC contractor has made all necessary arrangements for the engagement of staff and labor and payment for their wages/ salaries, housing, feeding and transport. However, the local staff/workers do not need accommodation on project base camp.
The Contractor and its subcontractor(s) shall prefer, to the extent practicable and reasonable, to hire unskilled staff and labor, and skilled staff and labor with appropriate qualifications and experience, who are residents of AJ&K or KP especially who are the affected of the Project	Unskilled jobs have been provided to nearby communities (Alda, Thori, Patrind, Tarcheela, Sarati, and other adjacent localities) in the reporting quarter. Also preference has been given to local people who qualify for skilled positions
The Contractor shall, and shall ensure that its subcontractors shall, fulfill and observe the Environmental and Social Requirements in relation to the engagement of staff and labor	EPC Contractor has established a proper mechanism of daily and weekly reporting and consistent monitoring of HSE and related social issues. On the basis of recommendations, corrective measures are being taken accordingly
RATES OF WAGES AND CONDITIONS OF LABOR	
The Contractor shall pay rates of wages, and observe conditions of labor, which are not lower than those established for the trade or industry where the work is carried out or as prescribed under the Laws of the Country. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions which are not lower than the general level of wages and conditions observed locally by employers whose trade or industry is similar to that of the Contractor.	The minimum salary for the permanent worker is 14,000/- for 208 hours monthly according to the budget notification 2015 plus food and accommodation if required.
PERSONS IN THE SERVICE OF OTHERS	

CONTRACTUAL TERMS/ CONDITIONS	STATUS OF COMPLIANCE DURING QUARTER
The Contractor shall not recruit, or attempt to recruit, staff and labor from amongst the Employer's	Full compliance of the condition was observed during entire quarter
LABOR LAWS	
International Human Rights & Core Labor Standards The Contractor shall comply with all the relevant labor Laws applicable Contractor's Personnel, including Laws relating to their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights.	All regulations are in implementation. Local labor laws were devised in light of International Human Rights & Core Labor Standards; therefore, compliance with local standards is same with international laws /standards. Furthermore, Pakistan has ratified ILO's conventions on core labor standards.
The Contractor shall require its employees to obey all applicable Laws, including those concerning safety at work.	Site HSE status has been improved due to regular instructions and corrective measures.
Abolition of child labor	To ensure the abolition of child labor the Computerized National Identity Card (CNIC) has been made mandatory for induction which is only provided by the GOP after the age of 18.
Elimination of all forms of forced or compulsory labor	No forced labor observed /reported during quarter. Furthermore, during site inspections by SHPL, OE and EPCC's HSE staff, it is strictly checked that no forced labor has been undertaken on any site in any form.
Elimination of discrimination in respect of employment and occupation	No discrimination exists as all persons have been provided equal opportunities irrespective of color, race, origin and nationality. Only difference is the nature of job and relevant skills.
Freedom of association and the effective recognition of the right to collective bargaining	No ban is imposed on workers with regard to establishment of workers' organization or freedom to express labor concerns. However, formal labor union or association has yet not been established.
WORKING HOURS	
<p>No work shall be carried out on the Site on locally recognized days of rest, or outside normal working hours, unless:</p> <p>(a) Otherwise stated in the Contract,</p> <p>(b) the Employer gives consent, which shall not be unreasonably withheld, or</p> <p>The work is unavoidable, or necessary for the protection of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Employer</p>	Work has been carried out on weekends but only with the consent of concerned staff/labor.
FACILITIES FOR STAFF AND LABOR	

CONTRACTUAL TERMS/ CONDITIONS	STATUS OF COMPLIANCE DURING QUARTER
(a) Except as otherwise stated in the Project Requirements, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. The Contractor shall also provide facilities for the Employer's Personnel as stated in Project Requirements.	Recommended facilities have been provided
(b) The Contractor shall not permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the Permanent Works.	Nobody has been permitted during reporting period

(vi) Medical facilities provided to Staff and Labor during quarter:

On both sites all time availability of clinical staff and facilities has been insured. No staff/workers visited medical facilities as the major construction activities are already completed in the previous quarter. However, availability of first aid boxes has been ensured at all sites Implementation of local labor standard.

PROJECT PROCEDURES FOR: (A) HIRING; AND (B) ACQUISITION OF GOODS AND SERVICES:

Procedures for hiring have been adopted as per EPCC's policy and also in compliance with EPC Contract. While, procurement of goods and services by EPC contractor is being carried out under Quality Assurance and Quality Control plan.

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(i) Local Employment Status:

As per the EPC contract, EPCC is bound to employ unskilled labor from local areas/ adjacent villages and for skilled jobs preference has to be given to the qualified locals.

LOCAL EMPLOYMENT STATUS

Company	AJ&K							KPK						Others	Total Employees
	Alrah	Thori	Patrind	Tarshila	Shoran	Other AJ&K	Sub-Total	Sarati	Boi	Deedal	Dalola	Others	Sub-Total		
Daewoo	1	10	2	-	-	71	84	1	4	-	4	6	15	47	146
Kyung Dong	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-
Sungbo	-	-	3	2	4	2	11	3	5	-	7	5	5	19	35
CNEEC	-	-	-	-	-	6	6	-	-	-	-	-	-	3	9
GDYT	-	3	-	-	-	8	11	-	-	-	-	3	3	1	15
Daekwang	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
Watch Man	-	-	-	-	-	-	-	-	16	-	-	-	16	0	16
Gurad & Guides	-	8	2	-	-	15	25	-	-	-	-	-	-	0	25
Total	1	21	7	2	4	102	137	4	25	0	11	14	39	72	248
	0.73%	15.33%	5.11%	1.46%	2.92%	74.43%	55.24%	18.26%	64.10%	0.00%	28.21%	35.90%	15.73%	29.03%	100.00%

Compliance with legal requirement for employment

Project Legal Agreement/Contract	Conditions/Requirements	Compliance Status
EPC Contract Section 6.1 “Engagement of Staff and Labor”	“The Contractor and its subcontractor(s) shall prefer, to the extent practicable and reasonable, to hire unskilled staff and labor, and skilled staff and labor with appropriate qualifications and experience, who are residents of AJ&K or KP especially who are the affected by the Project”	Being complied as most of the workers are from local community. The detail is presented in previous section (viii)
As per Para 5 (n) of Environmental approval issued KPK EPA Approval Condition	“Non-technical jobs should be provided to the local community. Employment record for all positions shall be provided to EPA-Khyber Pakhtunkhwa and priority should also be given to local in technical jobs but not at the cost of merit or requirement of the management of the project”	Unskilled jobs have been provided to local residents whereas preference has been given to locals for technical positions but subject to availability.
As per condition Environmental approval issued by AJK EPA	“As far as possible, employment should be provided to local people for all unskilled jobs. Preference may also be given to local people for all semi- skilled and skilled jobs. Employment record for all positions shall be provided to AJK-EPA positively”	Employment opportunities have been disclosed to the local communities through different avenues such as newspapers advertisement, public notice on prominent locations and through community coordinators and local project staff. Preference has been given to the locals subject to availability of skilled and unskilled human resources.

ENVIRONMENTAL AND SOCIAL CAPACITY

i. Staff capacities in environmental and social management (as relevant)

The Project is being managed/ monitored by EPCC/OE/SHPL having a balanced team of HSE staff comprising safety, environment and health professionals. An orientation to environmental management, health and safety during construction work is part of induction form of all the staff and workers hired. Furthermore, daily HSE monitoring, toolbox meeting programs and other related activities raise the awareness level among all staff and workers.

ii. HSE Weekly Meetings:

As per monthly HSE Plan of EPC contractor, weekly internal meetings and meetings with site construction teams have regularly been conducted on both sites.

Issues regarding compliance with HSE standards have always been main agenda items during the meetings.

iii. Environmental laws and regulations

EIA study of the project was completed in light of following laws and regulations. EMP as part of EIA is in implementation under the same laws and regulations;

- Pakistan Environmental Protection Act 1997
- National Environmental Quality Standards (NEQS)
- AJK Environmental Protection Act 2000
- Land Acquisition Act 1894
- Draft National Resettlement Policy 2002
- NWFP Forest Ordinance 2002
- Sarhad National Conservation Strategy 1992
- ADB Safeguard Policy Statement 2009
- IFC Handbook (Resettlement Action Plan)

iv. Safety Training and Campaign

Capacity building activities coupled with effective supervision is always result oriented. Regular HSE trainings are conducted for project employees on different subjects. These trainings are conducted in the light of standards guidelines and procedures developed by Daewoo E&C for its project while working across the globe, however, site specific modifications have been made in manual.

v. Induction Training

As part of EMP all staff and workers before starting their respective jobs have been given induction training as per “Induction Performa” recommended in EMP document. Since, the Physical progress of the Project is completed 100% in the last quarter, no new induction was done in the reporting quarter.

vi. Tool Box Meetings

This is a constant activity undertaken daily by EPCC before the start of every construction shift and is part of 3.5 Safety Campaign. Daily HSE related matters are conveyed to all staff and labor during the meeting by HSE staff.



vii. Daily Education/Training on site

During frequent site visit on spot education/training is an ongoing activity that certainly enhance and promote safety culture on sites.

Moreover, during inspection of equipment and color coding activities, workers and relevant staff has also been educated appropriately. Safety Campaign as part of monthly HSE Plan has been implemented during the reporting quarter on both sites.

viii. Needs assessment of environmental and social management capacity

As ongoing activity, continuous capacity building initiatives including more specific trainings on environment and social management are required for staff and labor. Furthermore, daily HSE monitoring, toolbox meeting programs and other related activities have raised the awareness level among all staff and workers.

EPCC's HSE department delivered orientation sessions, awareness raising and capacity building sessions on environment and social management and also identified following training needs of the staff and labor during the next quarter.

- i. Work on Height
- ii. Pollution Prevention
- iii. Corporate Social Responsibility
- iv. Safe behavior

STAKEHOLDER CONSULTATION/CSR ACTIVITIES

To initiate and sustain constructive external relationships with Project stakeholders particularly with adjacent /local communities, consultation is an important tool to enhance the social performance of the Project.

Meetings and discussions were held with local NGOs and government departments (Environment Protection Agency, district administration and development authority Muzaffarabad). As part of the grievance redress mechanism the OE is also involved in the community/stakeholders engagement.

Details of community programs involving civil society/NGOs in implementation:

Some professional services on quarterly basis are being hired by EPCC from locally based individuals and organizations during the quarter. Following organizations have been engaged to undertake activities under EMP and Social Uplift Plan.

HSE sign board preparation and printing activity requirements of the project is being undertaken by local vender (Add City) owned by Mr. Khursheed Qureshi, resident of Patrind village. Add City owner Mr. Khursheed is president of Kunhar Welfare Organization and he himself and rest of his partners are PAPs who are linked with same organization.

Flora and Fauna Study by local Fisheries and wildlife expert Mr. Yousaf Qureshi who is also retired Director Fisheries Government of AJK.

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Table: Organizations/NGOs consulted during the quarter

Organization Name	Location	Purpose/ issues discussed	Actions to address Issues
Kunhar Welfare Organization	Patrind- (Upper Site AJK Part)	EPCC is in constant liaison with the organization regarding preparation of awareness material.	During quarter, HSE sign board preparation and printing activity is being undertaken by local vender (Add City) owned by Mr. Khursheed Qureshi, resident of Patrind village who is president of Kunhar Welfare Organization and he himself and rest of his partners are PAPs who are linked with same organization. Therefore, all printing works are allocated to same organization.
Pakistan Red Crescent Society (PRCS)	Muzaffarabad- (Lower Site AJK)	Placement of First Aid Trained Ambulances Drivers for night shift+ Fitness /service of both ambulances.	First Aid trained drivers placed on night shift and ambulances were sent for service and maintenance by PRCS.
Edinburgh DIRECTAID	Muzaffarabad- (Lower Site AJK)	Environmental monitoring reports submitted by the NGO were discussed to address and incorporate the comments/recommendations made by the owner engineer.	Environmental monitoring activities are being organized by local NGO Edinburg Direct Aid

Light Vehicles & Drivers Detail (Patrind Hydro Power Project)

Company Vehicle & Drivers					
Sr.	Name	Vehicle No.	Vehicle Type	Used By	Remarks
1	Sajjad Ahmed	LED-460	Land Cruiser	PM	P/H Site
2	Sadaqat Ashknaz	LED-465	Prado	SM	P/H Site
3	Najam Pervaiz	LEC-3797	Fortuner	GM Admin	P/H Site
4	Muhammad Shahd Ali	LEC- 3798	Fortuner	Const.Dept	P/H Site
5	Muhammad Iqbal Mir	LED-473	Pickup (Vigo)	Common use	P/H Site
6	Irshad Khan	LEA- 3807	Fortuner	Planning Dept.	P/H Site
7	Muhammad Iqbal	LEC-3808	Fortuner	M&E Dept.	P/H Site
8	Shabbir Hussain	LEC- 3792	Pickup (Vigo)	H/E Dept.	P/H Site
9	Naseem Hijazi	LEC- 3791	Pickup (Vigo)	HSE Dept.	P/H Site
10	Ashiq Hussain	LEB- 732	Pickup (Hilux)	Admin Dept.	P/H Site
11	Khalid Hussain	LEC- 3793	Hi ace (Mini Van)	Local Staff Pick & Drop	P/H Site
12	Muhammad Muneer	LEC- 3795	Van High Roof	Local Staff Pick & Drop	P/H Site
13	Muhammad Arouf	LEC-3796	Fortuner	Const. Dept	Weir Site (Day Shift)
15	Muhammad Imran	LEC-3794	Hiace (Mini Van)	Local Staff Pick & Drop	Weir Site

COMPLIANCE AND IMPLEMENTATION OF MITIGATING MEASURES IN ESMP

Compliance monitoring of environmental and social management plan has been an on-going activity undertaken by OE and EPCC's HSE staff on both sites. Non compliances with recommended standards and regulations were recorded and reported daily, weekly and monthly. EMP Compliance status is attached as **Annex-2**.

a. Environmental monitoring under EMP:

Internal Environmental and Inspection checklist is developed and being filled on daily bases. Besides this following activities have been undertaken as part of environmental monitoring:

i. Fish fauna Study Monitoring:

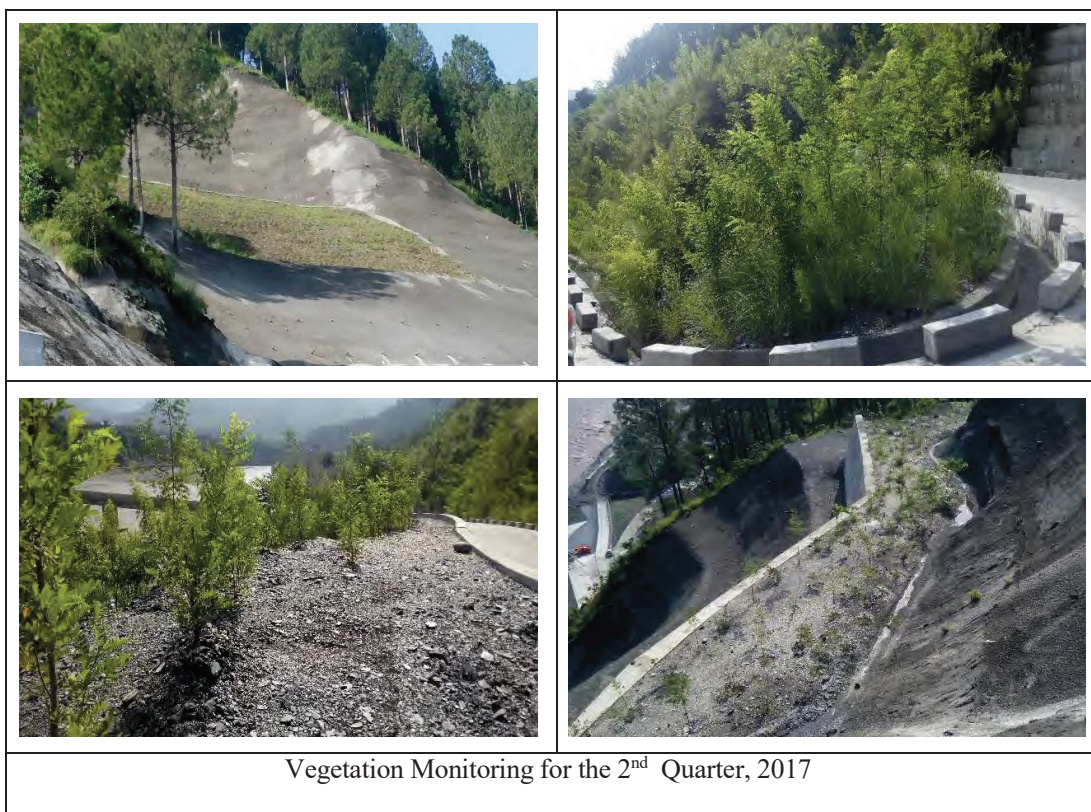
Quarterly Study/monitoring was undertaken in Kunhar River (Up & down stream of Project site) during the month of August, 2017. The study was delayed due to non-availability of fishery expert. Samplings were carried out at the six study points. Coming studies will give a clear picture of the impact of any construction or change in the water flow on the fish. Some insignificant changes in the fish catch and quality of water observed during the study is only due to the irregular seasonal variations and pattern of water turbidity due intensity of rain or drought. Detailed report is annexed as **Annex-4**.



ii. Flora Study Monitoring:

Quarterly Study/monitoring was undertaken at both (Power house & weir) sites in Mar, 2017.

The monitoring report recommends the bio-engineering works for the treatment of unstable slopes and stabilization of landslides to retain the good looks and better environment; detailed report is annexed as **Annex-3**.



iii. Water Quality Analysis:

A team comprising of technical experts from PCRWR officials and Patrind hydropower project staff was assigned in order to carry out field survey and collect water samples from identified water sources being used by the local community and for drinking purpose and other domestic needs. Officials from PCRWR with the assistance of project staff collected the samples from identified site according to the standard procedure. The detailed report is attached as **Annex-6**.



Water Quality Analysis PCRWR

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Table: Compliance with NEQ's

Envrn. component	Standards (NEQS)	Compliance/Mitigation measure	Remarks
Air Quality	EPA ambient air quality (EPAs standards for each Parameter)	NEQS: To ensure dust suppression due to transportation activity, unpaved roads are being sprinkled with water at least twice a day. The EPC is taking all necessary measures to limit pollution from dust and any wind-blown materials during construction.	Dust control has improved significantly during the quarter.
Water quality	WHO Guidelines (EPAs standards for each Parameter)	Waste water from tunnel is treated through sedimentation tanks. Waste water discharged from HRT is being measured	Biannual quality monitoring of waste and drinking water was undertaken in the last quarter.
Noise levels /Vibration	EPA ambient noise standards and worldwide vibration standards.	Noise: Noise prone activities are avoided during night time. No open blasting occurs during quiet hours. Excavators and all heavy machines are lubricated in a routine matter to minimize the noise and to increase the life of equipment Vibration: EPC is more concerned regarding factors of human comfort and structural damage and always try to comply with allowable vibration standards. Blasting checklist is used by HSE staff.	Noise level and vibration record is maintained on daily bases after each blast
Soil quality	EPA quality standard (Different standards for each Parameter)	No environmental incident except minor soil contamination has been observed.	Visual observations mitigation was done by removing the contaminated soil cover
Flora	Visual observations by relevant Forest professional during EIA study.	Study /monitoring during previous quarter undertaken	Study undertaken in Aug-17 (Annex-03)
Fish Fauna	Observation by relevant wildlife & Fisheries professional during EIA study.	Study /monitoring for last quarter undertaken	Study undertaken in Aug-17 (Annex-04)

b. Occupational health and safety

Health and safety of workers has been a prime consideration of Project. In accordance with the safety standards all workers working at site are provided with the Personal Protective Equipment (PPE) comprising of hard hats, safety shoes, and jacket and dust masks depending upon the job specification to prevent injuries. Hygienic inspections were conducted by medical staff. Morning physical exercise has also been undertaken regularly. All sub-Contractors have issued necessary PPEs to employees. Also, daily site inspections are undertaken to ensure the implementation. Community Safety Health and Security:

1. Consistent supervision on surge shaft access road and power house protection works was ensured.
2. Waste management training sessions were held for supervisors and relevant personnel. Furthermore, waste segregation methods were practically taught to site workers and staff to adopt appropriate mechanism.
3. Water sprinkling on project access road for workers /community health and safety
4. Water filter plant is installed for drinking water by Daewoo EPCC at camp residence to provide clean & pure water. Filter Plant cartridges are being replaced quarterly to have better quality of water.
5. During quarter, coordination meetings, monitoring and inspections were undertaken jointly by EPCC and OE's HSE staff with regard to site HSE status,. No dumping of excavated material was allowed on unapproved sites.
6. Waste segregation, collection, transportation and disposal mechanism has been improved during the month and full time waste collectors were placed on both sites. Waste management training sessions were held for supervisors and relevant personnel.
7. Sign boards have been made and placed on the site where there is a need to aware people while doing work.

c. CO₂ emissions by the Project

Following project activities are likely to produce CO₂ emissions, which were given due consideration and following mitigating measures were adopted to minimize the CO₂ emissions.

Sources of CO₂	Mitigating/ Preventive Actions
Use of excavation machinery	Regular tuning/servicing of the machinery is made compulsory and regular inspection is done to ensure that. Smoke producing vehicles are banned from working right away until they are repaired.
Tree removal/Land use change	Removal of trees on construction sites will increase the concentration of CO ₂ the Project Site atmosphere as trees acted as CO ₂ sink. Therefore, as corrective approach, Tree Plantation shall be carried out as retrofitting measure as stipulated in the EMP when it will be practically possible.
Solid Waste Disposal	Improper waste management could result accumulation of CO ₂ and CH ₄ in the atmosphere. For temporary storage of waste proper waste collection and storage areas have been designated. During last month of the reporting quarter waste management mechanism was improved.
Use of Construction machinery	Regular inspections of machinery are practiced by HSE staff to check machinery conditions. Warning letters have been issued by OE and EPCC to the smoke producing and vehicles.
Usage of liquid fuel	Liquid fuel used at different project activities amounts the maximum CO ₂ emissions by the project.
Emissions from electricity use	Electrical appliances release some trace amount of gases in order to mitigate that, it is in company's policy to switch off all the electrical appliances when not in use.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN, INCLUDING IFC E&HS ACTION PLAN

To manage the environmental and social issue appropriately, following detailed plans developed by EPCC have been in implementation to fulfill the environmental and social compliance requirements of the project;

- a) Plan for Disposal of Excavated Material

- b) Plan for Waste Management
- c) Plan for Traffic Management
- d) Social Uplift Plan

a. Plan for Disposal of Excavated Material

Excavated material is being disposed of in excavated waste disposal area approved as per EIA.

b. Plan for Waste Management

EPC and sub-contractors have waste collectors placed on both sites to maintain housekeeping and timely segregation /collection of waste. All waste generated in all operation at sites is being managed in accordance with EMP & Waste Management Plan. All the recyclable Waste has been carried and transferred to the scrap dealer by Daewoo vehicle. Paper, Plastic, cardboard and few iron bars have been properly measured by the scrap dealer, the quantity of which has been noted down on the waste consignment note. Daily environmental Performa regarding potential environmental impacts has been made and monitored at site regularly by direct observation and inspection. These impacts include the monitoring of air emissions, water consumption and discharge, waste management, housekeeping, noise impact, hazardous waste management at the project site. Waste Collection done on the daily basis; Waste Collectors of Daewoo and collects the trash from the site, camp residencies and dispose of in the trash bins, after waste collection the waste is segregated then non recyclables are taken to the government approved landfill for proper disposal of waste. Daewoo E & C is in contract with MCM for the collection of waste on tri-weekly basis.



Municipal Corporation Muzaffarabad is being paid to collect the community waste from collection point established near project site where as for project waste a detailed method statement has been prepared and is being implemented on both sites.

First step that has been followed so far in managing our Project Waste was the collection of all waste from all points of the site. that are used again by a different user or for a different purpose, like a jacket, shoes or a jar used for a cup.

c. Plan for Traffic Management:

Safety precautions have been placed to protect workers and the general public. Vehicles are equipped with directional control signage and are being inspected prior to use. Workers have been made aware of mobile equipment operating in the area. Hazard lights have been installed on heavy vehicles and mobile equipment.

d. Social uplift plan:

Revised social uplift plan (SUP) was submitted by EPCC to SHPL in October, 2015. Besides SUP various activities have also been undertaken to facilitate locals such as subletting works, supply of construction material. Detailed implementation status of social uplift plan is attached as **Annex-05**.

RESETTLEMENT PLAN IMPLEMENTATION

i. Scope of Land Acquisition and Resettlement Impacts

The land identified by the EPC Contractor on the basis of basic design of the Project measuring 872.65 Kanal (683.95 Kanal on AJK and 188.7 Kanal on KP side) was acquired by the Company through Land Acquisition Act (LAA), 1894 applicable in both AJ&K and KPK.

During the construction on the weir site, it was noticed that the land area of 3.7 Kanal “Additional Land” is further required on AJ&K side which is to be submerged due to the head pond of the Project. Due to this addition the total land for the Project becomes 876.35 Kanal.

Due to the change in the design and location of weir downstream, it was confirmed through survey that the land area of 10.3 Kanal is further required on AJ&K side the slope stabilization in the stilling basin area downstream of the weir.

Furthermore, lately on the complaint of the local Mr. Khalid who also raised the same issue during the Lenders’ E&S mission in November 2015, on the head pond area a survey was conducted to confirm whether his land is affected or otherwise. EPCC conducted the survey and it was confirmed that his land measuring 5.45 Kanal was being affected due to submergence in the head pond. The process of acquisition has been started by contacting the relevant revenue department.

SUMMARY OF THE LAND TO BE ACQUIRED ON AJK AND KPK

PERMANENT LAND						
Sr.	Project Component	Affected Land (Kanal)				
		State owned Land/ Riverbed	Farmland	Wasteland	House land	Total
1	Reservoir Impounding	87.3	282.05	231.9	9.1	610.35
2	Weir Structures	0	1.5	48.7	0	50.2
3	Powerhouse	13.6	30.1	32.85	5.25	81.8
4	Surge Tank	-	-	47.75	-	47.75
5	Additional Land	0.3	3.75	15.4		19.45
Total Permanent Land Acquisition (Kanal)		101.2	317.4	376.6	14.35	809.55
TEMPORARY LAND						
1	Colony of Expatriate construction staff, Switchyard, labor camp, access road, bridge, batching plant at Powerhouse Site	54.75	0	27.8	0	82.55
Total Temporary Land Acquisition (Kanal)		54.75	0	27.8	0	82.55
Total Land Acquisition (Kanal)		155.95	317.4	404.4	14.35	892.1

ii. Status of Land Acquisition, Progress on Compensation Payments and Assistance Delivery

Payment for land acquisition on both sides of the project is in process. The Company has deposited the assessed cost (100%) into Government treasuries for subsequent payment to APs. For the additional land acquired for the head pond about 97% payment has been made which is reflected in the below table. However, there is delay in the payment of compensation due to (i) unavailability of entitled land owners who are working or based in other cities or (ii) an existing shareholding dispute among the families. Status of the land acquisition is as follows;

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Summary of Land Acquisition Progress and compensation payments

Village	Area	Award Amount	Disbursed	%age	No. of Persons	Persons received payment
1. AJ&K						
A. Land/Property						
Powerhouse (Alda Village AJ&K)	81.8	92,479,824	87,593,842	94.72%	196	561
Headpond (Shoran Village AJ&K)	130.75	75,181,250	73,283,741	97.48%	611	200
Weir + Headpond (Patrind Village AJ&K)	341.1	204,037,798	195,911,948	96.02%		353
Forest land for Surge Tank (Alda village)	47.75					
B. Additional Land/Property						
Weir + Headpond (Patrind Village AJ&K)	3.7	2,127,500	1,955,000	91.89%	3	19
Weir + Headpond (Patrind Village AJ&K)	10.3	6,076,540	5,562,233	91.54%	3	19
B. Trees						
Alda		1,815,089	1,804,318	99.41%		19
Alda		75,546	75,546	100.00%		
Shoran		757,391	685,073	90.45%		58
Shoran		106,053	106,053	100.00%	1	1
Patrind		837,882	829,515	99.00%		32
Sub-Total	615.4	383,494,873	367,807,269	95.91%	814	1262
2. KPK						
Land/Property/Trees						
Weir + Headpond (Sarati Village KPK)	188.7	128,557,081	114,613,320	89.15%	196	Detail Yet to receive
Sub-Total	188.7	128,557,081	114,613,320	89.15%	196	

RESETTLEMENT AND RECONSTRUCTION

Living standards have been improved due to better compensation received and economic activities in the project vicinity. PAPs who lost their houses had utilized compensation amount in reconstruction of houses. Others have made investment in alternative lands in urban areas for better facilities.

Furthermore, locals from adjacent villages have established small businesses like shops and canteens.

RESETTLEMENT RELATED CONSULTATION AND DISCLOSURE ACTIVITIES AND GRIEVANCE PROCEDURES

In order to ensure that grievances and complaints are addressed in a timely and satisfactory manner and that all possible avenues are available to project affected persons (PAPs) to resolve their grievances, a Grievance Redress Committee has been proposed with following composition:

- | | |
|--------------------------------------|------------------|
| 1. District Revenue Officer | Chairman |
| 2. Union Council Nazim | Principal Member |
| 3. SHPL Representative | Member |
| 4. Affected Community Representative | Member |

Establishment of a grievance committee requires the consent from District Administrations (AJK & KPK). The proposed GRC has not been established because SHPL could not ensure the availability of District Revenue Officers as and when required. Nevertheless, while the GRC has not yet been formalized, issues related with acquisition and compensation and community complaints are being addressed with the involvement of same authorities. In practice the same forum is functional but officially has not yet been notified.

Furthermore, the lenders' E&S mission during their site visit in August 2015 suggested establishing a three tier GRC including the sub-contractors, EPC and SHPL/OE. The same was established and communicated to all the workers and the community for future matters and contact.

GRC would be a forum for raising objections and holding discussions to resolve conflicts. Moreover, consultation with the local community and concerned public representatives and officials of the relevant line departments is an ongoing process. Relevant information to the stakeholders has been provided in a timely manner and in a form and language that are understandable and accessible to them. A grievance mechanism is available to allow an AP appealing any disagreeable decision, practice or activity arising from land or other assets compensation. The community/ APs

complaints are being addressed very diligently and carefully at all levels, i.e. district and at project level. Even though the GRC has yet not been established but complaints received are being addressed at all levels (project & local administration level) depending on nature of complaints. Issues related to land acquisition and compensation requires involvement of District Revenue Officer who is part of proposed GRC while other matters related with employment or employees are being managed through community liaison officers/coordinators and project management.

Annexures

Annex-1

Inspections

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Sr.	Inspection	Date			Location	Details
		Day	Month	Year		
01	Color Coding	02	04	2017	Power House Site	Color Coding Inspection of fire extinguishers at powerhouse site
02	Color Coding	03	04	2017	Power House Site	Color Coding Inspection of Hand and Power tools at powerhouse site
03	Lifting Equipment Inspection	03	04	2017	Power House Site	Inspection of lifting gears at Powerhouse site
04	Light Vehicle Inspection and Certification	04	04	2017	Power House Site	Inspection of all light vehicles on lower site carried out by HSE department.
05	Camp office inspection	04	04	2017	Power House Site	Inspection of accommodations carried out by HSE officers.
06	Fire Extinguishers Inspection	22	05	2017	Weir Site	Color Coding Inspection of fire extinguishers
07	Color Coding	02	05	2017	Power House Site	Color Coding Inspection of Electrical Equipment at powerhouse site
08	Light Vehicle Inspection and Certification	04	05	2017	Power House Site	Inspection of all light vehicles on lower site carried out by HSE department.
09	Camp office inspection	07	06	2017	Power House Site	Inspection of accommodations carried out by HSE Staff at Powerhouse site.
10	Fire Extinguishers Inspection	07	06	2017	Power House Site	Monthly Inspection of fire extinguishers carried out at powerhouse site
11	Fire Extinguishers Inspection	07	06	2017	Power House Site	Monthly Inspection of fire extinguishers carried out at powerhouse site

Annex-2

EMP COMPLIANCE STATUS

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Sr. No	Environmental Management Plan (Compliance Status)		
	Feature/Issue	Parameters/monitoring	Compliance Status/Action taken by EPCC
1.	Statutory Requirements	Compliance with approval conditions	<ul style="list-style-type: none"> With few exceptions, implementation in compliance with EPA's NOC & ADB's Environmental and Social Safeguards, IFC's Performance Standards
2.	Landslides	Catchment stability	<ul style="list-style-type: none"> Annual Monitoring undertaken after monsoon during September 2015 and report received from experts and has already been shared with SHPL & OE. Slope stability on powerhouse and surge shaft slopes is under process and stone pitching is also under process on the right bank slopes on weir site.
3.	Erosion and Sediment	i. Extent of erosion and sedimentation ii. Topsoil stripped and covered or seeded if stockpiled for longer than one month or during the monsoon	<ul style="list-style-type: none"> Erosion & Sediments on project sites has yet not been quantified, however, to prevent this protection works have been undertaken on slopes at both sites. Wind erosion of dust and sand has been controlled by frequent water sprinkling and covering stockpiles with polythene sheets To prevent HRT waste water sediments flow to the river settling tanks and chambers have already been constructed and are cleaned on regular basis.
4.	Muck Disposal	i. Reuse of spoil/muck within project areas where possible ii. Correct disposal of surplus spoil/muck in designated areas	<ul style="list-style-type: none"> Excavated material being used in civil works and dumping is done on approved area at both sites. Muck material has also been used in repairing of project access road during the month
5.	Water Quality	Wastewater treated prior to river discharge (Temperature, dissolved oxygen, pH, conductivity, turbidity, total phosphorous,	<ul style="list-style-type: none"> Biannual water quality monitoring was undertaken during the month of August 2017 & Reports are already shared with OE.

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		inorganic phosphorous, total nitrogen, ammonia nitrogen, nitrogen oxides, biochemical oxygen demand and fecal coli forms)	
6.	Waste Management	<ul style="list-style-type: none"> i. Waste materials reused or recycled on-site where possible ii. Non-recyclable wastes disposed of appropriately 	<ul style="list-style-type: none"> • Papers, mineral water bottles are being sent to market for recycling • segregation on source has been improved • Waste consignment note has been maintained by keeping the recyclable waste record properly and remaining food waste has been composted into the designated trench in the disposal area
7.	Hazards/Risk	<ul style="list-style-type: none"> i. Workers provided with appropriate safety equipment and regular safety training ii. Storage of hazardous goods in bounded areas or in secure sheds iii. Explosives stored in guarded bunkers iv. Use of hazardous goods according to manufacturers' specifications 	<ul style="list-style-type: none"> • Induction trainings • Providing PPEs • Tool Box Meetings, Job craft & on site trainings • Explosive store established under NOC (Lower Site) • MSDS and SOPs partially followed
8.	Aquatic Ecology	<ul style="list-style-type: none"> i. Fish and Aquatic populations 	<ul style="list-style-type: none"> • Fish study was undertaken in 2nd Quarter, & Reports are shared with OE. • Fishing & hunting prohibited on project sites. No endanger species found. • No considerable disturbance to aquatic life
9.	Flora	<ul style="list-style-type: none"> i. Direct observation of surrounding vegetation 	<ul style="list-style-type: none"> • Study/monitoring undertaken in 2nd Quarter, Removal undertaken as indicated in EIA. Mitigation measures will be undertaken after construction phase. • Plantation activity undertaken above surge shaft slopes. • Grass pitching and tufting activity to restore the look of an area
10.	Noise and Vibration	<ul style="list-style-type: none"> i. Maintenance of equipment in accordance with manufactures' specifications ii. Controlled blasting 	<ul style="list-style-type: none"> • Regular inspections and service of heavy equipment • Regular monitoring, blast permit issuance and SOPs adopted
11.	Air Quality	Exhaust emissions from machinery – visual inspection	<ul style="list-style-type: none"> • Regular inspections and service of heavy equipment
12.	Traffic/Access	<ul style="list-style-type: none"> i. Enforcement of speed limits on Project roads ii. Noise Traffic Signs 	<ul style="list-style-type: none"> • Heavy equipment/vehicle driver's education sessions • Speed limit and directional sign board installed

Annex-3

VEGETATION STUDY- KUNHAR

RIVER

STUDY REPORT ON THE IMPACT OF PATRIND
HYDRO POWER PROJECT
ON THE VEGETATION OF THE AREA



By

Muhammad Yousaf Qureshi

(Apr-Jun 2017)

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IMPACT OF PATRIND HYDRO POWER PROJECT

ON THE VEGETATION OF THE AREA

1. Background

The area around Power House of the Patrind Hydropower Project is rich in biodiversity. Although the high tree canopy is limited and has been damaged by the local residents in the past but ground cover is quite thick and rich. The area behind the powerhouse has been affected by the project development activities. Landslides have appeared around this area but area of high work concentration close to the powerhouse has been strengthened by shotcreting, retaining stone walls and to some extent planting. Other adjacent area has not been tackled for any activity. The adjacent big landslide volume has appeared due to the triggering impact during the tunnel construction. This landslide needs stabilization by engineering, biological and bioengineering works as has been recommended in almost all the previous study reports. Vegetative cover is always affected by the construction of the dams in one way or the other. The extent of the impact depends on the nature of the dam construction.

A project like Patrind Hydro Power production affects the vegetative cover in three ways.

1st: water storage impact; it affects the vegetation coming under the lake water. All the trees, shrubs and herbs submerge in the water and die. Various studies have been carried out to monitor the impact on the vegetation and soil around the project area during the construction phase. Infrastructure development has been completed now and the project is under test phase and planned to be completely operative very shortly.

2nd: The area affected by the tunnel construction. This phenomenon has not only triggered down the surrounding area creating or accelerating the landslides but also disturbed the natural water ducts coming out in shape of perennial springs. Blasting has also created dust and cracks in the neighboring houses.

3rd: Cutting of soil at both the end houses. This study has been carried out to spell out the impact on the surrounding area from the inception of the project to its operational phase.

There is no land use policy implemented in Pakistan, due to which the steep slopes are not wisely used resulting into the massive vegetation loss which ultimately causes the land destabilization. Patrind is not the only area which has become so prone to land erosion, instead all adjacent areas on both sides of the river Kunhar, Jhelum and Neelum are showing the same picture.

The heavy population pressure on the northern mountain ecosystem has adversely affected the vegetative cover. The area around the powerhouse has been badly used by the local communities before the inception of this project. The only dominant tree species is the Chir Pine (*Pinus roxburghii*) which has been cut by the custodian community of Allarra. The vegetative cover is very thin and this tree species requires about 120 years reaching its maturity. Removal of the vegetative covers on the steep slopes is very detrimental for the area as the heavy rain showers of monsoon bleaches away the fertile soil and area becoming deserted. Another main reason for low tree cover is the high demand for grazing land and fodder for the animals. Local people in the area burn the land after cutting the grass in the month of October and November. This leads to the loss of all vegetative cover on the steep slopes and leaving behind the exposed surface to the mercy of the Nature. The soil loses the water percolation capability hence, giving support to start of gully making and erosion on larger scales. Thus we can say that due to the heavy grazing, lopping, poor agricultural practices and urbanization, the original vegetation is almost destroyed. In the result of the shortage of vegetation cover, the area is very badly suffering from soil erosion. This trend of vegetation loss is not going to reduce in the future as the population growth rate is very high. Total population of Pakistan has reached to almost 217 million according to the 2017 census figures.

2. Introduction

The study area is about 100 acres both on the weir point at Patrind (34° 20' 36" N and 73° 25' 10" E at an elevation of 2516 ft) and around the outlet at Alda (34° 20' 06.05" N, 73° 27' 18.6" E) in AJK.

The lake on the Patrind side has got established its maximum level submerging the area marked before. Mountains are steep and covered with very poor vegetation except the area adjacent to the weir point. The catchment of Kunhar River is about 1625 km² and river water flow mostly depends on the mountain snow and some rain

water stream contribution in the lower reaches during the monsoon. Annual rain fall of the catchment area is above 60". The river becomes voracious during the floods and washes away all the structures, sides and changes the bed location as well. The rainfall during this monsoon is of high intensity and still going on at its peak.

The vegetative cover on the powerhouse site is very poor as compared to the Patrind area. Big landslides are other phenomena of havoc and their control has become near to impossible. Proper measures have not been taken to control the landslides except in the close vicinity of powerhouse where shotcreting has been applied together with plantation at a very small scale. The power cable line is passing through the forest area behind the powerhouse and area coming under the transmission line has been cleared by the forest department.

The agricultural production system consists of upper catchments and gullied areas (wastelands), covering some 56% of the area, terraced fields along hillsides (39% of area) and irrigated agriculture (5%). Natural forests and rangelands are the major land use in the upper catchments.

Agricultural production on the terraced fields depends on runoff water harvesting and soil moisture conservation. These terraced fields were created by leveling with bulldozers/manual labor during the last 3-4 decades. Subsidized machinery encouraged the farmers to level the hillsides without considering the requirements for water harvesting and safe disposal of surplus runoff during high rainstorms.

3. Forest Types (Ecological Zones):

The Patrind project area lies in the Sub-tropical ecological zone of the country. This zone is again classified into:

- a) Subtropical Scrub forest with broad leaved tree species in the foot hills and
- b) Subtropical Chir pine Forest with a major tree species of Chir Pine.



The weir at Patrind with the lake

4. Vegetation Cover

Project site vegetation does not contain any species listed as endangered or threatened by the Government of Pakistan or IUCN. Only two species *Celtis australis* (Batculd) and *Ficus carica* (Enjeer) were found rare in Pakistan but they are listed as common for the rest of the world. The presence of these two species will not be disturbed as they were found above the submerged area and away from the area where trees needed to be felled down on the intake side. The rest of the vegetation species were found protected and common in Pakistan and for the rest of the world. So it is concluded that there will be no negative impacts of Patrind Hydropower Project on the plant species existence.

Following tree species were documented in the project area both in Patrind and in Alda:

<u>Common Name</u>	<u>Botanical Name</u>	<u>Type of Tree</u>	<u>Status</u>
Phagwarr	<i>Ficus Palmata</i>	soil binder	common
Anjeer	<i>Ficus carica</i>	Fruit	rare
Dhaman	<i>Grewia oppositifolia</i>	Fodder	common
Drawa	<i>Ailanthus anus</i>	firewood	common
Robinia	<i>Robinia pseudoacacia</i>	firewood	common
Drek	<i>Melia azadrach</i>	firewood	common
Batculd	<i>Celtis australis</i>	soil binder	rare
Kangarr	<i>Pistacia khunjak</i>	soil binder	rare

Talli (shisham)	<i>Dalbergia sisso</i>	furniture wood	common
phulai	<i>Acacia modesta</i>	firewood	common
Sherol	<i>Alnus nitida</i>	Firewood	common
Shahtoot	<i>Morus alba</i>	Fruit	common
Akhrot (Wallnut)	<i>Juglans regia</i>	Fruit	common
Nim	<i>Azadirachata indica</i>	Firewood	common
Kau	<i>Olea cuspidate</i>	Firewood	common
Chir	<i>Pinus roxburglii</i>	Timber	common
Pipal	<i>Ficus religiosa</i>	Firewood	common
Kiker	<i>Acacia nilotica</i>	Firewood	common
Beence	<i>salix spp</i>	Firewood	common
Batang	<i>Prunus patia</i>	fruit	common
Ber	<i>Zizyphus mauritiana</i>	fruit	common
Snatha	<i>Dodonaea viscosa</i>	soil binder	common
Narri	<i>Arundo donax</i>	Hedge	common

The main contributor grass species are *Heteropogon contortus* (Sariala), *Cenchrus ciliaris* (Dhaman), *Desmostachya bipinnata* (Dab ghaas), and *Cynodon dactylon* (Khabbal).

Comparatively low vegetation cover was recorded in the flat area and highest from steep slope areas (74.29%) followed by gentle slope and gully bed areas. There is good stand of Cheer Pine trees above the power house but 12 big gaps were noticed.

5. Status of the area.

The area affected by the project on the Patrind side has been stabilized by concrete work on both sides of the weir and reinforced on the right bank of the lake appeared by stone pitching and wire gabions. The vegetative cover of the lake area has come under the water which was marked before. Embankment done under the project is very effective and no water scouring has been observed so far.



Embankment of the lake by stone pitching, concrete work and wire gabions

Most of the trees in the area had been removed by the local community before the rise of the water level.

The present status of vegetation does not depend upon the river Kunhar water but it depends on precipitation available in the area. So reduction in water regime downstream will not affect the vegetation of the area. The average biomass for forage that will be submerged under water after the construction of weir was calculated as 3,468 Kg/ha. The total biomass inundated is estimated to about 200 tons. (farmer Study Report for Patrind project)

The area affected on the weir site due to inundation is 57.2 ha and on the powerhouse site is 5.5 ha which has come under construction.

The area above the Powerhouse at Alladra has been strengthened by soil creting and adjacent slide has not been treated by any means. This is the Forest land and no proper input and care has been observed by the Department of the forest. The main transmission line is passing through the forest behind the powerhouse. The area coming under the transmission line has been cleared by the Forest department. The trees are cut, converted into planks and are stacked at the edge of the hill. There are large patches having no woody vegetative cover in the Chir pine forest. Measurement was done at two sample gaps which shows that about two acres gap of land has no bush or tree cover. Such 12 gaps were observed during the study. They need to be planted and protected from fire and local animals.



Stacked wood after cutting below the transmission line



Transmission Line

6. The results

The result indicates that landscape, the nature of the rock and the redistribution of rainfall water by run-off are the main sources of spatial variation in the study area. The construction of the dams will positively affect the groundwater. At some locations, the groundwater table will rise and the old springs that were once dried up will become functional allowing the farmers to extract water. However, with the construction of tunnel, the water stored in the catchment area has disturbed affecting some of the deep rooted plant species at some places. Tunnel has also played a vital role in the expansion of the land slide above and adjacent to the powerhouse.

Some local tree and bush species were found near the top which are excellent soil binders and they need to be planted in the affected area as well.

It has been observed that some bioengineering works have been initiated in the project area. Soft gabions (large parachute bags filled with soil), grass tufting in between the concrete patches, concrete walls, drains and few wire gabions were observed during the field study. But they were very few.

Plantation work has been carried out in the project area and their survival percentage is also very encouraging most probably due to unusual continues rain spell after the planting season of February 2017. Unfortunately some goats were found browsing on these plants and if they are not protected from the animals then they won't survive.



Winter plantation of 2017.



Goats roaming and enjoying their food

The species planted are not the ones recommended in the December 2016 report and they are not planted on the slide areas. Please follow the recommendations of the report otherwise there is no use of getting a technical report. All those works must be done to control the adjacent slide that may cause damage to the project in the near future. The area is highly unstable and needs special treatment.

7. Recommendations:

1. Tree species of alternate requirement of water and soil should be planted in this area like shrole, salix, walnut, bamboo, wild fig, Anjeer instead of planting Robinia, Eucalyptus, Ailanthas.
2. Parachute cloth bags filled with sand and gravels have been removed and are lying there. The cheap empty cement bags should be stacked in rows one above the other filled with soil and in between each row the cuttings of mulberry and poplar should be inserted so that it becomes green even during the start of the first spring season in March-April. This activity is needed to be done on larger scale inside the large and small slides above the powerhouse.
3. Grass tufting has been done in a limited area. This needs to be replicated along with deep rooted tree species of Walnut. Lawn grass has been placed beside the powerhouse. This will make the area green and nice looking.



Green grass tufting is in process on the lawn beside powerhouse

4. Check damming in the eroded gullies are required to be done to control further erosion. Steel wire gabions have been erected but very little work. That has to be done in the gullies just adjacent to the project area and at the bottom to control the river cutting.
5. Bomb sowing (seeds with sticky ball of soil) is required in the inaccessible areas. Some bush seed like, dodonia needs to be done.
6. Check damming is required to be done in gullies starting from the top and making at least three gullies near to the bottom. Check dams may be constructed with dry stone masonry if steel gabions are expensive for the project.
7. Bamboo cuttings should be planted in the marshy area along with salix at the bottom of the slide.
8. Some 24 Acres gaps have to be filled with Chir pine tube plantation with 600 plants per acre.
9. Some goats were observed inside the working site browsing on the newly planted area. These goat entries must be checked to get the plantation saved and grown. Grazing and browsing has to be controlled after the plantation for the better success rate.
10. Area above the powerhouse is facing the problem of soil erosion. It is again recommended that Bio-engineering works should immediately be started in these areas to control these slides effectively which include vegetated soft gabions, vegetated loose stone walls, gabion check dams, live brush wood check dams, planting, sowing and tufting, dry seeding, hydro seeding, hay seeding, grass sodding,

sowing with geo- textile sheets, brush wattles, brush layering, hedge layering, semi-dead fences with live hedges etc.

11. A new Socio-economic program is in process under the project. This should also address the training of the communities in:

- a. Training in selection of plant suitable to the particular area with planting techniques
- b. Training in cheap and practical means to control the small and large landslides
- c. Plant nursery raising
- d. Fruit orchard development

Diagram marked with colour lines requiring different interventions

Red Line: Bio engineering works

Green Line: bamboo, Salix and Narri plantation

Blue line: plantation soil binding trees, Chir pine, fruit plants and bushes under the transmission line



Annex-4

FISH STUDY - PATRIND HPP

IMPACT ASSESMENT ON FISH RESOURCES OF RIVER
KUNHAR BY PATRIND HYDROPOWER PROJECT



QUARTERLY STUDY REPORT

By

Muhammad Yousaf Qureshi

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Objectives of the Study:

- a) To find out the impact of Patrind Hydro Power Project on the fish fauna of River Kunhar in, above and below the Patrind Project area during the construction and the operational phase.
- b) Suggest technical measures to have minimum impact on the aquatic life of River Kunhar by the Patrind Hydro Power Project.

EXECUTIVE SUMMARY

Fisheries management capacity and information base requirements are reviewed for the six phases of the dam project cycle:

- i) dam identification;
- ii) dam design;
- iii) dam project appraisal;
- iv) dam construction;
- v) dam operation; and
- vi) dam decommissioning.

Fisheries management as applied to dams is perceived to be problematic and difficult due to the severe changes in hydrology and the impacts on fish that occur.

Dams impact fish directly and indirectly. Directly by blocking or creating hazards to migration in upstream and downstream directions, and by mortality or damage when fish pass through dam discharge structures and indirectly dams impact fish biodiversity, fish stocks and Fisheries management by modifying and/or degrading the upstream and downstream aquatic environments, including: thermal stratification of the reservoir and release of cool and anoxic hypolimnion water downstream; downstream flow alteration and termination of inundation of downstream floodplains; sediment and nutrient trapping in reservoirs; release of contaminants from trapped sediment into the reservoir food chain.

Fisheries management objectives in relation to dams include conventional management objectives: prevention of loss of endangered and/or commercially important fish biodiversity; maintenance of fish stock abundance; sustainability of catch, employment and income; security of consumer food fish supply; and production of exportable fish products.

Fisheries management objectives specific to dams include provision of bypass facilities for upstream and downstream migrations, development of new fisheries potentials in reservoirs, and maintenance of biodiversity in impacted environments (affluent streams, downstream river etc.).

The key output of the study is an assessment of the level of impacts on, and the risks for, fish and fisheries, as well as a statement with regard to the degree of suitability and acceptability - or need for rejection - of the project *from a fisheries point of view*. In addition, there should be given a set of mitigation measures and an environmental management plan. These changes should be incorporated into the final design of the dam project.

During the Dam Project Appraisal Phase, community-based fisheries management should be continued from the previous phase. During project appraisal, the worth of the project is examined. The key information required is contained in the environmental impact assessment and environmental management plans.

During the Dam Construction Phase, fisheries management activities need to be carried on which aim at preventing damage to fish biodiversity and fish stocks arising from construction activities. The main impacts are soil erosion and silt runoff into the river, siltation of key fish habitats downstream, blast damage from explosives and blockage of fish migration. Real time data is required during this phase. The management activities need to be rapidly responsive to the construction schedule. Information needs focus on suspended solids, sediment transport, fish mortality, fish migration and fish biodiversity.

During the Dam Operation Phase, the needs for fisheries management of three impact areas must be addressed:

- 1) The reservoir and its affluent streams,
- 2) The fauna passage facilities,
- 3) The downstream river channel and floodplain(s)

Reservoir fisheries management concerns focus on protecting spawning grounds in affluent inflow areas, stocking with indigenous and non-indigenous fish species to increase production, development of a small pelagic fishery, and management of the water level to prevent erratic behavior deleterious to fish stocks.

Management of the fauna passage facility includes monitoring of fish traffic in terms of species, numbers, and length/weight range. An assessment should be carried out of the efficiency of the fish pass in providing an access route for individual species, and appropriate adjustments made to the structure to improve its efficiency. The overall impact of the fish pass on reservoir fisheries and downstream river fisheries should be determined. The minimum e-flow of the Patrind project laid down must be maintained to control the fish survival downstream.

Downstream river fisheries management concerns focus on aeration of anoxic discharge water from the dam, provision of effective fish passes to allow brood stock and juveniles to migrate across the dam, reduction of turbulence in the stilling pool, and mitigation of fish losses on the floodplain. The release of artificial mini-floods and the provision of adequate dry season flow are crucial to maintaining a suitable environment for migratory fish species, especially endangered species.

Information base requirements during dam operation consist of two types: 1) conventional fisheries management data used to assess catch and effort, and 2) data on fish biodiversity, fish stocks and environmental parameters to assess the impact of the dam and the efficiency of mitigation measures.

During the Dam Decommissioning Phase, fisheries management should focus on rapid recovery of fish stocks that have suffered impacts during dam operation. Measures should be implemented to prevent damage to fish stocks during dam demolition as well as enhancement measures, e.g. river rehabilitation, for the aquatic and related terrestrial environments. Fish biodiversity and migrations, as well as sediment loads, should be carefully monitored. Conventional community-based fisheries management should be continued.

The criterion 'no loss of biodiversity' is proposed as a goal towards which all dam projects should strive.

1. INTRODUCTION

Fisheries management as applied to dams, and the fish stocks and aquatic environments affected by dams, is a subject fraught with difficulties. It is a complex endeavour as it involves conventional fisheries management activities associated with regulating fishing effort and maintaining stock abundance, as well as various types of civil engineering constructions and manipulation of the aquatic environment. In the past, fisheries management concerns have typically received only modest attention in terms of research budgets, importance as a selection criterion for dam design alternatives (or project alternatives), and mitigation of negative impacts on fish biodiversity, fish stocks and fisheries. Happily, this situation has improved since environmental impact assessment (EIA) became universally mandatory for most types of dam projects. Important advances in management approaches and engineering of mitigation measures have resulted in new dam projects becoming more environmentally friendly than in the past.

Initial environmental Assessment had been carried out during the dam design and construction but no fish pass facility has ever been designed to have water connectivity for the migration of the fish especially during its spawning period.

Historical studies of the fish fauna in river Kunhar show a large diversity of fish species found here but unfortunately poor management in the riverine fishery for the last few decades have deteriorated the population and existence of many important fish species in it.

The Patrind project is almost in its operational phase. Water reservoir had been created several times and retreated for some problems in the construction. This phenomenon has affected the regular flow of water down stream and reservoir upstream. This has laid a negative impact on the survival of the fish fauna. Another big gap in the project designing is the absence of any fish hatchery facility to restock the fish affected by the project. In spite of strong recommendation in the quarterly reports for having a safe fish pass and ensuring the minimum E-flow, no attention has been paid which is a very serious negligence of the administration of the project.

The catches of fish during the study period show that only two species, *Schizothorax plagiostous* and *S. curvifrons*, are existing and rest of the species could not be caught. The last studies from September 2013 onward show that fish population has been decreased to a considerable level due to the dam construction. No attention has been paid to the social sector for supporting them with mitigation measures. Exotic trout fish can be introduced in the reservoir initially on experimental basis and then, depending on the positive results, on permanent basis as recreational/sport fishery has been steadily increasing in the upper reaches with cold water. During the survey of the valley in the month of September 2016, it was noticed that trout fish production has increased to a considerable level as almost all the restaurants in the valley provide a fresh fish to its customers.

2. FISH MIGRATION PAST MANGLA DAM

There is no data available on the fish migration in the past from Mangla Reservoir in river Jhelum. Some records show the generic statements that Domel (the junction of River Neelum and River Jhelum in Muzaffarabad) was famous for mahsher (Tor putitora) fishing with rod and record catch of 28 kg had also been claimed during the Maharaja regime from this point. The lack of long term data on water quality, plankton concentrations and fish populations limits the conclusions that can be made about the aquatic ecology in the Project area. The scope of present study does not require covering of fish fauna present in Jhelum River along with its migration status. There is almost no possibility of upstream migration of fish fauna above Mangla Dam to the Project area as authenticated by the study results and supported by the local information recorded through the interviews. Even then, if some migration occurs that will be compensated by the Jhelum River. Thus, it can be safely concluded that the proposed Project will have an impact of river ecology in the stretch of 13 kilometers below the weir point due to shortage of water and 8 kilometers above due to increase in water level. There will be no impact on the available fish fauna as well as the migration of fish species above Mangla dam. River Jhelum and Neelum will be affected by the hydropower generation under Kohala and Neelum and Jhelum Hydropower generation projects. These projects will have a bigger negative impact on a large stretch of water as compared to Patrind Hydropower Project. Nallah Boi will compensate the impact to certain level but the quality of water is different than the River Neelum, so it may not support the same fish species.

3. The Fish

Past history shows that the project area had a rich biodiversity in river Kunhar but present picture of the area is not that encouraging as most of the reported fish has disappeared altogether. This is, most probably, due to hydrological changes, stream flow pattern, very high and devastating floods of 1992 and beyond that, illicit hunting of fish by the use of destructive means like explosives, poisoning, electric currents etc. Common Otter (*Lutra lutra*) used to be very common once in the area, but now this has disappeared and most probably it is no more existing in River Kunhar. No fisheries staff had ever been interacted during the study period. The departments of Fisheries of Khyber Pakhtoonkhaw and AJK have not been able to protect the river Kunhar below the town of Gharri Habibullah most probably due to the shortage of conservation staff with them.

The main natural factors which influence fish life in the Himalayan streams are: (i) current of velocity; (ii) fluctuation in water discharge; (iii) water temperature and dissolved oxygen level; (iv) substratum; (v) shelter from the current; and (vi) food availability represented mostly by organisms clinging to and growing on rock and stone surfaces in fast current.

Snow trout, a cold water riverine and medium migratory fish, is locally known as Malli or Sawti. It belongs to the family Cyprinidae and sub-family Schizothoracinae which are widely distributed in the Himalayan and sub-Himalayan region and much of the rest of Asia. Altogether 28 species of Schizoranae are reported in Himalayn river waters but only two of genus Schizothorax are recorded in the study area of river Kunhar i.e., Schizothorax curvifrons and Schizothorax plagiostomus and they are common in river Kunhar. Both the

species are phytophagous fish and have developed a special mouth to scrape the algae attached on stones. They spawn twice a year during September/October and March/April, but September/October is the best season for spawning. Clear water, stony bottom of creeks composed of fine pebbles and gravel, and water flow of 2.8-4 m/sec, pH 6-7 and dissolved oxygen concentrations of 8-15 mg/L form good spawning conditions in the natural environment.

To cope with the steep, fall in temperature in winter months, schizothoracines migrate from headwaters to lower altitudes where they represent a sizeable part in fish catches in large rivers and their tributaries. The rise in temperature in Kashmir and Kunhar streams from near-freezing level to 10-18°C during May-June induces *S. plagiostomus*, *S. longipinnis*, *S. kasmiriensis* and *S. curvifrons* to spawn. During the upstream migration the fish still finds itself in waters of low temperature of 8.0-9.5°C, owing to the steady influx of snow-melt water. This induces the species to migrate to and spawn in side streams or point of warm and coldwater confluence, which receive warmer ground water of 17.5-21.5°C. In the same drainage, *S. plagiostomus* and *S. curvifrons* migrate downstream to the lowermost reaches where it spawns from September to December at 15.0 to 21°C. These observations indicate that in some schizothoracines multiple spawning is determined by temperatures and flow rates optimal for egg laying. The eggs are large-sized (3.0-4.0 mm diameter) and sticky in nature. They are laid in shallow pools (50-70 cm depth) and remain adhered to the substratum until the hatching of fry.

The absence of minimum E-flow in the stream, fluctuating discharge of water and drying out of streams, leaving only isolated pools or no water at all, is another important factor for the species and population decline in river Kunhar. A general observation during the last studies on seasonal fluctuation in river discharge in Kunhar river system indicate that the range of mean flow from October to March (winter months) represents only 8-10% of the total annual flow. There are also variations from year to year depending on the winter and monsoon precipitation. Reduction of torrential streams to stagnant pools exposes the fish to terrestrial predators and to depletion in dissolved oxygen concentrations, especially when autumn leaf fall takes place. However, due to low temperature, the level of dissolved oxygen may not fall below the optimum requirement of coldwater fish (7.0-8.0 mg l). As soon as the flow is restored with spring rains and snow-melt water, a rapid re-colonization of the stream takes place.

Schizothorax and Schizothoracichthys spp are dominant among the cold water fish in river Kunhar in terms of catch and abundance in all seasons. The substratum consists of boulders, stones, gravel and patches of aquatic vegetation in the pools with lichens on the shallow sides of the river.

As a result of this study in river Kunhar it came out that a gradual increase in water temperature and pH corresponds to a decrease in dissolved oxygen, decline in the density of nymphs of mayflies and stoneflies, but in an increase in larval and adult aquatic beetles. The information collected during expeditions is based on spot measurements and it does not represent average values. The following parameter ranges for the Kunhar River were

recorded at six sampling points during the study. Following table shows the result; transparency; pH; water temperature (oC); dissolved oxygen;

Table-1 showing water parameters

S No	Point	Dissolved Oxygen (ppm)	pH	Temperature °C	Transparency
1	Boi	8.1	6.5	11.54	1
2	NallahBoi	8	6.5	12	1
3	Parri	8.1	6.5	11.5	1
4	Turchilla	9	7	13.4	1
5	Dalola-1	9	7	13.4	1
6	Dalola -2	9	7	13.4	1



Checking PH and Temperature of Kunhar River at Point No. 1 (Boi)

4. Fish catch and fishery potential

The downstream pools and minimum flow still have the potential of supporting various fish and other aquatic organisms to grow. The fish catch was very high during the fall in the water level downstream due to stoppage of water at the weir. But; now the fishing in the project area has almost stopped due to water shortage. Water storage above the weir has reduced the river water level and possibility of using any fishing gear has become impossible. People can catch the fish by their hands. Similarly, fish potential has reduced to almost non-existent level. If some people take interest in rearing fish downstream of the weir, they can develop larger pools and may start external feeding. If this once becomes successful, an additional income generation activity for the poor local communities may get started.

5. Fish catches and species composition

One fisherman, Muhammad Haneef, was engaged for fishing in the river Kunhar at six sampling points. Fishing in the Kunhar River using cast nets of 1 m to 1.5 m diameter recorded only one catch of fish species at Point-I during this sampling. The water was crystal clear and fish got escaped by sighting the fisherman. The impact of the dam construction has appeared on the aquatic life in the river Kunhar.



Fish Caught at Sampling Point 1

Catch in the deep lake behind the weir has become impossible due to the depth of the lake and fish survival probability has also become near to impossible as the river ecology has changed altogether. The fish caught at sampling Point-I was very healthy and it shows the survival of fish in any pool water.

5.1: Reported Fish species of River Kunhar in the past:

Family: Salmonidae

Oncorhynchus mykiss {*Salmo gairdneri*} (Rainbow Trout)

Salmo trutta (Brown Trout)

Family: Cyprinidae

Schizothorax esomus

Schizothorax plagiostomus

Schizothorax micropogon

Schizothorax curvifrons (Snow Trout)

Tor putitora

Tor tor

Labeo spp

Cyprinus carpio

Family: Sisoridae

Glyptothorax kashmiriensis

6. Potential of Sports and recreational fishery

Trout

The trout fish once introduced in upper reaches of River Kunhar is now acclimatized in the area (upstream of Jared in Kaghan). It is legally permitted to be caught by rod and line using both artificial and live baits. Special bylaws have been formulated under the Fisheries Act in the Khyber Pakhtunkhwa province. They regulate the fishing season, bag limit and prescribed baits.

A quite large reservoir has appeared behind the weir at Patrind and this water is very much suitable for growing trout fish species (*Salmo gairdarii*, *salmo trutta*) here. This has to be experimented and planned very well by the expert to develop such facility. This could become a major income generation activity for the surrounding community and will be great reward from the project authority to the affected community.

7. Fisheries Status of River Kunhar in view of locals

During this study, few locals were interviewed randomly as usual. Among them were Mr. Raja Jan Muhammad and Maqbool Hussain Chughtai. According to them, “people residing on both sides of the river had been catching the fish when release of the water was zero from the weir point”. “No outsider comes here for fishing now” they added. If the minimum E-flow of 2 cumecs is not maintained, the riverine fishery will have no existence in downstream water except below the nallah Boi. The ecology of the river system will also change altogether and possibility of other fish species and other aquatic organism will replace the present combination of species survival.

7.1 Field Results:

7.1.1 Point-I(Boi)

First sampling point of the study is situated at 34° 18' 19" N, 73° 26' 44" E at 2422 ft of elevation above sea level. The water level is normal as compared to the last study in December 2016. The water has not been stopped at the weir due to some technicalities. One fish species, *Schizothorax plagiostomus* was caught here with a weight of 240 grams. The fish was very healthy and it can be predicted that the food is abundant but the population has decreased. The water is clear; change in

flow has been noticed. More water depth is in the middle while shallow sides are limited.



Fig: River water in May 2016



River water in December 2016.

7.1.2 Point-II (Domel Boi)

This sampling point is situated at $34^{\circ} 18' 36''$ N, $73^{\circ} 26' 43''$ E at 2398 ft of elevation above sea level. The nallah water was very clear as compared to the river water. The river flow is more centered at this time. No fish could be caught here even in the nallah. This is the only source of water contributing in the river Kunhar down the Boi to Domeshi.



Pic: Nallah boi confluencing with river Neelum during May 2017



Fig: Confluence of Boi Nallah Pictures in Sep. 2016, September 2015 and Dec. 2016.

7.1.3 Point-III: (Parri)

This sampling point is situated at $34^{\circ} 19' 47''$ N, $73^{\circ} 25' 35''$ E at 2475 ft of elevation above sea level. The small creek joins the river here. No fish could be caught here. The river flow is high and centered.



Fig: Sampling at point-III, Parri during May. 2017 and December 2016.

7.1.4 Point IV: Tarcheela (alternate to older point of Outlet of river diversion)

This point has become inaccessible and now there is no use to sample at this point because the water over flowing from the spillway will have no fish or such larger aquatic life as the lake behind the spillway is very deep. Instead of this point a point near Tarcheela was sampled but again no fish was found. Here it is important to mention that the agreed minimum quantity of water must be released regularly so that impact on aquatic life can be kept to a compromising level. As it has been done on December 26, 2016 by completely stopping the water for raising the water level in the lake, then the fish life cannot be guaranteed below this point. The point sampled at Tarchella also had no fish.



Fig: The weir point in May 2017



Fig: The weir point in December 2016

7.1.5 Point-V: Dalola-1 (Flushing Tunnel Inlet old point)

This point is also inaccessible because of wire stone gabions in the side walls, netting could not be done. The introduction and rearing of trout fish in the lake is possible here with artificial feeding mechanism. If utilized carefully, the lake can produce several tons of trout fish annually and area can be leased out or handed over to the affected local community for farming the trout fish and earning some money from here.

7.1.6 Point-VI Shorran (Dumping Point before)

This is the point from where the water enters into the lake. According to the fisherman, a group of *Glyptothorax kasmiriensis* was seen here on December 2016 but now they have disappeared. I requested him to catch the fish whenever he can find it so that impact of change in ecology could be ascertained. No fish was found here.



Fig: point-VI Shorran in May 2017

Table-2 Showing Data collection at each sampling point

Point-I							
S No.	Air temp. °C	Water temp. °C	pH	DO mg/l	Fish Species	Weight (gms)	Length (cm)
1	30.5	11.4	6	8.42	<i>Schizothorax plagiostomus</i>	240	29
Point-II							
2	30.8	12.5	6.5	8.25	No fish		
Point-III							
3	32	13.2	6.5	8.13	No fish		
Point-IV							
4	33.2						
Point-V							
5	33.2	13.5	6	8.0	No fish		
Point-VI							
6	33	13.5	7	8.13	No fish		
Total Fish collected							
		<i>Schizothorax plagiostomus</i>				1	
		<i>Schizothorax curvifrons</i>				0	

Species composition

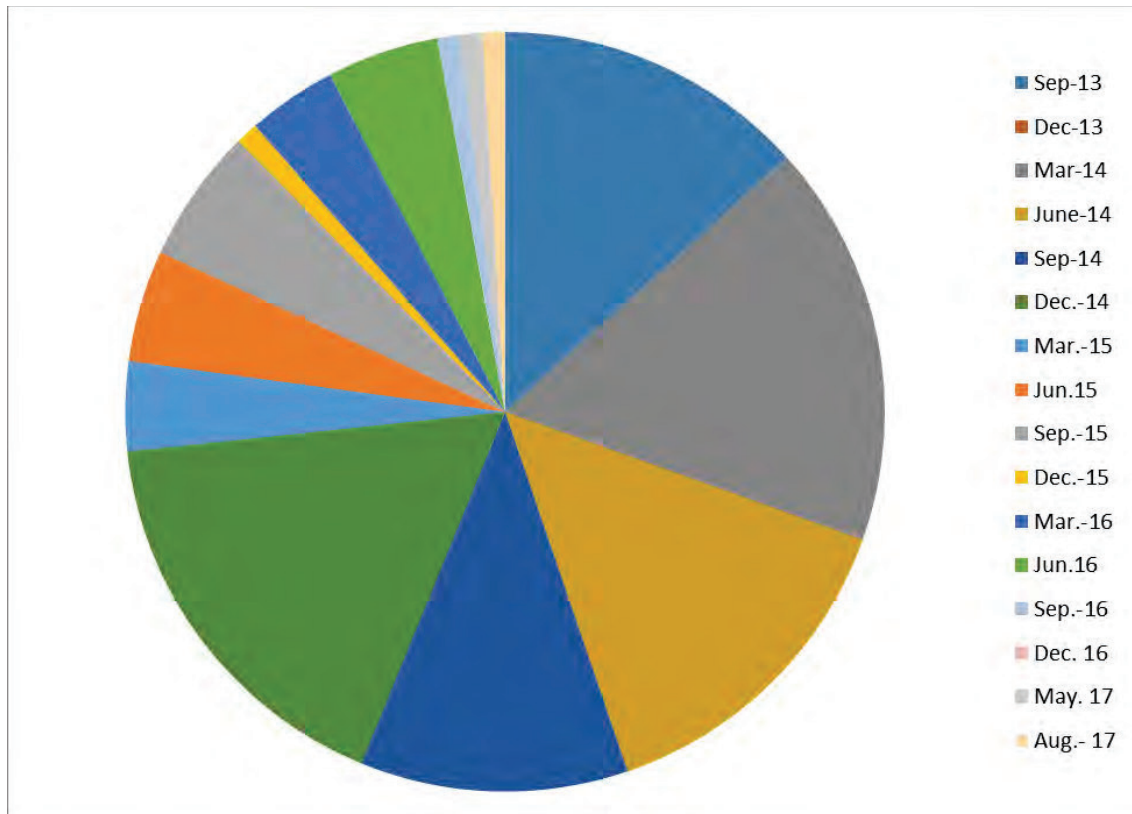
Schizothorax curvifrons = 0

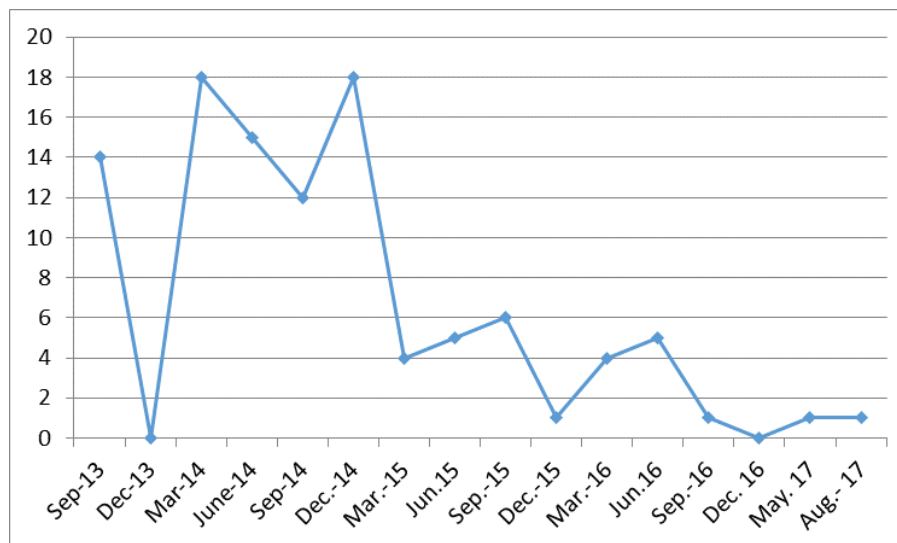
Schizothorax plagiostomus = 1

8. Comparison

The graph below shows the trend of fish availability in the river Kunhar. Fish population remained higher in the early catches but it has decreased with the passage of the time. A definite impact has been noticed. Similarly, whole ecosystem in the project area has been

disturbed. It is suspected that no more locally found fish will exist in this water system because of the change in ecology. Next study during the operational phase will spell out the change and existence of the fish species of the river. The aquatic environment of the River Kunhar is significantly changing as the project has completed and water release in the river has decreased. Similarly, appearance of the water pool behind the weir has also shown different results. The size and weight of fish in the pool will be higher and change in species composition is also expected as some other species may get better survival environment here. Migration of fish will stop due to non-existence of safe paths. The major change in ecology is expected during the operational phase and obstruction on the river flow. This will affect the migration of the fish even upstream and all breeding grounds will highly be affected downstream.





Graph showing trend of fish availability as derived from the studies of the project area

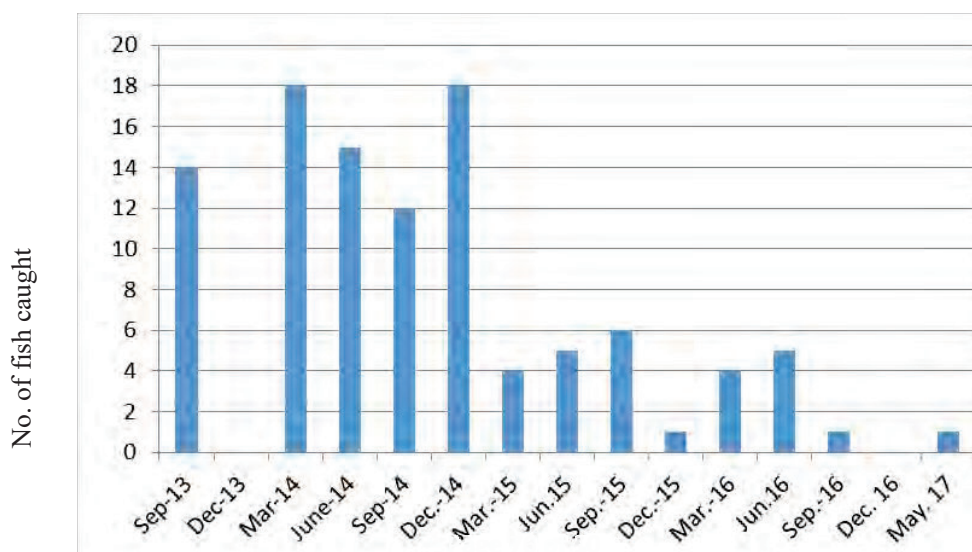
Table-3 Comparative number of fish Caught at sampling points

Period	Point	No. of fish	Period	Point	No. of fish	Period	Point	No. of fish	Period	Point	No. of fish
July-September 2013	1	3	July-September 2014	1	0	July-September 2015	1	4	July-September 2015	1	0
	2	6		2	4		2	1		2	0
	3	4		3	1		3	1		3	0
	4	0		4	2		4	0		4	0
	5	1		5	3		5	0		5	0
	6	0		6	2		6	0		6	1
Total:		14			12			6			
October-December 2013			October-December 2014	1	6	October - December 2015	1		October - December 2016	1	0
				2	5		2			2	0
				3	0		3			3	0
				4	4		4			4	0
				5	0		5			5	0

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				6	3		6			6	0
Total:					18						
January-March 2014	1		January-March 2015	1	2	January-March 2016	1		January-March 2017	1	1
	2			2	0		2			2	0
	3			3	0		3	3		3	0
	4			4	0		4			4	0
	5			5	0		5	1		5	0
	6			6	2		6			6	0
Total:					4			4			1
April-June 2014	1	5	April-June 2014	1	3	April-June 2016	1	4			
	2	7		2	1		2				
	3	4		3	1		3				
	4	0		4	0		4				
	5	No access		5	0		5				
	6	2		6	2		6	1			
Total:		18			7			5			

The graph given below shows the comparative picture of the fish catches during each study



Quarters of the Years

Fig: Showing comparative updated graph of fish catches during each study

9. Result

There is a very clear reduction in the number of fish catch from the last studies which shows the trend of increasing impact on the fish fauna of River Kunhar in the project area of the Patrind Hydro power project. This shows that the impact has appeared because of the tunneling of the diversion and stoppage of the up and down stream migration of the fish. This has also changed the decrease in quantity and course of flow of water downstream due to which breeding grounds have been disturbed. If the breeding of the fish will not take place, then its existence will be threatened.

10. Recommendations

Fish catches in the Kunhar River have been declining because of the changes in river flow, fluctuation in the current of water and overflow of water from the spillway. This impact will further increase during the operational phase of the project.

During the Operation Phase, the needs for fisheries management of three impact areas must be addressed: 1) the reservoir and its affluent streams, 2) the fauna passage facilities, 3) and the downstream river channel and floodplain(s),

1. Reservoir fisheries management concerns focus on protecting spawning grounds in affluent inflow areas, stocking with indigenous and non-indigenous fish species to increase production, development of a small pelagic fishery, and management of the water level to prevent erratic behavior deleterious to fish stocks.
2. Management of the fauna passage facility includes monitoring of fish traffic in terms of species, numbers, and length/weight range. An assessment should be carried out of the efficiency of the fish pass in providing an access route for individual species, and appropriate adjustments made to the structure to

improve its efficiency. The overall impact of the fish pass on reservoir fisheries and downstream river fisheries should be determined.

3. Downstream river fisheries management concerns focus on aeration of anoxic discharge water from the dam, provision of effective fish passes to allow brood stock and juveniles to migrate across the dam, reduction of turbulence in the stilling pool, and mitigation of fish losses on the floodplain. The release of artificial mini-floods and the provision of adequate dry season flow are crucial to maintaining a suitable environment for migratory fish species, especially endangered species.
4. Fish catches in the Kunhar River have been declining because of the use of illegal fishing methods such as poisoning and use of electro-fishing gears. To preserve the fish stocks, controls should be imposed on illegal fishing practices and a fish sanctuary be established. The deep water pools of the Kunhar and its feeder streams should be declared fish sanctuaries for the protection of brood stock. The Fisheries departments of KP and AJK should be taken on board to check the illegal fish catch.
5. The Kunhar River catchment has been subject to deforestation, resulting in erosion and silting of streams and rivers. There is a need for land rehabilitation measures to be urgently implemented in the watershed. The incidence of water pollution is increasing in the lower reaches of the river due to the discharges of sewage waste, and the illegal use of insecticides, pesticides and piscicides. Control over such activities must be strictly enforced.
6. Habitat improvement is an essential factor for fishery improvement. To avoid seasonal changes of water level, suitable pools should be created under the management of the local development authority. Such a practice will improve the fish habitat quality and avoid the winter desiccation.
7. Protection of fish stocks and fishery regulation should be based on periodic assessments of fish stocks. It is high time to enforce the existing fishery law and to restrict the use of nets with less than 2 cm mesh size.
8. Early planning and consultation with expert should be initiated to have aquaculture development in the cold water lake appeared as a result of damming on river Kunhar at Patrind.

11. Potential Impacts and Mitigation Measures

Aquatic ecology is affected by water quality, quantity, availability of breeding habitat (such as spawning and rearing grounds), foot access to the river, fishing methods and terrestrial activities along the river banks and in the watershed (Helland-Hansen et. al., 1995). The existing aquatic habitat of the Kunhar River in the Project area is continuous, fast flowing where water quality and quantity are seasonally affected, primarily by monsoon runoff and snowmelt. The Patrind Hydropower Project will divide the existing aquatic environment into three distinct habitat areas with different flow conditions:

- 1) Upstream of the weir
- 2) Within the weir pond
- 3) Downstream of the weir

1) Upstream of the Weir and in the Pond

Flow rates, water quality and fish habitat in the Kunhar River and its tributaries, above the reservoir at a distance will not be affected by the Project, except for the distribution of some aquatic organisms. The presence of the reservoir will isolate these upstream, fast-flowing habitats from the riverine habitat below the reservoir, preventing migratory species from reaching these areas. The populations of sedentary, resident fish species above the reservoir will not be directly affected by the Project, but will become genetically isolated from populations downstream.

2) Within the Lake

The upstream at the weir will create a deep, still water aquatic habitat, replacing about 7km of existing riverine habitat. Water quality in the reservoir was found suitable for the protection of aquatic ecosystems. The most productive parts of the reservoir will be the shallower sections where light is able to penetrate to the bottom and allow the growth of attached aquatic macrophytes.

The creation of the lake will provide a large open water fish habitat that could be used for promotion of fish culture especially for cold water fish. If the harvesting of fish proves viable will be an offset to the lost production. This will also increase the fish fauna and their density to be exploited locally for the socio-economic uplift of local communities. Trout fish culture with external feeding will be the best option for lake fisheries development.

3) Downstream of the Weir

The Project will alter the Kunhar River flow regime in the stretch starting from the weir to the confluence with Jhelum River (13 Km length). Changes in the flow regime will affect the composition and abundance of planktonic and benthic communities, thus affecting the food supply of fish. These changes will have the potential to influence on the species composition of the fish population in the Project area, but due to the low availability of fish fauna in the Project area as shown by the study results, the impact shall not be significant.

Furthermore, it should be noted that the topography of Kunhar River valley downstream of the weir is characterized by high river banks with relatively deeper bed levels that prevent the use of the Kunhar River for agricultural irrigation and drinking water supply. The operation of the Project for hydropower generation will reduce flows downstream of the weir. A minimum of 2 m³/s of water will be released from the head pond as ecological flow throughout the year. This flow will increase further downstream as numerous medium and small streams enter the Kunhar River, thus providing mitigation measures for aquatic flora and fauna in the downstream reach of the weir. These additional side streams will, on average, contribute an estimated 1.8 m³/s to the Kunhar River flow downstream of the weir.

Importantly it should be ensured to release the agreed amount of E-flow below the spillway without a single interval, otherwise chances of the existence of the local fish becomes dubious.

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Annex-5




Implementation Plan of Social Uplift Plan

Pakistan Hydropower Project




Implementation Status & Future Plan of Social Uplift Plan

[June, 2017]





Part I. Environmental & Social Uplift Program during Construction Phase

No.	Classification	Description of Plan	Time Schedule	Status	Photos
1.	Bridge connecting Alda to Muzaffarabad	<ul style="list-style-type: none"> Permanent bridge across Jhelum River connecting Lower Chatter Muzaffarabad to Alda village. 	<ul style="list-style-type: none"> Completed in Sep. 2012 Full time Vehicular traffic access will be allowed to the local community after construction phase. 	<ul style="list-style-type: none"> Construction was completed in stipulated time during month of September 2012. Pedestrian, motorbike and light vehicles access is available to local community. 	
2	Improvement on existing road (Weir Site)	<ul style="list-style-type: none"> Link road up to Sarati village Mosque 	<ul style="list-style-type: none"> Completed in 2013 	<ul style="list-style-type: none"> This is conducted as part of Road improvement of Weir Site Link road constructed to give convenient access to the Mosque in Sarati village 	 
3	Embank protection	<ul style="list-style-type: none"> Slope protection and embankment against the risk of encroachment 	<ul style="list-style-type: none"> Completed in 2015 	<ul style="list-style-type: none"> Permanent protection measure with concrete works have been taken 	


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No.	Classification	Description of Plan	Time Schedule	Status	Photos
		<p>and inundation during heavy rainy season</p> <ul style="list-style-type: none"> - Rip-rap protection • Gabion protection 		<p>(Up & downstream the access bridge) along the river bank at batching plant area and M&E fabrication workshop area</p> <ul style="list-style-type: none"> • Same measures have been undertaken on power house site in front of O&M building and powerhouse structure site. 	
4	Water supply for Power House (Alda)	<ul style="list-style-type: none"> • Cash support for RCC water tank construction for Alda Village 	<ul style="list-style-type: none"> • Completed In June, 2016 	<ul style="list-style-type: none"> • EPCC paid PKR 600,000 to local community as building cost of water tank. - Size (3m×3m) - Pvc pipe line : 1,500m 	
5-0	Water supply for Weir site	<ul style="list-style-type: none"> • Initially water supply were planned for Tarcheela, Patrind, Taitree(Sarati) because Tarcheela and Patrind, were designated as camp area • However acquisition of Tarcheela and Patrind land turned down by villagers • Eventually our current camp was built in Taitree adjacent to Sarati • Developing water supply for Tarcheela and Patrind cancelled 			
5-1	Water supply for Weir site	<p>Water supply to the Sarati village after developing and using the well in weir camp</p>	<ul style="list-style-type: none"> • Water tank completed In 2012 • Handed over 	<ul style="list-style-type: none"> • Water resistivity survey was carried out but no ground water was found. Currently Sarati village is using weir camp water source after making branch pipe 	


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No.	Classification	Description of Plan	Time Schedule	Status	Photos
5-2	Water supply for Weir site	<ul style="list-style-type: none"> • Connection of water pipe line to the water tank at Sarati village • Installation of surface drainage line at Sarati village 	<ul style="list-style-type: none"> • Completed In 2013 • Handed over 	<ul style="list-style-type: none"> • Water pipe line was developed from existing water tank to Sarati village in 2013. - GI pipe(D50mm) : 230m - Installation of fence and protection wall for water source were installed and access road was also repaired. • Surface drainage line was developed at Sarati village in 2013. - RCC pipe(D450mm) : 87m - 3 Manholes and block masonry 	 
5-3	Water supply for Weir site	<ul style="list-style-type: none"> • Repairing water tank at Sarati village with proper top covering 	<ul style="list-style-type: none"> • During construction phase 	<ul style="list-style-type: none"> • Water tank for Sarati village was repaired and has been made dirt free - Top cover is installed surrounded by a concrete protection wall 	
5-4	Water supply for Weir site	<ul style="list-style-type: none"> • Installation of water tank for Deedal Hoondi village 	<ul style="list-style-type: none"> • Completed in 2013 • Handed over 	<ul style="list-style-type: none"> • Water tank installed near access to disposal area in Deedal Hoondi village in September 2013 and this is currently in use. 	

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No.	Classification	Description of Plan	Time Schedule	Status	Photos
				<ul style="list-style-type: none"> Source comes from behind batching plant. Water comes from under the ground(spring water) 	
	[Additional Support]	Community access to the water source lying behind batching plant of weir site.	<ul style="list-style-type: none"> Completed In 2015 	Pathway towards spring was constructed to facilitate local's access to the water source.	






Part II. Environmental & Social Uplift Program after Construction Phase

No.	Classification	Description of plan	Time Schedule	Status	Photos
1	Water supply for Power House Site	<ul style="list-style-type: none"> Water supply to the Lower Chatter and Alda villagers using the well in labor camp area 	<ul style="list-style-type: none"> Completed in 2014 The local community will have access to this water well after construction phase 	This well is currently being used to supply water to CNEEC and Kyungdong workers who are engaged in Powerhouse construction during construction phase.	



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No.	Classification	Description of plan	Time Schedule	Status	Photos
2	Water supply for Weir Site (Tarcheela)	<ul style="list-style-type: none"> Cash support on tubular well construction for Tarcheela village 	<ul style="list-style-type: none"> Tarcheela find spot for tubular well and EPCC paid Rs.150,000/- on 21st Mar,2017 they will complete building the tubular well April in 2017(time line is subject to change) 	<ul style="list-style-type: none"> As agreed EPCC paid half payment Rs.150,000/- to Tarcheela village. Tubular Well construction work is progress and hopefully complete on 30th April 2017 	
3-0	Improvement on access to isolated villages (Weir Site)	<ul style="list-style-type: none"> Because Tarcheela and Patrind land acquisition turned down by villagers, Improvement on access Sarati to Patrind & Tarcheela plan partly cancelled Link plan between KP and AJK remains. 			
3-1	Improvement on access to isolated villages (Weir Site)	<ul style="list-style-type: none"> Provision of Link between KP and AJK regions to local people As the permanent link route, Spillway bridge of Weir will be allowed to the locals. 	<ul style="list-style-type: none"> After construction phase in March 2017 Time line is subject to change according to progress 	<ul style="list-style-type: none"> Cofferdam was constructed in 2013 and used to be an access for Tarcheela villagers Currently, road passing through the weir site is being used by the locals as access between AJK & KP Site. 	




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No.	Classification	Description of plan	Time Schedule	Status	Photos
3-2	Improvement on access to isolated villages (Weir Site)	<ul style="list-style-type: none"> Installation of pedestrian bridge for Patrind villagers. 	<ul style="list-style-type: none"> Pedestrian bridge installed in 2012 and 2013 	<ul style="list-style-type: none"> The villagers used to go across the river by cable trolley but it was washed away by flood in May 2005. As part of corporate social contribution, EPCC built the pedestrian bridge temporarily. 	 <p>[Bridges installed in 2012 & 2013]</p>
4-1	Improvement on existing road (Weir Site)	<ul style="list-style-type: none"> 1st improvement for Boi road between sarati village and batching plant completed 	<ul style="list-style-type: none"> completed in 2014 	<ul style="list-style-type: none"> Road Pavement Work Completed 	




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No.	Classification	Description of plan	Time Schedule	Status	Photos
4-2	Improvement on existing road (Weir Site)	<ul style="list-style-type: none"> • Final improvement for Boi road between sarati village and batching plant (Hoondi). 	<ul style="list-style-type: none"> • After construction phase in April 2017 • Time line is subject to change according to progress 	<ul style="list-style-type: none"> • Road Pavement Work Completed 	
5-1	Improvement on existing road (Power House)	<ul style="list-style-type: none"> • 1st~3rd improvement done • EPCC have done several restoration works for the sliding section of the road until now. 		<ul style="list-style-type: none"> • EPCC subcontracted to DAM (Development Authority of Muzaffarabad) 3 times for that work. - Restoration Works Work completed 	


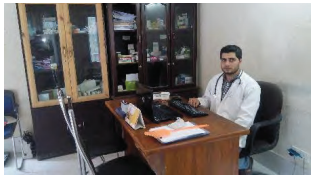

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No.	Classification	Description of plan	Time Schedule	Status	Photos
5-2	Improvement on existing road (Power House)	<ul style="list-style-type: none"> • Final improvement • The rest part of road from labor camp area to Jhelum River bridge will be improved 	<ul style="list-style-type: none"> • Road Pavement is completed from Ice Factory to Jhelum River Bridge. 	<ul style="list-style-type: none"> • Work completed 	 
5-3	Improvement on existing road (Power House)	<ul style="list-style-type: none"> • Road from Power House to Alda village entrance will be fenced 	<ul style="list-style-type: none"> • After construction phase in April 2017 • Time line is subject to change according to progress 	<ul style="list-style-type: none"> • Boundary fencing completed 	
6-0	Improvement of construction	<ul style="list-style-type: none"> • Because Tarcheela and Patrind land acquisition turned down by villagers, Improvement plan (Park) for Patrind & Tarcheela cancelled. 			








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No.	Classification	Description of plan	Time Schedule	Status	Photos
6-1	Improvement of construction area	- Disposal area in weir site will be changed into cricket field & park	<ul style="list-style-type: none"> After construction phase in April 2017 Time line is subject to change according to progress 	Working in progress	
6-2	Improvement of construction area (Power House)	- Labor camp & workshop area in Power House Site will be changed into cricket field & park	<ul style="list-style-type: none"> After construction phase in April 2017 Time line is subject to change according to progress 	Working on plan.	
6-3	Improvement of construction area (Power House)	- Batching plant & Stock yard, will be changed into cricket field & park	<ul style="list-style-type: none"> After construction phase in April 2017 Time line is subject to change according to progress 	Working on pln.	



Part III. Development of Medical Treatment, School Support and Charity

No.	Classification	Description of Plan	Time Schedule	Status	Photos
1	Medical treatment for local residents	<ul style="list-style-type: none"> In case of emergency, ambulance and medical aid is available and locals can be facilitated. 	<ul style="list-style-type: none"> During construction phase. 	<p>A doctor and male nurses are placed on both sites and local people could be facilitated in emergency.</p> <p>An ambulance is also available for them during any emergency situation.</p> 	 
	[Case]	<ul style="list-style-type: none"> Emergency support case on road side accident (Outside project) 	<p>On 24th June 2014, a traffic accident occurred outside the project boundary at weir site that resulted in injuries. EPCC's HSE team provided the first aid and using site ambulance injured person was shifted to Kunhar Christian Hospital where he was admitted for further treatment. (Person belongs to PAPs from adjacent village Sarati)</p>		

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No.	Classification	Description of Plan	Time Schedule	Status	Photos
			  		
2-1	School support (Wier Site)	<ul style="list-style-type: none"> Deedal Meera school was badly damaged due to earthquake in 2005 	<ul style="list-style-type: none"> Completed in 2013 	<ul style="list-style-type: none"> EPCC installed the entire roof, doors and windows in 2013. 	
2-2	School support (Wier Site)	<ul style="list-style-type: none"> Deedal Meera school support 	<ul style="list-style-type: none"> March 2014 	<ul style="list-style-type: none"> After training on how to cross road safely gifts awarded 	



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No.	Classification	Description of Plan	Time Schedule	Status	Photos
2-3	School support (Wier Site)	<ul style="list-style-type: none"> • Patrind school support 	<ul style="list-style-type: none"> • February 2015 	<ul style="list-style-type: none"> • Food and stationary gifted 	 
3-1	School support (Power House)	To aid schools and residents adjacent to the site	<ul style="list-style-type: none"> • During construction phase 	<ul style="list-style-type: none"> • TV set has been gifted to residents near the site as goodwill. • Various sessions on HSE awareness have been held in adjacent schools • Private School yard has been protected by EPCC adjacent to camp office. • Stationary and books were distributed among school childrens 	  

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No.	Classification	Description of Plan	Time Schedule	Status			Photos
3-2	Donation to school (Power House)	Table / Chairs / Stationary donated to local school near Power House Camp	• 28 th of March, 2016	Item	Q'ty	Amount	
				Table(student	6	12,000	
				Table(teacher	4	18,000	
				Office table	1	6,500	
				White board	4	18,000	
				Total		54,500	
4	Local employment	• Local residents of AJK or KP especially PAPs (Project Affected Persons) will be given a priority over others for employment.	• During construction phase	• Nearly 86% of total manpower is employed from the local communities. (AJ&K : 65.5%, KP : 20.5%) • EPCC has kept employment for the local people despite the delay in construction work during the first half of 2014.			  [Local Job advertisement]
5	Economic Activities / Indirect employment	• Creating business & job opportunities.	• During construction phase.	• Locals from adjacent villages have established small business such as shops and canteens. As the EPCC is now paying in cash for			• In future, as the activation of construction work, more business & jobs opportunities will be created.

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No.	Classification	Description of Plan	Time Schedule	Status	Photos
				<p>food so small cafeterias & canteens (in total : 4ea) have been established with in the project vicinity on both sites.</p> 	

Annex-6

Water Quality Analysis

	WATER QUALITY LABORATORY MUZAFFARABAD Pakistan Council of Research in Water Resources Ministry of Science & Technology, Government of Pakistan Shaha Nara Tariq Abad by Pass Road, Muzaffarabad Office Phone # 05822-920949
WATER QUALITY TEST REPORT	

Report Serial No.	WQL-MZD- 3070 -2017	District Name	Muzaffarabad
Name of Theist	Muzaffarabad	Town/ Union Council	Muzaffarabad
WQL Sample Code	MCL-PTN-(01)-T7-2017	Clint Code	PP.08.17
Sampling Date	8.08.2017	Reporting Date	12.08.2017
Sampling Site Address	Camp Filtration Plant, Weir (Upper Side)		
Clint Name & Address	HSE Manager (DAEWOO E & C), Pakistan Patrind Hydropower Project		

CHEMICAL & MICROBIOLOGICAL PARAMETERS				
Sr.#	Water Quality Parameters	Units	Permissible Limits	Results
1.	Electrical Conductivity	(micro-S/cm)	NGVS	369
2.	pH	-	6.5-8.5 (PSQCA)	7.35
3.	Turbidity	NTU	<5 (PSQCA)	0.04
4.	Chloride	(mg/l)	250 (PSQCA)	7
5.	Chlorine	(mg/l)	0.3 (PSQCA)	0.00
6.	Bicarbonate	(mg/l)	NGVS	160
7.	Carbonate	(mg/l)	NGVS	0.00
8.	Calcium	(mg/l)	100 (PSQCA)	48
9.	Hardness	(mg/l)	500 (PSQCA)	170
10.	Sodium	(mg/l)	200 (WHO)	80
11.	Potassium	(mg/l)	10 (PSQCA)	1.3
12.	Total Dissolved Solids (TDS)	(mg/l)	1000 (PSQCA)	203
13.	Flouride	(mg/l)	1.5 (PSQCA)	0.03
14.	Total Coliforms (P/A Kit)	+ve/-ve	Nil (PSQCA)	-Ve

PSQCA: Pakistan Standard Quality Control Authority, P/A: Presence/Absence, +Ve: Presence of Bacterial Contamination, -Ve: Absence of Bacterial Contamination, NGVS: No Guideline Value Set, WFP: Water Filtration Plant, WQL: Water Quality Lab., BDL: Below Detection Limit


Terms & Conditions:

- Test Results in this report relate only to the test item/sample submitted and tested. Tested parameters followed the APHA (American Public Health Association) standard methods, 21st Edition.
- The test report shall not be reproduced except in full, without written approval of WQL-PCRWR
- Water Quality Parameters exceeding the WHO Drinking Water Guideline values (Guidelines for the drinking Water Quality, third editions, 2004) National Environmental Quality Standards (1999) and Pakistan Standard Quality Control Authority (PAKEPPA, 2008) are highlighted

Remarks: 'Safe Water'

Prepared By: (Lab. Analyst)		Checked By: (QC Incharge)	
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Environmental & Social Monitoring Report (Jan-Mar 2017)

	WATER QUALITY LABORATORY MUZAFFARABAD Pakistan Council of Research in Water Resources Ministry of Science & Technology, Government of Pakistan Shaha Nara Tariq Abad by Pass Road, Muzaffarabad Office Phone # 05822-920949
WATER QUALITY TEST REPORT	

Report Serial No.	WQL-MZD- 3076 -2017	District Name	Muzaffarabad
Name of Theist	Muzaffarabad	Town/ Union Council	Muzaffarabad
WQL Sample Code	MCL-PTN-(07)-T7-2017	Clint Code	PP.08.17
Sampling Date	8.08.2017	Reporting Date	12.08.2017
Sampling Site Address	Ex Beaching Plant Tube Well ,Lower Side		
Clint Name & Address	HSE Manager (DAEWOO E & C), Pakistan Patrind Hydropower Project		

CHEMICAL & MICROBIOLOGICAL PARAMETERS				
Sr.#	Water Quality Parameters	Units	Permissible Limits	Results
1.	Electrical Conductivity	(micro-S/cm)	NGVS	558
2.	pH	-	6.5-8.5 (PSQCA)	7.53
3.	Turbidity	NTU	<5 (PSQCA)	0.09
4.	Chloride	(mg/l)	250 (PSQCA)	17
5.	Chlorine	(mg/l)	0.3 (PSQCA)	0.00
6.	Bicarbonate	(mg/l)	NGVS	230
7.	Carbonate	(mg/l)	NGVS	0.00
8.	Calcium	(mg/l)	100 (PSQCA)	64
9.	Hardness	(mg/l)	500 (PSQCA)	200
10.	Sodium	(mg/l)	200 (WHO)	86
11.	Potassium	(mg/l)	10 (PSQCA)	4.0
12.	Total Dissolved Solids (TDS)	(mg/l)	1000 (PSQCA)	307
13.	Flouride	(mg/l)	1.5 (PSQCA)	0.00
14.	Total Coliforms (P/A Kit)	+ve/-ve	Nil (PSQCA)	-Ve

PSQCA: Pakistan Standard Quality Control Authority, P/A: Presence/Absence, +Ve: Presence of Bacterial Contamination, -Ve: Absence of Bacterial Contamination, NGVS: No Guideline Value Set, WFP: Water Filtration Plant, WQL: Water Quality Lab., BDL: Below Detection Limit

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- Water Quality Parameters exceeding the WHO Drinking Water Guideline values (Guidelines for the drinking Water Quality, third editions, 2004) National Environmental Quality Standards (1999) and Pakistan Standard Quality Control Authority (PAKEPPA, 2008) are highlighted

Remarks: 'Safe Water'

Prepared By: (Lab. Analyst)		Checked By: (QC Incharge)	
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Annex-7

Complaint Log

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Sr. No	Date		Issue	Plaintiff	Response		Status
	dd/mm/yyyy				OE	EPCC	
Labor Issues Monitoring Record							
1	7/12/2016	EPCC worker approach OE office with a complaint that his leg got broken while working on the project initially he was treated and the treatment cost was borne by EPCC however he was terminated from the job at a later stage before the completion of his treatment. The man return to the OE with a request to advise EPCC to complete his treatment.	Qazi Abdul Latif EPCC Worker	OE noted down his complaint and forwarded to EPCC and ask them to accommodate the worker.	EPCC agreed for his further treatment and made the compensation.	Closed	

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Community Issues Monitoring Record							
Sr. No	Date		Issue	Plaintiff	Response		Status
	dd/mm/yyyy				OE	EPCC	
1	18/10/2016	The residents of Alda Village approached the office of the Deputy Commissioner Muzaffarabad with the plea to instruct EPCC to deposit the excavated material in their land to level it and also construct a protection wall to prevent the deposited material from washing away. The DC office issued	Alda village community	OE team attended the meeting in the office of the DC along-with EPCC representatives. OE conveyed to the DC office that deposition of material along the river bank is an environmental issue and will attract the attention of EPA. OE proposed a joint survey with EPCC and community representatives to decide the locations where	EPCC marked the boundary and agreed to start material deposition in the selected areas. EPCC is currently working on the design of the protection wall and the work will soon commence.		Closed

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		summons to OE and EPCC for a meeting on 19th October, 2016.		material should be deposited. OE, EPCC & Community representatives carried out the joint survey in the afternoon on the same day. Areas suitable for dumping of the material were marked and OE asked EPCC to dump the material within the agreed boundary and construct the protection wall		
				In a follow-up visit on 20th October OE noted that no dumping of excavated material had started. OE approached the	EPCC responded that there is an internal dispute among the community members which is causing the delay in the commencement of work.	

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			EPCC and asked them about the reason for not starting the work.		
			OE suggested to conduct a meeting with the community members	EPCC responded that they are in touch with the community and had already requested a meeting but the community members have their commitments due to which they are currently unavailable for the meeting. As soon as EPCC gets a response from the community the meeting will be conducted in the presence of OE.	
			On 22/11/2016 OE ask EPCC to keep us update on this issue.	On 22/11/2016 We tried to start civil work to construct protection structure, however it was disturbed intentionally by villagers. They claimed land acquisition for the outer land of retaining wall planed.	
			OE suggests a joint meeting to resolve the issue.	Through meeting, some of land owner agreed excavation of 140 meters long retaining wall under the condition that EPCC give some contact whereas other land owner have not agreed excavation of the rest 170 meters long. Instead they demanded land acquisition of the land. After that a couple of meetings were arranged in the month of January by EPCC with the un agreed land owners, Daewoo E&C replied that land owner cannot claim for ownership of this river land to Daewoo E&C because it became part of river even though it used to be their land long time ago. A/C Muzaffarabad could not conclude as well because this dispute can be resolved only at the Court.	
			In February 2017, OE ask	In 3 rd week of February, eventually land owner accepted building 170 meters retaining	

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				EPCC to arrange a meeting with the un agreed land owners to resolve the issue.	wall on condition that they get some contract related to this wall.	
				OE ask for the agreement copy and the copy of the contract for the construction of protection wall.	EPCC replied, copy of the agreement and contract b/w EPCC and Alda village community.	
2	15/11/2016	Mr. Qadeer Qureshi complained that his house cracks were created due to blasting at weir site near Patrind village dated 18/9/2016 and demanded compensation.	Qadeerr Qureshi (Patrind village)	OE forwards the issue to EPCC and asks for repair works.	We've told him that we are ready to repair house cracks but Mr. Qadeer Qureshi is still insisting on cash settlement. Our responsibility is to repair house cracks, not cash payment. Therefore, this issue is being pended by Mr. Qadeer Qureshi, not us. We will submit our application to D/C office.	Closed
				OE suggest to provide repair material (Cement etc.) And also the labor payment to Mr Qadeer Qureshi to resolve the issue affably.	EPCC and Mr Qadeer Qureshi both agreed on OE suggestion. EPCC conducted house survey to calculate that how much repair material will be needed and in how much day's repair work will be done. EPCC provide all the related repair material accordingly and payed one-week payment of labor as the work will be complete in one week.	

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3	10/12/2016	They asked compensation for the affected area due to collapse of protection structure	Shoran affected village community.	OE forwarded this issue to EPCC	1) EPCC conducted pre-survey on November 21, 2016. We are waiting for revenue office's confirmation on survey findings. 2) Revenue office confirmed size of land to be acquired at the beginning of December, 2016. However, we are still waiting for their official letter including survey findings. Then we can submit official application for land acquisition.	Closed
				OE ask for updates on this issue.	Revenue office issued section 5 of land acquisition act 1894 Pakistan. In this section, Land owners can make objection on land acquisition, however they (Shoran village community) don't raise any objection. We can say procedures are coming to its final stage now.	
				OE ask for update on this issue	EPCC replied that the amount of 2837560 PKR for the required land which is 4 Kanal 13 Marla 1 Sarsai has been deposited in the govt. treasury, now govt. will pay to the land owner.	
4	17/03/2017	A complaint received from Tarcheela village community regarding the tubular well construction payment. According to the agreement b/w EPCC and Tarcheela	Tarcheela village community	OE forwarded the complaint to EPCC, Once EPCC agreed with the community and made a written agreement that the payment will be done in installments upon the presentation of	We are going to pay them 50% of the total agreed amount for the construction of tubular well which is Three hundred thousand PKR for which we have started our process and soon they will get the 50% amount. On 21st March 2017 EPCC replied that they are still in process of making the payment.	Closed

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		<p>village community, EPCC will pay them three hundred thousand PKR in installments for the construction of tubular well after Tarcheela village community present bills received from the contractor of tubular well. Now the Tarcheela village community is saying that they have presented the bills received from tubular well contractor but EPCC is not</p>	<p>bills, now it is obligatory on EPCC to follow the agreement.</p> <p>On 21st March 2017 OE ask EPCC for updates on this issue and also ask for the documents which proves that the payment has been made to the community.</p> <p>On 30th March 2017 OE ask EPCC for updates on this issue and also ask for the documents which proves that the payment has been made to the community.</p>	<p>On 25th April 2017 EPCC replied that one hundred fifty thousand PKR payment has been made to the tarcheela community representative Mir Rehmat Qureshi and the rest of the payment will be given upon the completion of tubular well.</p> <p>On 22nd June 2017 EPCC replied that the final payment of one hundred fifty thousand has been paid to Tarcheela village representative Mir Rehmat Qureshi.</p>	
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		paying them the payment and saying that after the completion of tubular well EPCC will pay them the agreed amount.		On 1st June 2017 OE ask EPCC for updates on this issue and also ask for the documents which prove that final payment has been made to the community.		
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