



Environmental & Social Monitoring Report (July to September 2014)

Project Number: 44914

PAK: Patrind Hydropower Project

Prepared by Star Hydro Power Limited

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Asian Development Bank



STAR HYDROPOWER LIMITED

147 MW PATRIND HYDRO POWER PROJECT

ENVIRONMENTAL & SOCIAL MONITORING REPORT

(JULY-SEPTEMBER 2014)



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A COMPANY OF KOREA WATER RESOURCES CORPORATION

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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 Labour 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 lenders' 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

a. Project Name and Summary Information

i. Project/Business Name

Patrind Hydropower Project

ii. Status of Construction

The Notice to Proceed (NTP) for main works was issued by the Company to EPC Contractor on December 26, 2012. However the preliminary works under Preliminary Contract were initiated in October 2010 and were dovetailed in to the main contract. As of September 2014 the physical progress achieved is 34.60%.

iii. Location of project

Village Patrind, District Muzaffarabad, Azad Jammu and Kashmir

iv. Nature

Run of river Hydropower Project.

v. Scale/size

147 MW

vi. Date of construction/operation commencement

Preliminary works commencement: September 2011

Main works start after issuance of NTP: December 2012

vii. 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>	

b. Relevant Environmental Permits or Compliance Certificates

a) Summary of permit conditions and media covered:

As per NOC Issued by AJK-EPA, SHPL/EPC is bound to:

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 has been 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 during last year. Copy of approval and EIA report is part of contract made with Contractor.
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 are 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 sent to EPA-AJK. Spoil is being 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 deem 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 the EPA-AJ&K covering the changes to be made in the design.
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Most of the conditions are common in both approvals with few exception of following issued by EPA KPK:

Condition	Status of compliance
Water in the pond created by construction of Patrind weir should be maintained at EI765m.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 from765m.amsl to 767m will act 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 on (month/date). 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”.

c. Incidents of Violations or Non-Compliance

To prevent incident and mitigate risks during the quarter, close supervision by Owner Engineer’s (OE) HSE team has been carried out. Non conformities were highlighted through correspondence (Non Conformity Reports (NCRs), Letters and site notes) and during formal and informal meetings. Remedial measures and corrective actions on part of EPCC have also been undertaken but still needs improvement in maintaining standards required for the Project. Incidents of violations and non-compliances by EPCC and its sub-contractors were included in daily, weekly and monthly reports.

Detail of correspondence with OE regarding non-compliances during the quarter is given in the table below:

Letters/Site Notes & Non Conformity Reports (NCR) issued by Owners Engineer during Quarter

Sr.No	Owners Engineer Correspondence		Subject	Engineering Procurement and Construction Contractor's response	
	Letter /NCR/Site Note Ref #	Date		Action Taken	EPCC Reference No
1.	LET/PES.ST-EPCC/504	2014.07.03	Improper Disposal of Chemical Waste	MSDS provided and remedial actions were undertaken on upper site Batching Plant, which has now been shifted on new batching plant area.	Patrind-14-538
2.	LET/PES.ST-EPCC/533	2014.07.17	Community-Lit Fire Incident Reports	Reports submitted	Patrind-14-565
3.	NCR-027	2014.07.20	Non Conformity Report	Warning letters issued to 6 violators and further investigation carried out.	Patrind-14-467 (closed)
4.	LET/PES.ST-EPCC/544	2014.07.25	Surge shaft Access Road Construction APP and Incident Report	Radio was arranged by HESPAK. Dike was prepared as per OE's suggestions.	Patrind-14-464 No more response required
5.	LET/PES.ST-EPCC/546	2014.07.26	Corrective Action Report – NCR#027	Requisite documents and detailed investigation report submitted	Patrind-14-567
6.	LET/PES.ST-EPCC/573	2014.08.19	Study and Monitoring of Fish Fauna in River Kunhar	Queries regarding fish status in Kunhar river have been sent to Fisheries Expert for further clarifications.	During recent study concerns were addressed and this has been shared with OE.

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7.	LET/PES.ST-EPCC/574	2014.08.20	Incident Reportage		Patrind-14-560 & 565
8.	LET/PES.ST-EPCC/592	2014.08.31	Accidents at weir site	Pending incident reports were submitted.	Patrind-14-560
9.	NCR-030	2014.09.03	Delay & lack of incident and accident reporting	Pending incident reports were submitted (closed)	Patrind-14-565
10.	LET/PES.ST-EPCC/599	2014.09.04	HSE plan for breakthrough in HRT	Method statement was submitted by Construction Department	Patrind-14-570
11.	LET/PES.ST-EPCC/616	2014.09.12	Urgent- Rising water levels in the River Jhelum	Personnel and equipment were moved away from river banks and precautionary measures were undertaken.	Patrind-14-582
12.	LET/PES.ST-EPCC/617	2014.09.14	Conditional closure of NCR's #27 & 30- Incident reports	Requisite information has been sent to OE	Patrind-14-635
13.	LET/PES.ST-EPCC/618	2014.09.14	Flood emergency- Near miss incident	Recommendations would be followed during future operations accordingly.	EPCC has not been asked for resubmission of incident report, only to follow the recommendations which are being followed.

Unsafe Act (UA) & Unsafe Condition (UC):

To mitigate risks of accidents UA/UC Observation Card System was introduced 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 in the construction sites (?).

In order to get maximum feedback from Project employees the best observer award system was introduced to encourage employees for making observations. In total, 21 UA/UC cards were received during reporting quarter (**Annex-1**). Other alternatives of monitoring like daily safety manager report received from all section have also been used to get feedback from employees.

Warning Letters for Non-Compliances:

During reporting period, depending on nature and severity of violation, warning letters have been issued to the violators by EPC contractor. Verbal warning is given for the first time on minor violations. If any employee fails to abide by EPC contractor's HSE policies after verbal warning he is given a written warning letter. 29 warning letters were issued by the EPC contractor for incident for violations of HSE procedures. List of warning letter is given in the table below. As per EPC's standard procedure after three warnings employee would not be able to continue its job. However, before removal it is important to ensure that individual has been informed / trained and provided with the necessary equipment.

WARNING LETTERS

Sr.	Safety Violator	Designation	Company	Dated	Warning Reason
1.	Mr. Waqar Ahmed	Site Engineer / Geologist	HITECH	06/07/2014	PPE Violation
2.	Mr. M. Ashfaq	Excavator Operator	HESPAK	16/07/2014	Unsafe Behavior
3.	Mr. Hwang In Chang	Construction Manager	Kyungdong	17/07/2014	Unsafe Behavior
4.	Mr. Fayaz	Wheel Loader Operator	HESPAK	17/07/2014	Unsafe Behavior
5.	Mr. Park Soon Mok	Project Manager	Kyungdong	17/07/2014	Unsafe Behavior
6.	Mr. Zia-ul-Islam	Excavator Operator	Kyungdong	17/07/2014	Unsafe Behavior
7.	Mr. Bilal Ahmed	HSE Doctor	Daewoo E&C	26/07/2014	Aggressive Behavior with HSE Manager
8.	Mr. M. Naheen khan	steel fixer	HESPAK	22/07/2014	PPE Violation
9.	Mr. M. Nawaz	steel fixer	HESPAK	22/07/2014	PPE Violation
10.	Mr. Umar	steel fixer	HESPAK	22/07/2014	working without induction
11.	Mr. Naseeb akthar	steel fixer	HESPAK	22/07/2014	working without induction
12.	Saeed ur Rehman	Driver	Kyungdong	1/08/2014	Unsafe Behavior Expired driving license, over

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Sr.	Safety Violator	Designation	Company	Dated	Warning Reason
					speeding.
13.	Samiual -haq	S/Engineer	HESPAK	05/08/2014	No PPEs, unsafe behavior
14.	Mubashir	workshop officer	Daewoo	08/08/2014	Failed to supervise, Creating environment issue
15.	Inayat Hussain	HTV Driver	Daewoo E&C	11/08/2014	Unsafe Behavior, Failure to Supervise
16.	Tauseef Ahmed	HTV Driver	Kyungdong	11/08/2014	Unsafe Behavior
17.	Gul Hassan	Carpenter	HESPAK	13/08/2014	
18.	Danish	Carpenter Helper	HESPAK	13/08/2014	
19.	Shahzad Ahmad	Male Nurse	Daewoo E&C	16/08/2014	Failure to comply with duty on 15/08/2014
20.	M. Arif	Excavator Operator	HESPAK	17/08/2014	Unsafe Behavior , Using mobile phone while operating excavator
21.	Danish	Helper	Daewoo	24/08/2014	operating without authorization, un safe behavior
22.	Kamran khan	Welding man	Daewoo	26/08/2014	operating without authorization, un safe behavior
23.	Dilnawaz	Male nurse	Daewoo	26/08/2014	
24.	M. Qadeer	HSE Labor	Daewoo E&C	28/08/2014	PPE Violation, Unsafe behavior, Misbehavior with super visor
25.	Saeed ur Rehman	Driver	Kyung Dong	01/09/2014	Unsafe Behavior
26.	Lee Kwang Jae	Site Manager	Daewoo E&C	14/09/2014	Fall Protection Violation
27.	Lee Kwang Jae	Site Manager	Kyung Dong	20/09/2014	Failure to supervise
28.	M. Jamshaid	Construction Manager	HESPAK	29/09/2014	Unsafe behavior
29.	M. Bilal	Carpenter	Daewoo E&C	30/09/2014	Using faulty tools

d. Incidents of Environmental and Safety Accidents

a) Environmental Accidents and Mitigation

- On 5th September 2014 at lower site along River Jhelum due to flash flood a huge amount of spoil and excavated material was washed away. However, chemical, oil and hazardous material was shifted on safer locations.
- During the reporting period minor soil contamination due to inappropriate handling of oil has been observed.
- Dust on Project access roads due to vehicles movement has been mitigated through frequent sprinkling.
- HRT waste water sedimentation/treatment tank was damaged at upper site which has been reconstructed. Whereas, at lower site new settling chambers and tanks have been established to treat the waste water before entering in river. Overtopping (rarely) due to delayed cleaning has resulted into downstream water contamination.
- HRT air quality has regularly been monitored, after HRT breakthrough it has naturally improved.
- During months of July & August 2014 non-compliance observed in managing waste in particular with regard to lack of segregation on source and timely disposal. However it has considerably improved in September 2014.
- The excavated material is being transferred to the disposal area at upper site but no embankment has yet been constructed to protect spoil erosion due to rise in river water or flood. Whereas, at lower site it is being dumped on approved site near bridge and is being used in civil works
- Following preventive and mitigation measures were adopted;
 - ✓ Used lubricants, cylinder etc. are stored in separate designated areas with proper barricading and signage.
 - ✓ Water filtration plants are installed on both sites to ensure clean water access to Project employees. Confirmatory tests were undertaken to ensure water quality.
 - ✓ Shotcrete activities have been undertaken to stabilize slopes and to mitigate risk of erosion. Besides this, polythene sheets were placed on slopes to prevent soil erosion and minimize landslide risk.
 - ✓ Soakage pits and septic tanks have been constructed to treat sewage waste with newly constructed labor camps.
 - ✓ Gaseous concentration (CO, H₂S, LEL, and O₂) in Adit and Headrace tunnel is being monitored on daily bases using gas detector. Monitoring of CO₂, N₂O, NO₂ and dust has also been undertaken.



Slope protection works on both sites

- ✓ Excavated material is being dumped in designated disposal areas on both sites preventing serious waste problem.
- ✓ 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.
- ✓ Quarterly Fish fauna and vegetation studies were undertaken.
- ✓ Annual landslide stability study was conducted after monsoon as per Project EMP.
- ✓ Biannual water quality monitoring has been undertaken in accordance with Project EMP.
- ✓ Hunting and fishing activities are prohibited on Project sites.

b) Health and Safety Accidents and Mitigation

During the reporting quarter, coordination meetings, monitoring and inspections were undertaken jointly by EPCC and OE's HSE staff with regard to site HSE status mainly for appropriate waste management and blasting activities.

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

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Incident	Frequency	Description	Media or Community Reaction
Fatality	None	None	None
First Aid Case	02	<ol style="list-style-type: none"> 1. A worker was busy in Pull-Out testing, and wanted to fix the coupler plate. His left hand got pressed between the coupler plate & charging car & got minor injury. The IP was brought to the site clinic and after the first aid he was sent to the Garhi Hospital, X-Rays for his left hand were done and his reports declared that there were no fractures observed on his left hand. 2. Mr. Jahangir Kyung Dong's labor was performing explosive charging activity and rocks started to fell down. A small pointed rock slipped inside the long shoes, as he was wearing long rubber shoes. This small pointed stone piece made a cut on the left limb of Mr. Jahangir. He started to run away and got slipped and fell down, although he was wearing full PPE, but his helmet slipped out of his head and his head hit the ground, his left side of the head got injured. Next Working Day in the morning, IP arrived to the Kyung Dong site office for work, but the site engineer Kyung Dong Mr. Lee- Keon-Jay advised him to have further rest and gave him three Paid Leaves. 	None
Damage only incident and Near Miss	03	<ol style="list-style-type: none"> 1. On 11th August 2014 at 14:20, Mr. Inyat Kyung Dong driver was doing his duty on dump truck and he wanted to go to Powerhouse from access bridge area, when he was going towards the power house, he just reached under the access bridge and noticed that at his left side a motor cycles were parked, and the other side Kyung Dong water tank was parked and he tried to pass them but his judgment was wrong because there was not enough space between them. Suddenly his truck hit the water tanker parked in front. Luckily in the incident nobody was in the vicinity, therefore nobody was injured and driver was safe too. 2. During flood emergency evacuation activities on 5th September a loader was trapped in collapsed portion of access bridge which was safely recovered, however, it was a risky job as access was completely eroded after recovery. 3. On 20th September 2014 during blasting, sub-contractor EJTECH's worker entered in HRT. Although he remained safe as he was on a considerable distance from blasting zone but this sort of negligence may result in a major incident. Therefore, incident was categorized as Near Miss and subsequently was reported by EPCC. 	None
Property damage/environmental incident	01	<ol style="list-style-type: none"> 1. A flood alert was issued by District Administration Muzaffarabad on 3rd September 2014 through local media. Since midnight 4th & 5th September 2014 water level started to 	Damages were reported through all

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Incident	Frequency	Description	Media or Community Reaction
		rise as River Jhelum and was flowing above the danger mark after incessant rain. Personnel and equipment were evacuated to a safe area on 4 th September 2014. EPCC maintained a close liaison with h the Disaster Management and District Administration of AJ&K to deal with any emergency and water level fluctuation. The entire access to the site was restricted by EPCC for safety reason. Powerhouse area, Batching plant area, M&E workshop & warehouse were flooded. The river overflowed the protection dyke and the whole Powerhouse structure area was flooded.	print and electronic Media
Medical Checkup / Examination / Treatment		July 2014: 67 (19 Upper Site + 48 Lower Site) August 2014: 141 (48 Upper Site + 93 Lower Site) September 2014: 132 (Lower site = 87, Upper site = 45) 340 Staff and workers visited medical facility during the quarter. However, majority of all visitors having normal checkup minor in nature like gastro enteritis, flue and headache etc.	None

Safety Milestone

First safety milestone was achieved in November 2013. About 2.6 Million Safe Man Hours have been completed by EPCC till 30th September 2014 without any Loss Time Injury (LTI) / fatality (After February 9, 2013 fatality incident)

External Monitoring /Inspection

Sites HSE internal inspection has remained an ongoing activity. Monitoring has been carried out frequently by Owner Engineer (PES).

AJK-EPA's team headed by DG Environment conducted post EIA monitoring visit on 25th August 2014 and made few observations with regard to HRT waste water discharge, local employment record and improvement in CSR activities.

ADB Monitoring Mission visited sites on 27 & 28 August 2014. During the wrap-up meeting held on 28th August 2014 at weir site, following observations, reservations and recommendations have been articulated by the ADB's team:

Social:

1. ADB emphasized on constant and enhanced consultation with local community, including NGOs working in local area for improvement of Company's corporate social responsibility. All consultations with APs, communities, and NGOs/CSOs, whether formal or informal should be properly documented (ie noting the date/participants/venue, agenda/topics discussed, concerns/issues raised, agreements reached, and actions required) and concerns raised during meeting should be addressed appropriately. The concerns of communities and NGOs will also be properly reported in the quarterly report to ADB.
2. SHPL and EPC contractors to explore and devise culturally appropriate and acceptable ways (for instance engaging female staff or consultant) of conducting dialogues and consultations with women, youth, and other vulnerable groups to help spread correct and updated information as well as listen and address the concerns and suggestions they raise.
3. SHPL to continue to follow up with the Government on the decision for the community land compensation. SHPL to conduct investigation on the allegation regarding blocked access to a landowners' remaining land.
4. Company to continue following up with relevant government units to establish the grievance redress committee as indicated in the Resettlement Plan or discuss with the government on a more feasible GRC composition to enable its establishment.
5. Clear procedure and instructions for access or use of the HSE Clinic must be posted outside the camp offices on both sites so that the locals are aware how they can use and visit the clinic without any restriction as there are complaints that the guards do not allow them to enter in the camp office sites. SHPL and EPC also need to present the procedure during the community dialogues.
6. ADB supports the project's initiative to improve the water supply connections for Sarati and Patrind village as part of social uplift activities. Alda villagers agreed to plan and put in place a community committee or users' group to maintain and sustain the community projects supported by SHPL. SHPL will monitor and report on progress. Access roads used by Project should be rehabilitated and maintained.
7. Employment opportunity should be disclosed to the local through newspaper advertisement, and open notices and further enhance their information dissemination activities on available jobs by posting vacancies in public places where people frequently pass by or visit such as market places, shops, and village halls/meeting places. These advertisement will clearly indicate the qualifications and experience required and a clear job description for each position.
8. During the development and implementation of the Income Restoration Program, SHPL and The Refuge will consult closely with the affected people, including women and vulnerable groups as indicated in the Resettlement Plan. During discussions with the APs on the income restoration activities SHPL and Refuge agreed to present insights on socioeconomic development directions in AJK and KP, demands in and linkage to the

local economy. It will also be useful to explore possible linkage, collaboration, or partnership with relevant government agencies or NGOs with similar activities in the area.

Environmental:

1. EMP compliance status should be detailed in quarterly reports.
2. HRT waste water must be treated appropriately before entering in river, especially upper site sedimentation tank must be reconstructed /rehabilitated.
3. Slope protection with shortcrete should be undertaken immediately to avoid the risk of soil erosion and destabilization.

Later in the quarter, Financiers' Technical advisor (the "FTA") visited the site and emphasized over the appropriate waste collection and improvement in documentation.

Internal Inspections Conducted During Reporting Period

To mitigate safety incidents, machinery, equipment and electrical appliances are being inspected regularly by EPCC to ensure fitness through color coding system. List of inspections done during the quarter is attached as (**Annex- 2**).

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. Inside HRT, proper gas and dust inspections were carried out on regular basis before and after blasting activity for inspection of the magnitude of hazardous gases and ensuring the air quality inside tunnel.

Furthermore, HSE internal audit by Daewoo Head Office team was carried out during month of August 2014.

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. Installation of new safety sign boards.
2. Workers have been provided with necessary Personal Protective Equipment (PPE) comprising of helmets, safety shoes and safety jackets and ankle belts to prevent injuries.
3. Warning letters have also been issued to the personnel found to perform activities that are against the rules and regulations of the HSE.
4. Newly employed staff, labor and daily wagers were given HSE inductions so that they are aware of potential risks associated with the construction sites emergency procedures.
5. Safety campaigns and awards are distributed to encourage and develop safe work behavior in labor and staff.
6. Collection of waste water from batching plant was improved on weir site.
7. To mitigate safety incidents, machinery, equipment and electrical appliances are being inspected to ensure fitness.
8. Regular trainings/education sessions for staff and labor.
9. Water sprinkling on Project access road for community health and safety.

Permit To work (PTW):

For the following activities have been issued during the quarter;

1. Welding/ Open Flame Work Permit
2. Blast Permit
3. Confined Space Entry Permit
4. Work at night

e. Labor Relations and Conditions

(i) Nature of labor dispute or grievance

During the reporting quarter no incident of labor dispute was observed, recorded and reported.

(ii) Legal requirements, Permit conditions and renewal requirements

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

(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 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.

Media or community reactions (if any)

No reaction was observed from media or the community.

(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

During the reporting quarter, new accommodations have been constructed on lower site because at upper site sub-contractor Sungbo C&E has resumed their activities. During month of July 2014 (Muslim's holy month of Ramadan) pace of work was slow due to reduced working hours.

All staff/workers before induction have been educated to respect local norms and never involve in any conflict with locals. Furthermore, to manage these accommodations community liaison officer / coordinator (04) are employed from local area. Basic services electricity, water and gas have been provided. Safety measures such as fire extinguishers and emergency contact numbers are available. Fire alarm system has been installed on main camps and site offices on both sites. Ambulance drivers are aware of all accommodations to

have prompt access in case of any emergency.

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 all staff and labor and payment for their wages/ salaries, housing, feeding and transport. However, the local staff/workers do not need housing in the 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	More than 150 of unskilled jobs have been provided to nearby communities (Alda, Thori, Patrind, Tarchela, Sarati, and other adjacent localities). 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	

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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.	<p>The pay rates of wages are comparatively better than the local prevailing rates. Temporary skilled workers = Rs. 700-800 .Temporary unskilled workers= Rs. 500-550 whereas in local market it ranges from 600-700 and 400-450 respectively.</p> <p>Minimum salary as per local labor law was 7,000 per month till 30th June 2013 which has been increased up to 9,000/- per month. While in the project the minimum salary for the permanent worker is 13,000/-</p>
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PERSONS IN THE SERVICE OF OTHERS

The Contractor shall not recruit, or attempt to recruit, staff and labor from amongst the Employer's Personnel.	Full compliance of the condition was observed during entire quarter
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LABOR LAWS

<p>International Human Rights & Core Labor Standards</p> <p>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.</p>	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	Compliant boxes are placed on each site. 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. However, no female is working as worker due to nature of job and local customs/norms.
Freedom of association and the effective recognition of the right to collective bargaining	No ban is imposed on workers with regard to freedom of association which is evident from the previous strikes for collective interests. However, formal labor union or association has yet not been established.

WORKING HOURS

No work shall be carried out on the Site on locally recognized days of rest, or outside normal working hours, unless: (a) Otherwise stated in the Contract, (b) the Employer gives consent, which shall not be unreasonably withheld, or 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	Work has been carried out on weekends but only with the consent of concerned staff/labor.
FACILITIES FOR STAFF AND LABOR	
(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 of the Project availability of clinical staff and facilities has been insured full time. 340 staff and workers visited medical facility during the quarter. However, majority of all visitors having normal check up with very few exceptions of minor cuts but rest are of minor in nature like gastro enteritis, flue and headache etc. Availability of first aid boxes has also been ensured at all sites. Furthermore, for major injuries and illness MOU with Muzaffarabad General Hospital exists, however, no case has yet been sent to this private hospital.

(vii) Implementation of local labor standard

- GoP Labor Policy 2010 implemented.
- 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.
- Standards consistent with IFC's EHS General Guidelines.
- Prefer to hire unskilled /skilled staff and labor from AJ&K or KP.

(viii) 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 which has been implemented during quarter.

(ix) Local Employment Status as of 3rd Quarter 2015:

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 locals. As of

<u>LOCAL EMPLOYMENT STATUS</u>													
Company	AJ&K							KPK				Others	Total Employees
	Allrha	Thori	Patrind	Tarshila	Shoran	Other AJ&K	Sub-Total	Bol	Dalola	Others	Sub-Total		
Daewoo	0	27	10	0	0	93	130	11	16	26	53	60	183
Sungbo	0	0	4	2	1	11	18	2	10	8	20	3	38
Kyung Dong	9	10	12	0	0	53	84	1	8	10	19	10	103
Total	9	37	26	2	1	157	232	14	34	44	92	73	324
	2.78%	11.42%	8.02%	0.62%	0.31%	48.46%	71.60%	4.32%	10.49%	13.58%	28.40%	22.53%	100.00%

September 2014, a total of 324 people from AJ&K and KP have been employed by the project. Of these people, ____ people are from the villages affected by the land acquisition (See table below). The decline of the employed people in construction (from 429 in June) is due to _____.

Compliance with legal requirement for employment

Project Legal Agreement/Contract	Conditions/Requirements	Compliance Status
EPC Contract Section 6.1 “Engagement	“The Contractor and its subcontractor(s) shall prefer, to the extent practicable and reasonable, to hire unskilled staff and labor from the local communities (AJ&K or KP). Moreover, where skilled staff and labor with appropriate qualifications and experience are who are residents of AJ&K or KP especially who are the affectees of the Project”	Employment record detailed in above table
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 appr oval 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

f. Environmental and Social Capacity

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

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, weekly internal meetings and meetings with site construction teams have regularly been conducted on both sites list of meetings is attached as (**Annex-3**). 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. Training /Campaign/Awareness Raising Programs Carried Out during Quarter:

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. List of the trainings and campaigns undertaken during the quarter is attached as (**Annex- 4**).



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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.

The induction trainings done during the quarter is given below;

Table: Inductions

	Total No of Induction Trainings		Total No. of employees inducted	
Months	Lower Site	Upper Site	Lower Site	Upper Site
July	25	01	50	04
August	50	4	146	6
September	35	31	96	63

vi. Tool Box Meetings

This is a consistent activity undertaken daily by EPCC before the start of every construction shift and is part of 3.5 Safety Campaign. Activity reports are being received from construction teams including sub-contractors. Daily safety message is 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 conducted during quarter on both sites.



viii. Monthly Safety Award

To promote staff and workers and promote safety culture on sites safety awards were given during reporting period.

Table: Safety Awards

3/7/2014	Sr.	Names	Company	Award	Location
	1.	Mr. Sang Tae Ho	Daewoo E&C	Best Manager	P/H Site
	2.	Mr. Muhammad Saeen	Daewoo E&C	Best UA/UC	Weir Site

ix. Needs assessment of environmental and social management capacity (as relevant)

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 training needs of the staff and labor during the quarter.

1. Electrical safety
2. Work on height
3. Waste segregation on source
4. Standard Operating procedures for Blasting

g. Stakeholder Consultation/CSR Activities

With regard to changes in design at weir site, consultations were undertaken with locals at weir site and both AJK & KPK EPAs. Involving communities and all other stakeholders' values and recognizes the stakeholders right to information about the Project, as well as their right to voice their views and concerns. Consultations were conducted in the Project area not only to satisfy the legal requirements but also to improve and enhance the social and environmental design of the Project.

The overall objectives of the public consultation process were as follows:

- ✓ To provide information related to changes in the design to stakeholders;
- ✓ To facilitate and maintain dialogue and gain the confidence of all stakeholders on carrying out Project activities in the area;

- ✓ To seek participation of all interested parties and identify stakeholder interests and issues;
- ✓ To create solutions for addressing these concerns and integrating them into Project design, operations, and management; and
- ✓ To encourage transparency and inculcate trust among various stakeholders to promote cooperation and partnership with the communities.

The communities were satisfied with the earlier arrangements with the Project team and didn't express any concern regarding the proposed changes in the design. Details of the consultations are below:

(A) Sarati Village

A public consultation was carried out on September 13, 2014 with regard to design change of Patrind Hydropower Project at the weir site. Following key members of Sarati Village were consulted:

1. Mr. Shah Zaman
2. Mr. Abdul Rehman
3. Mr. Muhammad Khalid
4. Mr. Muhammad Sajjad
5. Mr. Muhammad Rashid
6. Mr. Aurengzeb
7. Mr. Muhammad Sajid
8. Mr. Muhammad Arif
9. Mr. Wazir Ahmed
10. Mr. Muhammad Azhar

A focus group discussion was organized with these key members of the community. General public from the Sarati village discussed the design in detail to get the clear idea of the changes, which showed that the community is well aware and educated about the Project. The main concerns which were identified during survey are as follows:

- ✓ The blasting activity for the construction of new tunnel (bypass)
- ✓ Regular water sprinkling for dust suppression during the excavation of slopes
- ✓ Control on noise level due to movement of heavy equipment and construction machinery
- ✓ Concerns over increase in the level of water after weir construction
- ✓ Movement of their families especially women and children should not be restricted with the execution of the project activities
- ✓ In case of damages to the community, the compensation procedure should be set in in writing

- ✓ The community members expressed that with the start of further work the employment opportunities will increase for locals. They also added that they will also have more business opportunities in the area with the new works due to design change
- ✓ The community members conveyed that with the construction of road on the weir it will make easier access for us to see and meet our relatives on the left bank and to go there on the other side



(B) Patrind Village

A consultative meeting was held with local community of Patrind village. Purpose of the aforesaid consultation was to provide timely and transparent information regarding changes in design, impacts and mitigation measures and involve them in decision making and to get feedback to voice their concerns.

Date of Consultation: 20th September 2014

Time of Consultation: 13:30-15:00 Hrs

Company's Representation:

1. Mr. Muhammad Aftab Alam (HSE Manager)
2. Mr. Javaid Awan (Assistant HSE Manager)
3. Ms. Ummara Queshi (Environment Officer)

Minutes of Meeting

HSE Manager started the consultation with welcome note and explained the participants regarding requirements and purpose of the consultation and proposed changes in Project design were disclosed using local language which was easily understood by the community personals. They were informed of Project socio economic benefits at local and national level and their contribution was acknowledged and appreciated. Their rights in light of ADB's social and environmental safeguards and as per contractual obligations were communicated clearly. During open discussion following concerns were raised by the community personals including PAPs:

- Pending land acquisition issues should be addressed. Also their house should be acquired on rental basis by the Company as it is located very near to the site fence.
- Compensation for already damaged structures should be made. In this regard the PAPs were told by the team that the post blast survey was conducted jointly by government and Company and it was evident that damage was not due to blasting at Project sites, however, before construction on changed structures especially bypass tunnel and weir pre and post blast survey will be carried out.
- During consultation it has been demanded by the locals that Company should facilitate the construction of government girls' primary school in Patrind village as goodwill, same as the Company had already facilitated in Deedal village of KPK side.
- Local movement must be facilitated establishing new track between Patrind and Tarcheela village and across the Project sites.
- Local employees who have been terminated previously during downsizing should be reinstated as the works on sites are restarted.
- Local labor should be given daily charges in compliance with labor law and better then the market prevailing rates and should not be discriminated and be given due respect.
- Water supply to the Patrind village must be improved.

A separate consultation session was held with local women by the Environment Officer Ms. Amara Qureshi who had shared same information with them.





Photographs of Public Consultation Patrind Village



Community consultation in Tarcheela village regarding design change (27-09-2014)

Sarati Village (Individuals)

The nearest house likely to be impacted by the design change of the Project was of an individual Muhammad Saleem from Satri village. His consent has been taken in the form of undertaking. He has also been compensated for his property in initial phases of the Project. He did not express serious concerns and signed an undertaking for the proposed design changes.

Details of consultations, if any, with local communities, nongovernmental organizations, civil society groups, and other stakeholders, including affected people:

Some professional services on quarterly basis are being hired by EPCC from locally based individuals and organizations during the quarter. Following organizations have been consulted to improve Company's CSR activities and undertake activities under EMP and Social uplift Plan:



Consistent liaison with adjacent schools



provided barrel for school lavatory

Table: Organizations/NGOs consulted during the quarter

Organization Name	Location	Purpose/ issues discussed	SHPL Response/Actions to address Issues
1- Sahara Welfare Organization	Dalola- (Upper Site KPK Part)	<ul style="list-style-type: none"> ▪ To promote Environmental and Safety Awareness among locals and school children. ▪ To inform the local community about socioeconomic benefits of the Project at local and national level. ▪ To involve them in Project development activities ▪ To create a sense of Project ownership as stakeholders 	<ul style="list-style-type: none"> ▪ Environmental monitoring activities are being organized by a local NGO Edinburg Direct Aid and reports were received during the quarter. ▪ Like Previous quarters, 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. ▪ After receiving water quality test results, EPCC is planning to make aware locals of contaminated sources and preventive measures against water contamination. ▪ Flora and Fauna Study by local Fisheries and wildlife expert Mr. Yousaf Qureshi who is also retired Director Fisheries Government of AJK.
2- Rural Development Foundation	Sarati- (Upper Site KPK Part)		
3- TanzeemUlwana	Daedal Mera- (Upper Site KPK Part)		
4- Kunhar Welfare Organization	Patrind- (Upper Site AJK Part)		
5- Press for peace	Muzaffarabad- (Lower Site AJK)		
6- Local Action Committee	Thuri/Lower Chatter Muzaffarabad- (Lower Site AJK)		
7- Pakistan Red Crescent Society	Muzaffarabad- (Lower Site AJK)		
8- Edinburgh DIRECTAID	Muzaffarabad- (Lower Site AJK)		

h. 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-5**).

a. Environmental monitoring under EMP:

Internal Environmental and Inspection checklist is developed and being filled on daily bases (**Annex-6**). Besides this following activities have been undertaken as part of environmental monitoring:

i. Land slide Stability/Catchment Monitoring:

Annual monitoring after monsoon was undertaken immediately after the devastating spell of torrential monsoon rains in the mid of September, 2014 monitoring team visited the area and examined landslides at certain locations. Study builds on field photographs taken to assess slope conditions at certain selected locations and onsite observations after the monsoon rain-fall seasons. it is established that areas around the lower site of project are still "highly" to "very highly" susceptible to future land sliding and warned of future land sliding hazard, especially after the summer monsoon seasons. It is fact that those slopes that still show fissures should be further investigated or monitored for management purpose. The monitoring and quantification of destabilized slopes after each consecutive monsoon seasons will provide evidence to conclude that disaggregated material and unstablized slope masses, eroded by rainwater and flash floods.

Detailed Report is annexed as **Annex-7**.

ii. Fish fauna Study/Monitoring:

Quarterly Study/monitoring was undertaken in Kunhar River (Up & down stream of Project site) on 24th September 2014. Sampling was carried out at the six study points. There is no apparent difference in the results of the last three studies which showed that the impact has not significantly appeared on the aquatic environment of the River Kunhar. This is mainly because of the ecology of the river has not changed very much except at the outlet of the diversion at Patrind. The major change in ecology is expected after the weir construction 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. The species composition may change and some species may disappear with the change of river ecology. Detailed report is annexed as **Annex-8**.

iii. Flora Study/Monitoring:

The area is again green but the major part of the area is covered by the grasses which the people prefer to have for grazing their cattle. They are least concerned for the damage to the bushes and the trees as the level of their awareness is very limited about that. There is a danger of sudden outbreak of the fire again which may cause a great damage to the project as

well along with the surrounding forest area on both the sides i.e., Alda and Patrind. The slide area at the left bank of the project area at Alda has further been expanded horizontally and vertically. This has come to the edge of the project area and mass movement of the soil can have serious impact on the project area. There is continuous water flow in the slide which needs a proper treatment. The soil of the slide area is shingle with a productive mixture of silt and clay. It is very difficult to control the slide with only engineering structures. Treating with shortcrete instead of treating it with plantation and bio engineering will not be a permanent solution to it. The project is mostly looked after by the Engineers and to them, it is the easiest and permanent solution for treating the slides. The loss of biomass quantum is not as significant as there has been a low vegetative cover in this area. Most of the Chir pine trees in the area to be submerged were found in Pole stage (age 20-30 years) with few at tree stage. The same is the case with other broadleaved species. There are few trees noticed defective and leaning condition. Two of them are dead and lying on the ground.

No new removal of trees has been observed as some trees were harvested on the inlet and outlet of the tunnel before where land was been affected to some extent which still needs a careful treatment. Detailed report is attached as **Annex-9**.

iv. Water quality Monitoring

Drinking and waste water quality monitoring has been undertaken during last quarter. The Company is planning to communicate these to the locals as well. Sample monitoring result is annexed as (**Annex-12**).

Table: Compliance with NEQ's

Environmental component	Standards (NEQS)	Compliance/Mitigation measure	Remarks
Air Quality	EPA ambient air quality (EPAs standards for each Parameter)	NEQS: Detecting seven hazardous gases in tunnel to ensure the Air Quality in Tunnel. i.e. CO (50 PPM to 100PPM),CO2,NO,NO2,O2,H2s,LEL (Methane) 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.	Although ventilation is improved in HRT after breakthrough but still gases test record is maintained on daily bases on both power house and weir site tunnels during blasting activities.
Water quality	WHO Guidelines (EPAs standards for each Parameter)	Tests for drinking and waste water quality have been conducted during last week of September 2014. Waste water from tunnel is treated as more sedimentation tanks have been constructed during quarter. Waste water discharged from HRT is being measured (Annex-11)	Biannual quality monitoring of waste and drinking water was undertaken for both sites and results have been shared with stakeholders

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Noise levels /Vibration	EPA ambient noise standards and worldwide vibration standards.	<p>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</p> <p>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.</p>	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 small 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 September 2014 (Annex-9)
Fish Fauna	Observation by relevant wildlife & Fisheries professional during EIA study.	Study /monitoring for last quarter undertaken	Study undertaken in September 2014 (Annex-8)

b. Occupational health and safety

Health and safety of workers has been a prime consideration of Project. In accordance with the safety standards, all the workers working at site have been provided with the Personal Protective Equipment comprising of hard hats, safety shoes, and jacket and dust masks depending upon the job specification to prevent injuries. Hygienic inspections have been made by medical staff. As per usual morning physical exercise has also been undertaken regularly at both sites. 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. During quarter more warning sign boards have been placed on both sites
2. Medical facilities available at project sites may also be used for nearby community in case of emergencies. Community people have been informed through community coordinators.
3. A strong liaison is established with concerned Government Departments (Police, Interior and administration) for site security arrangements
4. Necessary road safety & community awareness sign boards were installed to mitigate possible hazards
5. Detecting seven hazardous gases in tunnel to ensure the Air Quality in Tunnel. i.e. (CO, CO₂, NO, NO₂, O₂, H₂S, LEL)
6. Use of ventilator during work in HRT has been recommended essential. Respiratory protective masks have been issued to tunnel workers
7. The EPCC is taking all necessary measures to limit pollution from dust and any wind-blown materials during construction

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.

Table: Sources of CO₂

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

d. 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

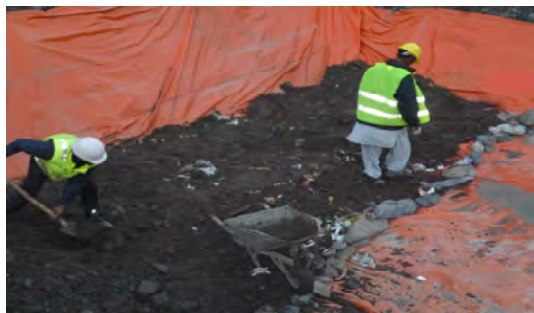
Excavated material is being disposed-off in excavated waste disposal area approved as per EIA. Furthermore no proper embankment has yet been developed to mitigate risk of soil erosion at upper site whereas at lower site partial embankment and gabion walls were washed away due to flash flood on 5th September 2014.

b- Plan for Waste Management

Municipal Corporation Muzaffarabad is responsible for waste collection and disposal as per MoU signed between EPCC and MCM but after detailed visit of MCM disposal area by EPCC and OE's HSE team it was decided to suspend collection by MCM due to inappropriate ultimate disposal. Waste collection and disposal has again undertaken on project sites using old landfill method.

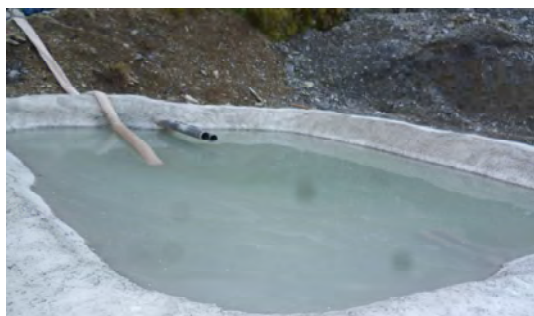


New trenches established for concrete and solid waste with proper lining



Soil Compaction has been done

Cardboards segregated from the Waste



Newly developed settling tanks to treat HRT waste water at weir site

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. Then, all the waste from different points are transported to the disposal area and placed in the trench.

Next step of segregation has been attempted, in which cardboard, plastic bottles, paper and plastic sheet has been segregated. Then, waste has been transported to Scrap Yard where signature for evidence from waste collector, waste handler/transporter and scrap dealer has been taken on the "Waste Consignment Note" of Waste Management Plan.

Thus, most of the Project Waste has been reused and recycled by selling it to the scrap dealer. Some of the items were of "Reusable's" that are used again by a different user or for a different purpose, like a jacket, shoes or a jar used for a cup. They are not reprocessed into raw materials. Whereas

some of our Project Waste includes “Recyclables” that are materials like glass, metal and paper that are collected, separated, processed back into raw materials, and made into new products.

Final step of Waste Compaction other than segregated waste has been done which is the process of compacting waste, reducing it in size. Wheel loader has been used for compressing waste so that more of it can be stored in the same space. Excavator has also been used to spread the waste evenly in layers over the landfill, and to compact waste to reduce its volume and help stabilize the landfill.

c- Plan for Traffic Management

Speed limit is controlled; 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 as indicated by OE. Furthermore, for heavy vehicle a diversion has been used near camp office lower site to mitigate risks and noise near schools, residential area and camp office as per initial traffic management plan.

d- Social uplift plan

Revised social uplift plan (SUP) was submitted by EPCC to SHPL in March 2013. Besides SUP various activities have also been undertaken to facilitate locals such as subletting works, supply of construction material. Status of SUP has been given in (**Annex-10**).

i. Resettlement Plan Implementation

i. Scope of Land Acquisition and Resettlement Impacts

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
Total Permanent Land Acquisition (Kanal)		100.9	313.65	361.2	14.35	790.1
TEMPORARY LAND						
1	Colony of Expatriate construction staff, Switchyard, labour 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)		155.65	313.65	389	14.35	872.65

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. 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;

{also add 2-3 sentences on the compensation payment for the additional land requirements reported to ADB in March 2014)

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	67,712,531	73.22%	196	330*
Headpond (Shoran Village AJ&K)	130.75	75,181,250	73,053,741	97.17%	611 ¹	199
Weir + Headpond (Patrind Village AJ&K)	341.1	204,037,798	163,691,288	80.23%		343
Forest land for Surge Tank (Alda village)	47.75					
B. Trees						
Alda		1,890,635	1,879,864	99.43%		20
Shoran		757,391	654,331	86.39%		55
Patrind		837,882	756,892	90.33%		34
Sub-Total	601.4	375,184,780	307,748,647	82.03%	807	981
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	

*The number of persons who received the payment is higher than the number of affected persons is due to the repetition of the owners names in the payment vouchers.²

Note: The number of persons received the payment has not been updated as no payment has been made during the reporting period.

¹ Out of 78 unpaid landowners, about 20 persons have not been paid due to family disputes while the rest of payments are being paid upon appearance before the revenue dept.

² 100% payment can only be completed upon the settlement of family disputes between the owners and the appearance of remaining owners before the revenue dept. no payment has been withheld due to court cases.

For clarity, payment for trees has been separated from the land cost of AJ&K villages which shows decrease in %age from second quarter.

j. Resettlement and Reconstruction

Updates on housing relocation and reconstruction

Out of the _[number]_ households , whose houses were displaced/resettled due to the project land acquisition, 24 have constructed new houses in adjacent villages and others have acquired land in urban areas to construct houses. Newly constructed houses are far better than the acquired properties. [Can you also state here number of remaining households who need to vacate their properties in the future and the reason why their move has been delayed] 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.

k. 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 cannot ensure that the District Revenue Officers could be available 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. SHPL will continue to pursue the establishment of the GRC, meanwhile, in cooperation with the relevant authorities, ensure that grievances are recorded and addressed following the timeframe in the RP.

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 through (which mechanism/unit?) 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

UA/UC CARDS

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DATE	SITE	LOCATION	OBSERVER NAME	OBSERVATION	CORRECTIVE ACTION
06/07/2014	Power House	Admin Office	Kamran Khan	On back side of admin office, electric generator was installed without grounding in unsafe condition	Grounding Completed
12/07/2014	Weir	HSE Office	Kamran Khan	Fire Prevention- Back side admin office too much dry grass found	Grass was removed and area was cleared of hazard
13/07/2014	Weir	HRT	Kamran Khan	Lifting Safety-- Inside HRT grouting machine belt was damaged so it can cause falling object hazard	During color coding damaged belt was removed by HSE staff.
14/07/2014	Power House	M&E Workshop Area	M. Shahid	Fire Prevention- No fire extinguisher was placed in M&E workshop	Fire extinguishers was placed on site
17/07/2014	Weir	New batching plant	Kamran Khan	Electrical safety- on new batching plant and housekeeping issues	Grounding of generators undertaken and best housekeeping practices adopted
5/08/2014	Weir	sand trap	Abdul Qadeer (Driver)	Weir access road got slippery during rain it must be repaired timely.	Weir access road has been repaired by construction team as per requirement of the work.
10/08/2014	Weir	New batching plant	Abdul Qadeer (Driver)	There should be a protective stair and fence around the inner stairs.	Stairs have been already equipped with fence mentioned by the relevant observer.

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20/08/2014	Weir	New batching plant	Abdul Qadeer (Driver)	Bathrooms needed to be clean at new batching plant area to prevent land pollution and to maintain aesthetic beauty of the area as well.	Regular monitoring is being done by EPC's HSE team and workshop Incharge regarding cleanliness of the respective area on daily basis.
6/08/2014	Weir	Office area	Abdul Qadeer (Driver)	The generator outside admin office is out of order that may cause fire hazard if not maintained properly in time.	A proper protective measure shall be taken and generator should be replaced or repaired. Meanwhile it has been removed.
4/08/2014	Weir	New batching plant	Kamran Khan	The brake of wheel loader of Daewoo is not working properly that can lead to major road accident.	Mitigation measures adopted
12/08/2014	Weir	Kyungdong Generator area	Kamran Khan	Excessive oil spillage has been observed in Kyungdong generator area.	Daily meetings have been conducted to minimize this issue.
16/08/2014	Weir	HRT	Kamran Khan	Electrical cables are observed to be scattered over water most often, similarly electric distribution cables are not covered properly that can cause electric hazard. Some of the workers, helpers, operator and drivers are observed in wearing poorly condition 3M mask filter.	Proper instructions have been delivered to Kyungdong in operating and managing electrical cables in an appropriate way. Masks have also been replaced and workers are provided with new masks now.
8/08/2014	Weir	Side of police house	Faisal Shazad	Placement of a water tank will be installed on the right side of police house to solve problem issue in that area regarding flora and fauna.	There is no space for the placement of water tank as this is construction area and after few days excavation will going to be start here.
6/08/2014	Weir	side office	Faisal Shazad	30 liters fuel can be saved if generators are used properly and would remain closed from 4:30 till 6:00 in the morning which can be beneficial for the company.	It depends on the working condition of the required area and this suggestion has been delivered to the admin as well.

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7/08/2014	Weir	whole side area	Faisal Shazad	Garbage should be disposed-off properly in the available drums and these waste collectors should be installed at every necessary point.	These waste collectors have already been installed at all working sites and this waste has been spread by the community and workers that need to be instructed and aware mostly to use HSE waste drums.
2/08/2014	Weir	Police check post 2	Faisal Shazad	The crossing area of police check post is quite narrow, if road area will be broaden then heavy vehicles can be prevented from major accident.	Crossing area has been broadening as per requirement.
3/08/2014	Weir	Office side	Faisal Shazad	If extra bulbs and air conditions remained close at night so people can be saved from short circuit that will ultimately pose a threat towards fire hazard.	This suggestion must be appreciable and most of the trainings have been conducted to promote this.
5/08/2014	Weir	Side area	Faisal Shazad	Usage of generator for heavy appliances instead of using electricity by WAPDA.	It could not be possible because fuel is more costly and it also creates noise and emissions.
26/08/2014	Weir	Kyungdong Shelter	Abdul Qadeer (Driver)	Pipe and water pump has been slipped down; a prior notice should be taken in account to fix these equipment.	Instruction regarding shifting of the material has already been delivered to Kyung Dong.
14/9/2014	Weir	Weir site	Nasir Bashir	The problem regarding thunderstorm lightening onto the electrical gauge or Office/ police shelters has not fixed yet which ultimately lead towards an Electrical Hazard.	This issue has been discussed variously in official meetings so far.
22/9/2014	Lower site	Surge Shaft	Malik Amjid	Platform should be fixed and modify in width during working condition.	Extra support has been made for stabilizing the platform.

Annex-2

INSPECTIONS

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Sr.	Inspection	Location	Inspector	Date	REMARKS
1.	Permit to work inspection	Weir Site	Mr. M. Javed	2/07/2014	Satisfactory
2.	Telecommunication system	Weir site	Mr. M. Javed	3/07/2014	Satisfactory
3.	Batching Plant inspection	Weir Site	Mr. M. Javed	4/07/2014	i. Proper area required for chemical Storage ii. Fence was damaged
4.	General inspection	Weir Site	Mr. M. Javed	5/07/2014	M/S pulley, w/motor and fence was damage
5.	Fire Extinguishers inspection	Weir Site	Mr. Syed Tariq Husain	8/07/2014	Some fire extinguishers were expired so requisition was made for refilling
6.	Waste Management and Environment	Weir Site	Mr. M. Javed	9/07/2014	New trenchers made for kitchen waste
7.	Monitoring of Permit to work system	Weir Site	Mr. M. Javed	10/07/2014	Inspection of Permit to work system regarding issuance and compliance on sites and working areas
8.	General Inspection of Tunnel	Weir Site	Mr. M. Javed	11/07/2014	Some electrical, fire extinguishers & housekeeping issues were observed
9.	Electrical inspection	Weir Site	Mr. M. Javed	16/07/2014	Inspection of electrical equipment on Weir site
10.	Batching Plant inspection	Weir Site	Mr. M. Javed	17/07/2014	Concrete waste & electrical lose connection at many places
11.	Permit to work	Weir Site	Mr. M. Javed	18/07/2014	Monitoring of compliance with permit to work system on Weir site
12.	Waste/environmental inspection	Weir site	Mr. Wyclife Uziah	19/07/2014	i. Proper lining of waste trenches required ii. Proper chemical waste collection mechanism should be adopted iii. Disposal of chemical waste should be done in sealed and non-corrosive barrels. iv. Washing of shotcrete machine outside tunnel entrance should be prohibited v. Insecticide spray should be

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					done
13.	Color coding 3rd Quarter	Weir Site	Mr. Wyclife Uziah	20/07/2014	Much of the electrical equipment required repairing
14.	Color coding 3rd Quarter	Weir Site	Mr. M. Javed	22/07/2014	Kyung dong found using faulty tools & lifting belts
15.	Road and sliding area	Weir Site	Mr. M. Javed	25/07/2014	Some area became prone to land slide & road was damaged due to rain
16.	Noise and vibration inspection at New batching plant area.	Weir Site	Mr. M. Javed	27/07/2014	All readings of noise & vibration were within limits
17.	Permit to work inspection	Weir Site	Mr. M. Javed	2/07/2014	Satisfactory
18.	Telecommunication system	Weir site	Mr. M. Javed	3/07/2014	Satisfactory
19.	Batching Plant inspection	Weir Site	Mr. M. Javed	4/07/2014	Proper area required for chemical Storage and fence was damage
20.	General inspection	Weir Site	M. Javed	5/07/2014	M/S pulley, w/motor and fence was damage
21.	Electrical inspection	Powerhouse site (Daewoo E&C)	Raja Faisal	13/07/2014	Electrical issues
22.	Electrical inspection	Powerhouse site (Kyungdong)	Raja Faisal	14/07/2014	Electrical issues
23.	Heavy Equipment Inspection	powerhouse site	Raja Faisal	1/08/2014	WA-350
24.	Heavy Equipment Inspection	powerhouse site	Raja Faisal	3/08/2014	Kawasaki 852Ib Equipment NO:05
25.	Mess inspection	Weir Site	M. Javed	3/08/2014	
26.	Camp inspection	Weir Site	M. Javed	3/08/2014	
27.	Heavy equipment inspection	Weir Site	M. Javed	3/08/2014	
28.	Heavy equipment /generator inspection	Weir Site	M. Javed	6/08/2014	some repairing required

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29.	B/Plant NBP.	Weir Site	M. Javed	8/08/2014	chemical waste lying on ground
30.	LTV inspection & certification	Weir Site	M. Javed	10/08/2014	
31.	Fire Extinguishers inspection	Camp Office Powerhouse site	S. Tariq Hussain	11/08/2014	Inspection of Fire extinguishers on powerhouse site.
32.	Heavy Equipment Inspection	powerhouse site	Raja Faisal	12/08/2014	Conc. pump car PC-068 Model: 2008
33.	Heavy Equipment Inspection	powerhouse site	Raja Faisal	12/08/2014	Concrete pump car PC-066 Model: 2008
34.	Heavy Equipment Inspection	powerhouse site	Raja Faisal	12/08/2014	Dump Truck TKB-921
35.	Heavy Equipment Inspection	powerhouse site	Raja Faisal	12/08/2014	Dump Truck AFR-2013
36.	Heavy Equipment Inspection	powerhouse site	Raja Faisal	12/08/2014	Dumper 2616
37.	Heavy Equipment Inspection	powerhouse site	Raja Faisal	12/08/2014	Dumper APF-2008/ A-12
38.	Heavy Equipment Inspection	powerhouse site	Raja Faisal	12/08/2014	TM-430
39.	Heavy Equipment Inspection	powerhouse site	Raja Faisal	12/08/2014	TM-406
40.	Heavy Equipment Inspection	powerhouse site	Raja Faisal	12/08/2014	Dumper LES-8883, DT-2267
41.	Heavy Equipment Inspection	powerhouse site	Raja Faisal	12/08/2014	Dumper APF-2008/MCM A-11
42.	Electrical Inspection	Workshop (Kyungdong)	Raja Faisal	15/08/2014	Transformer is not barricaded & not grounded also. Transformer should be barricaded by installation of fence around it and transformer should be grounded by making proper earth pit. Housekeeping Issue. House Keeping should be done to avoid any incident. No Inspection tag is attached and

					<p>circuit breaker is installed without distribution box. Inspection tag should be attached and circuit breaker should be installed inside the distribution box.</p> <p>Broken light and holder. Light should be replaced and install light holder or remove the cable.</p>
43.	Batching plant inspection	Weir Site	KAMRAN	20/08/2014	
44.	Blasting inspection	Upper site	M.Javed	2/9/2014	Inspection of implementation of blasting procedures during the blasting activity, placement of the permits is required on board for display
45.	Batching plant inspection	Upper site	M.Javed	7/9/2014	Inspection of batching plant at weir site
46.	Fire Extinguishers Inspection	powerhouse site	S. Tariq Hussain	8/9/2014	Inspection of fire extinguishers In HSE, camp office, inner side office, corridor, kitchen outer side, camp, generator area, chiller, main entrance, PM office, HSE training hall, right wing, welding shop, operator cabin, residence, weigh bridge, Malik House (Rental) workshop area, surge shaft.
47.	Compliance with blasting procedures	Upper site	M. Javed	8/9/2014	Controlled blasting should be carried out.
48.	fire extinguishers inspection	Upper site	M. Javed	11/9/2014	Some cylinders discharged.
49.	fire extinguishers inspection	Upper site	Saleem	12/9/2014	Some tags were missing
50.	Batching plant inspection	Upper site	M. Javed	13/9/2014	Installation was not completed up to yet.
51.	Environment inspection	Upper site	M. Zaheem	14/9/2014	Some community complaints observed during inspection.
52.	Batching plant	Upper site	M. Javed	15/9/2014	Fire extinguisher was missing

	Inspection				from designated area.
53.	Compliance with JSAs and permit to work system.	Upper site	M. Javed	20/9/2014	Inspected the crane, conducted onsite tool box talk and discussed the value of JSA (Job safety analysis) at site.
54.	Blasting inspection	Upper site	M. Javed	21/9/2014	Proper illumination & access ladder.
55.	Confined space log.	Upper site	M. Javed	21/9/2014	(Confined space log) Cross checking of Tunnel IN/ OUT status board to verify the compliance with HSE rules and regulations announced and disseminated after the completion of tunnel.
56.	Use of PPEs at site.	Upper site	Saleem	21/9/2014	Use of PPEs at site, Re: Satisfactory
57.	Explosives inspection	Upper site	M. Javed	21/9/2014	Proper maintenance of Issue and balance list.
58.	Oxygen & fuel-gas cylinder inspection	Upper site	M. Javed	21/9/2014	Satisfactory
59.	Inspection of batching plant area	Upper site	M. Javed	24/9/2014	Satisfactory
60.	Heavy equipment inspection	Upper site	M. Javed	24/9/2014	Main glass is found damaged & side mirror is missing.
61.	Heavy Equipment Inspection	Powerhouse site	Myung Hun Chung	29/9/2014	Crane inspection (Mechanical), the main parts inspected were bearing, gear, bolt, seals and lubrication
62.	Noise & vibration inspection	Upper site	M. Javed	29/9/2014	Noise Meter & Blast mate is being used for inspection
63.	Lighting inspection	Upper site	Zaheem	30/9/2014	Required more light on excavation area.

Annex-3

WEEKLY MEETINGS

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Sr. No	Date	Location	Meeting	Agenda
1.	2/07/2014	Weir Site	Daily Safety Meeting	Office Location work plan
2.	3/07/2014	Weir Site	Meeting with Admin Department	i. Road repairing ii. Disposal area iii. HSE site issues
3.	9/07/2014	Weir site	Weekly HSE Meeting	i. HRT electrical issues ii. Visibility and dust preventive measures iii. Road condition iv. Housekeeping v. HSE site issues
4.	15/07/2014	Powerhouse Site	Weekly HSE Meeting	i. Electrical Issues at 3rd corner ii. Housekeeping inside generator area iii. Unsafe Acts iv. Surge protection not installed v. Electrical connection board vi. HESPAK using improper electrical instruments vii. Material arrangement viii. Electrical issues
5.	16/07/2014	Weir site	Weekly HSE meeting	i. HRT electrical and visibility issues ii. Road condition iii. HRT lightening issue iv. HSE site issues
6.	22/07/2014	Powerhouse Site	Weekly HSE Meeting	i. Wheel loader producing smoke ii. Electric cables and joints iii. PPEs and Mask filters changing required iv. New lights installation v. workers working without safety induction vi. Requirement of industrial sockets vii. Poor generator joints viii. Gas cylinders issues ix. Damaged Equipments x. Working platforms xi. Housekeeping
7.	23/07/2014	Weir site	Weekly HSE meeting	i. All HSE issues including environment, housekeeping, visibility, road & Lighting system were discussed
8.	25/07/2014	Weir site	Meeting with Admin department	i. Emergency Response Plan during Eid holidays
9.	3/08/2014	Weir Site	Meeting with Admin Department	i. Road repairing, disposal area and other site HSE issues.
10.	5/08/2014	HSE Training Hall Camp Office Powerhouse Site	Weekly HSE Meeting with Subcontractors and Construction Team Lower Site	i. HRT heavy equipments and electrical issues, ii. Housekeeping in 3rd corner workshop, iii. Wiplocks required, iv. Surge protection from the thunder storm still not installed, improper scaffold found being used, v. At powerhouse slope area lifting without load test and permit, vi. Waste management should be proper to close NCR No. 26, vii. The polyethylene sheets should be collected if not under use.
11.	6/08/2014	HSE HALL Weir Site	Weekly HSE Meeting with construction team upper site	i. Discuss HRT & B/plant safety & environment issue.
12.	9/08/2014	Kyungdong office	Kyungdong /construction	i. Installation of ventilator/road repairing and cleaning in HRT.
13.	12/08/2014	HSE Training Hall Camp Office	Weekly HSE Meeting with Subcontractors and	i. Proper storage of diesel and Mobil Oil, ii. Wrong parking and lose material observed at

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		Powerhouse Site	Construction Team Lower Site	<ul style="list-style-type: none"> site, iii. Workers of subcontractors with damaged PPEs and without PPEs, iv. Fall protection and improper barricading, v. Material stored at the edge by Naveed Brothers.
14.	13/08/2014	HSE training Hall weir site	Weekly HSE Meeting with construction team upper site	<ul style="list-style-type: none"> i. HRT lighting system, ii. Hazard lights on heavy equipments, iii. Poor road condition
15.	19/08/2014	HSE Training Hall Camp Office Powerhouse Site	Weekly HSE Meeting with Subcontractors and Construction Team Lower Site	<ul style="list-style-type: none"> i. Electrical issues at Powerhouse slope protection and generators area are not proper and as per standard, ii. Workers using the helmets without chin strip, iii. Falling Hazards due to improper ladder, iv. Periodic cleaning required in sedimentation tank, v. Workers found sleeping inside HRT, vi. Material stored at the edge and unsafe excavation and improper barricading by Naveed brothers.
16.	20/08/2014	Camp Office weir site	Weekly HSE Meeting with construction team upper site	<ul style="list-style-type: none"> i. All site issues regarding HSE, site illumination ,Housekeeping, Material Arrangement, ii. Permit to work, vehicles repairing and HRT waste water etc.
17.	26/08/2014	HSE Training Hall Camp Office Powerhouse Site	Weekly HSE Meeting with Subcontractors and Construction Team Lower Site	<ul style="list-style-type: none"> i. Issues of 3rd corner (Storage of metallic sheets at road, Oil spillage, soil contamination, polyethene sheets on road) ii. Electrical generators not grounded, iii. Housekeeping of electric panels, iv. HRT Issues (Electric cables lying on ground, housekeeping), 5-Cave in hazards (material stored at edge, unsafe excavation, improper barricading), v. workers on site without induction and proper PPEs.
18.	27/08/2014	HSE Office weir site	Weekly HSE Meeting with construction team upper site	<ul style="list-style-type: none"> I. All site issues regarding HSE, e.g., lighting, Housekeeping, Material Arrangement, permit to work, vehicles repairing and HRT waste water etc.
19.	2/9/2014	HSE Training Hall Camp Office Powerhouse Site	Weekly HSE Meeting with Subcontractors and Construction Team Lower Site	<ul style="list-style-type: none"> i. Falling Hazards (Hard fabrication required for open edges, platform should be repaired and increased in height) ii. Flashback arrestors should be installed on both ends of the compressed gas cylinders iii. damaged equipments shouldn't be used iv. Chemical storage should be made proper on 3rd corner v. Electrical generators are still not grounded at the generator storage area, DPs should be locked out and grounded vi. Air hoses are not installed by proper whip checks vii. Drivers should must have valid driving license and not allowed for over speeding viii. Excavated material is dumped near the river.
20.	9/9/2014	HSE Training Hall Camp Office Powerhouse Site	Weekly HSE Meeting with Subcontractors and Construction Team Lower Site	<ul style="list-style-type: none"> i. Status cards are not changed and workers entered from one side of HRT and left HRT from other end, ii. Housekeeping inside QA/QC lab is not proper,

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				<ul style="list-style-type: none"> iii. The chemical storage tanks are stored at the edge of the access road at the third corner, iv. Workers working on the height are not using the file arrest system, v. Solid waste management training.
21.	23/9/2014	HSE Training Hall Camp Office Powerhouse Site	Weekly HSE Meeting with Subcontractors and Construction Team Lower Site	<ul style="list-style-type: none"> i. Surge Shaft (Moving parts without covering, broken pads, generators without grounding and proper arrangements, improper electrical wiring), ii. 3rd corner issues (Oil spillage, not proper waste management) Emergency contact number not placed at the proper position on HRT iii. The water drum should be removed from the 2nd corner iv. Powerhouse slope (pressure equipments without testing and whip checks, Oil spillage, improper cable arrangement and grounding, barricading and material arrangement) v. workers working at powerhouse without PPEs vi. Improper waste management at access bridge and other areas Heavy equipments in bad condition vii. HITECH workers working at site without induction viii. Dangerous access to new batching plant.
22.	30/9/2014	HSE Training Hall Camp Office Powerhouse Site	Weekly HSE Meeting with Subcontractors and Construction Team Lower Site	<ul style="list-style-type: none"> i. Electric cables in water & above steel bars ii. Gas cylinders without flashback arrestors, iii. Excavators without hazard light, side mirrors & pin iv. Empty fire extinguishers without inspection v. oil spillage at 3rd corner vi. segregation of waste vii. use of PPEs 8-unsafe acts viii. Scaffold issues and proper platforms on the ix. Mobile crans without outrigger pads x. Boring machine without the covering of the moving parts xi. Housekeeping.

Annex-4

HSE TRAININGS

Environmental & Social Monitoring Report (July-September 2014)

Sr.	Training	Date	Trainer	Location	Attendees	Target staff
1.	Electrical Safety and fire prevention	3/07/2014	Mr. Syed Tariq	Weir Site	20	Daewoo, Kyungdong
2.	Blasting procedures	6/07/2014	Mr. Waqas	Weir Site	11	Daewoo, Kyungdong
3.	Signs & barricading	12/07/2014	Mr. Syed Tariq	Weir Site	18	Daewoo, Kyungdong
4.	Flood Evacuation Training	28/07/2014	Mr. M. Javed	Weir Site	9	Daewoo & Kyungdong
5.	Firefighting and fire prevention training + drill	10/07/2014	Mr. Raja Faisal	Powerhouse Site	23	Naveed Brothers and HITECH
6.	Firefighting and fire prevention training	11/07/2014	Mr. Raja Faisal	Powerhouse Site	11	Kyungdong
7.	Firefighting and fire prevention training	13/07/2014	Mr. Raja Faisal	Powerhouse Site	11	HESPAK
8.	Driving Safety Tips, Driving in Ramadan	17/07/2014	Mr. Syed Tariq	Powerhouse Site	18	Daewoo E&C
9.	Working at height and weather conditions	16/07/2014	Mr. Raja Faisal	On Site Training Powerhouse Site	4	Daewoo E&C
10.	Signalman/ Flagman & Land sliding hazards training	22/07/2014	Mr. Syed Tariq	Powerhouse Site	14	HESPAK
11.	HSE Counseling (Vehicle safety training)	17/07/2014	Mr. Syed Tariq	On Site Training Powerhouse Site	4	Safety violators
12.	Heat Stress and Dehydration Training	22/07/2014	Mr. Bilal Ahmad	Powerhouse Site	14	HESPAK
13.	Wheel Loader Operating Training	23/07/2014	Mr. Syed Tariq	Powerhouse Site	12	Kyungdong
14.	General Safety Training	4/08/2014	S. Tariq Hussain	HSE Training Hall Camp Office	26	Daewoo E&C
15.	Personal Protective Equipment (PPE)	5/08/2014	S. Tariq Hussain	HSE Training Hall Camp Office	22	Daewoo E&C
16.	General Safety Training	6/08/2014	S. Tariq Hussain	HSE Training Hall Camp Office	24	HESPAK
17.	General Safety Training	7/08/2014	S. Tariq Hussain	HSE Training Hall Camp Office	39	Kyungdong
18.	Scaffolding Safety Training	7/08/2014	S. Tariq Hussain	HSE Training Hall Camp	12	Daewoo E&C Korean staff

Environmental & Social Monitoring Report (July-September 2014)

Sr.	Training	Date	Trainer	Location	Attendees	Target staff
				Office		
19.	safe driving training	8/08/2014	M. Javed	HSE Hall	10	Daewoo/Kyungdong
20.	Health & Environment	15/08/2014	Javed	HSE Training Hall Weir site	17	Daewoo & Subcontractors
21.	PPE	18/08/2014	M. Javed	HSE Hall	9	Daewoo /Kyungdong.
22.	Permit to work training	19/08/2014	S. Tariq Hussain	HSE Training Hall Camp Office	15	Daewoo E&C and subcontractors
23.	Awareness about restarting work	19/08/2014	M. Javed	HSE Hall	7	Sungbo
24.	Shelter demolishing training	20/08/2014	M. Javed	HSE Hall	3	Naveed Brothers
25.	Work at height	25/08/2014	M. Javed	HSE Hall	19	Daewoo, Sungbo, Kyungdong
26.	Job Safety Analysis Training	29/08/2014	S. Tariq Hussain	HSE Training Hall Camp Office	23	Daewoo E&C and subcontractors
27.	Safe work procedure	1/9/2014	M.Javed	HSE hall upper site	40	Daewoo E&C, Sungbo, Kyung Dong, H/Pak
28.	Work at height	3/9/2014	waqas	HSE hall upper site	8	Kyung.dong
29.	Safe evacuation training	5/9/2014	M.Javed	HSE hall upper site	7	Kyung.dong
30.	Permit to work training	9/9/2014	Choung myung hun	Powerhouse site	17	Daewoo E&C and subcontractors' Korean staff.
31.	JSA & Job Awareness training	9/9/2014	M.Javed	HSE hall upper site	8	Naveed brothers
32.	Waste management training	10/9/2014	Umara nazir	HSE Training Hall Camp Office	11	Daewoo E&C & Subcontractors
33.	Tool Box Talk	10/9/2014	S. Tariq Hussain	HSE Training Hall Camp Office	51	Daewoo E&C & Subcontractors Site supervisors
34.	Tool box training	10/9/2014	Tariq hussain	HSE hall upper site	36	Daewoo E&C, kyongdong, sungbo & h/pak.
35.	Tool Box Talk	11/9/2014	S. Tariq Hussain	HSE Training Hall Camp Office	12	Daewoo E&C & Subcontractors staff and workers
36.	Banks man Training	18/9/2014	S. Tariq Hussain	HSE Training Hall Camp Office	20	Daewoo E&C & Subcontractor
37.	Toolbox training	18/9/2014	M. Javed	At access bridge (Onsite Training- weir)	7	Daewoo E&C
38.	JSA Training	21/9/2014	M. Javed	On HRT	6	ky. Dong

Environmental & Social Monitoring Report (July-September 2014)

Sr.	Training	Date	Trainer	Location	Attendees	Target staff
				Workplace (Onsite Training-weir)		
39.	Defensive driving training	24/9/2014	S. Tariq Hussain	HSE Training Hall Camp Office	40	Daewoo E&C and subcontractors
40.	Safe blasting & Gen/safety.	28/9/2014	M. Javed	Sung bo mess hall (weir site)	15	ky. Dong /Daewoo E&C
41.	Training	Date	Trainer	Location	Attendees	Focused Staff
42.	Safe work procedure	1/9/2014	M. Javed	HSE hall upper site	40	Daewoo E&C, Sungbo, Kyung Dong, H/Pak
43.	Work at height	3/9/2014	Waqas	HSE hall upper site	8	ky.dong
44.	Safe evacuation training	5/9/2014	M. Javed	HSE hall upper site	7	ky.dong
45.	Permit to work training	9/9/2014	Choung Myung hun	Powerhouse site	17	Daewoo E&C and subcontractors Korean staff.
46.	JSA & Job Awareness training	9/9/2014	M. Javed	HSE hall upper site	8	Naveed brothers
47.	Waste management training	10/9/2014	Umara Nazir	HSE Training Hall Camp Office	11	Daewoo E&C & Subcontractors
48.	Tool Box Talk	10/9/2014	S. Tariq Hussain	HSE Training Hall Camp Office	51	Daewoo E&C & Subcontractors Site supervisors
49.	tool box training	10/9/2014	Tariq hussain	HSE hall upper site	36	Daewoo E&C & Subcontractors
50.	Tool Box Talk	11/9/2014	S. Tariq Hussain	HSE Training Hall Camp Office	12	Daewoo E&C & Subcontractors staff and workers
51.	Banks man Training	18/9/2014	S. Tariq Hussain	HSE Training Hall Camp Office	20	Daewoo E&C & Subcontractor
52.	toolbox training	18/9/2014	M. Javed	At access bridge (Onsite Training- weir)	7	Daewoo E&C
53.	Defensive driving training	24/9/2014	S. Tariq Hussain	HSE Training Hall Camp Office	40	Daewoo E&C and subcontractors
54.	Safe blasting & Gen/safety.	28/9/2014	M. Javed	Sung bo mess hall (weir site)	15	Kyung Dong /Daewoo E&C

Annex-5

EMP COMPLIANCE STATUS

Feature/Issue	Parameters/monitoring	Location	Actions taken and monitoring results	Detailed reports
Statutory Requirements	i. Compliance with approval conditions	<ul style="list-style-type: none"> Whole Project 	Implementation in compliance with: EPA's NOC & ADB's Environmental and Social Safeguards, IFC's Performance Standards,	Quarterly Compliance Monitoring Reports
Landslides	i. Slope Stability ii. Crack on the slope iii. Water from the slope	<ul style="list-style-type: none"> Both sites and adjacent catchment area 	Monitoring is required once the year. The study has been carried out in September 2014. Measures like rock bolt Concrete have been undertaken.	Summary in Section H and Report is detailed as Annex- 7
Vegetation Clearance	i. Progressive vegetation clearance within marked sites	<ul style="list-style-type: none"> Slopes above Power house area 	Monitoring undertaken during September 2014. Limited clearance also undertaken at power house catchment within marked area. No additional clearance occurred.	Summary in Section H and Report is detailed as Annex- 9
Erosion and Sediment	i. Slope protection ii. Slope drainage system iii. Sedimentation ponds	<ul style="list-style-type: none"> Surge shaft slopes, access road and powerhouse slopes 	To mitigate erosion and risk of sliding Shotcrete activity on slopes has been carried out. Surge shaft slopes and sliding areas were covered with polythene membrane sheets. Pre-cast panels (PC) have been installed on Powerhouse slopes for stabilization.	None
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"> Power house access road Disposal areas upper & Lower site 	Excavated material from HRT is being used in civil works such as backfilling and road improvement (Upper & Lower site) Dumping on approved sites.	Section H "Excavated material waste management plan"
Water Quality	i. Waste water treated prior to river discharge ii. Temperature, dissolved oxygen, pH, conductivity, turbidity, total phosphorous, inorganic phosphorous, total nitrogen, ammonia nitrogen, nitrogen oxides, biochemical oxygen demand and faecal coli forms	<ul style="list-style-type: none"> In front of HRT on both sites 	Treatment being undertaken through sedimentation tanks. Quality monitoring has been undertaken in September 2014 and reports have been received during current quarter. Septic tanks constructed with accommodation, camp and site office facilities(Upper & Lower site) Drinking water quality tests of adjacent sources undertaken during past quarter.	Detailed Reports have separately been submitted sample is placed as Annex- 12

Feature/Issue	Parameters/monitoring	Location	Actions taken and monitoring results	Detailed reports
Waste Management	i. Waste materials reused or recycled on-site where possible ii. Non-recyclable wastes disposed of appropriately	<ul style="list-style-type: none"> Construction and camp sites 	Papers, mineral water bottles and cement bags are being sent to market for recycling. Garbage/Waste temporarily stored on site and disposal through MCM landfill site and in excavated material area using landfill method Septic tanks and soakage pits prepared on both sites	Section H Waste management plan
Hazards/Risk	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"> All construction sites and storage areas 	Induction training providing PPEs, Tool Box Meetings, Job craft & on site trainings, Hazardous material like polypropylene fiber and acetylene placed in segregated areas. Explosive store established under NOC fulfilling all requirements MSDS and SOPs being followed	N/A
Labor	i. Enforcement of workforce rules and regulations ii. Provision of alternative fuels for cooking, heating and light iii. Provision of adequate and well maintained services and facilities	<ul style="list-style-type: none"> Construction and camp sites 	i. National and International Labor Laws and Standards are implemented ii. LPG cylinders are being used for cooking purpose iii. Health and other welfare facilities provided	N/A
Aquatic Ecology	i. Fish and Aquatic populations	<ul style="list-style-type: none"> Fish monitoring in Kunhar River Up & down stream the Weir Site 	Study undertaken during both quarters of 2014 Fishing & hunting prohibited on project sites. No endanger species found. No considerable disturbance to aquatic life.	Summary in Section H and report is detailed as Annex-8 .
Flora	i. Direct observation of surrounding vegetation	<ul style="list-style-type: none"> Both weir and power house site 	Study undertaken during both quarters of 2014 Mitigation measures will be undertaken after construction phase.	Summary in Section H and Report is detailed as Annex-9

Feature/Issue	Parameters/monitoring	Location	Actions taken and monitoring results	Detailed reports
Noise and Vibration	i. Maintenance of equipment in accordance with manufactures' specifications ii. Controlled blasting	<ul style="list-style-type: none"> Construction sites including HRT 	Regular inspections and service of heavy equipment - Pre blasting survey, blast permit issuance and SOPs adopted.	N/A
Air Quality	i. Exhaust emissions from machinery – visual inspection	<ul style="list-style-type: none"> All construction sites 	For non-compliance replacement of vehicles and equipment undertaken. Monitoring through labs has also been planned.	N/A
Traffic/Access	i. Enforcement of speed limits on Project roads ii. Traffic Signs	<ul style="list-style-type: none"> Power house and weir access roads Project access roads 	Heavy equipment/vehicle drivers education sessions Speed limit and directional sign board installed	Section H Traffic Management plan
Spring Water	Water Quantity Drinking Water quality monitoring	<ul style="list-style-type: none"> Sources available on project sites and in adjacent villages 	Drinking water monitoring undertaken in September 2014. Community & labor awareness and provision of safe drinking water.	Detailed Reports have separately been submitted sample is placed as Annex- 12
Complaints	All complaints replied to	<ul style="list-style-type: none"> Adjacent villages 	Internal Grievance Redress Committee. Compliant boxes installed for community but with little exception direct mode is being used i.e. meetings / telephonic etc. Committee established at government level in AJK.	No complaint received

Annex-6

ENVIRONMENTAL INSPECTION

CHECKLIST

Pakistan Patrind Hydro Power Project



WASTE MANAGEMENT AND WELFARE FACILITIES INSPECTION CHECKLIST
(HSE Department)



	Location	17/08	18/08	19/08	20/08	21/08	22/08	23/08	24/08	25/08	26/08	27/08	28/08	29/08	30/08	31/08
Drinking Water	M&E Workshop	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	Batching Plant	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	HRT	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	Power House	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	Explosive Storage	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	Surge Shaft Slopes	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	HSE Staff:															
	HSE Manager:															

	Location	17/08	18/08	19/08	20/08	21/08	22/08	23/08	24/08	25/08	26/08	27/08	28/08	29/08	30/08	31/08
Toilet	Workshop	F	G	F	F	F	F	F	F	F	F	F	F	F	F	F
	Batching Plant	G	G	G	G	G	G	G	G	G	G	G	G	G	F	F
	HRT	F	F	F	F	F	F	F	F	F	F	P	P	P	F	F
	Power House	P	F	F	F	F	F	F	F	F	F	P	P	P	F	F
	Explosive Storage	E	E	E	G	E	E	E	G	E	E	E	G	G	E	E
	Camp Office	G	G	G	G	G	G	G	G	G	G	G	G	G	E	E
	HSE Staff:															
	HSE Manager:															

	Location	17/08	18/08	19/08	20/08	21/08	22/08	23/08	24/08	25/08	26/08	27/08	28/08	29/08	30/08	31/08
House Keeping	M&E Workshop	G	G	G	G	G	G	G	F	G	G	G	G	G	G	G
	Batching Plant	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	HRT	G	G	G	F	F	G	F	F	G	G	G	G	G	G	G
	Work Site Power house	F	G	G	G	G	F	G	F	G	F	F	F	F	G	G
	New Batching Plant Surge Shaft	G	G	G	G	G	G	F	G	F	G	G	G	G	G	G
	Workshop	P	F	F	F	G	G	F	F	P	P	G	G	G	F	F
	HSE Staff:															
	HSE Manager:															

	Location	17/08	18/08	19/08	20/08	21/08	22/08	23/08	24/08	25/08	26/08	27/08	28/08	29/08	30/08	31/08
Waste Management	M&E Workshop	G	G	G	G	G	G	F	F	F	G	G	G	G	P	G
	Batching Plant	G	G	G	G	G	G	F	F	G	G	G	G	G	F	G
	HRT	G	G	G	G	G	G	F	F	G	P	G	G	G	G	G
	Explosive Storage	G	G	G	G	G	G	F	G	G	F	P	G	G	G	G
	Surge Shaft Slopes	G	G	G	G	G	F	F	F	P	F	G	G	G	F	F
	Workshop	P	F	F	F	G	G	F	F	P	P	G	G	G	F	F
	HSE Staff:															
	HSE Manager:															

Note: E = Excellent Status, G = Good Status, F = Fair Status, P = Poor Status.

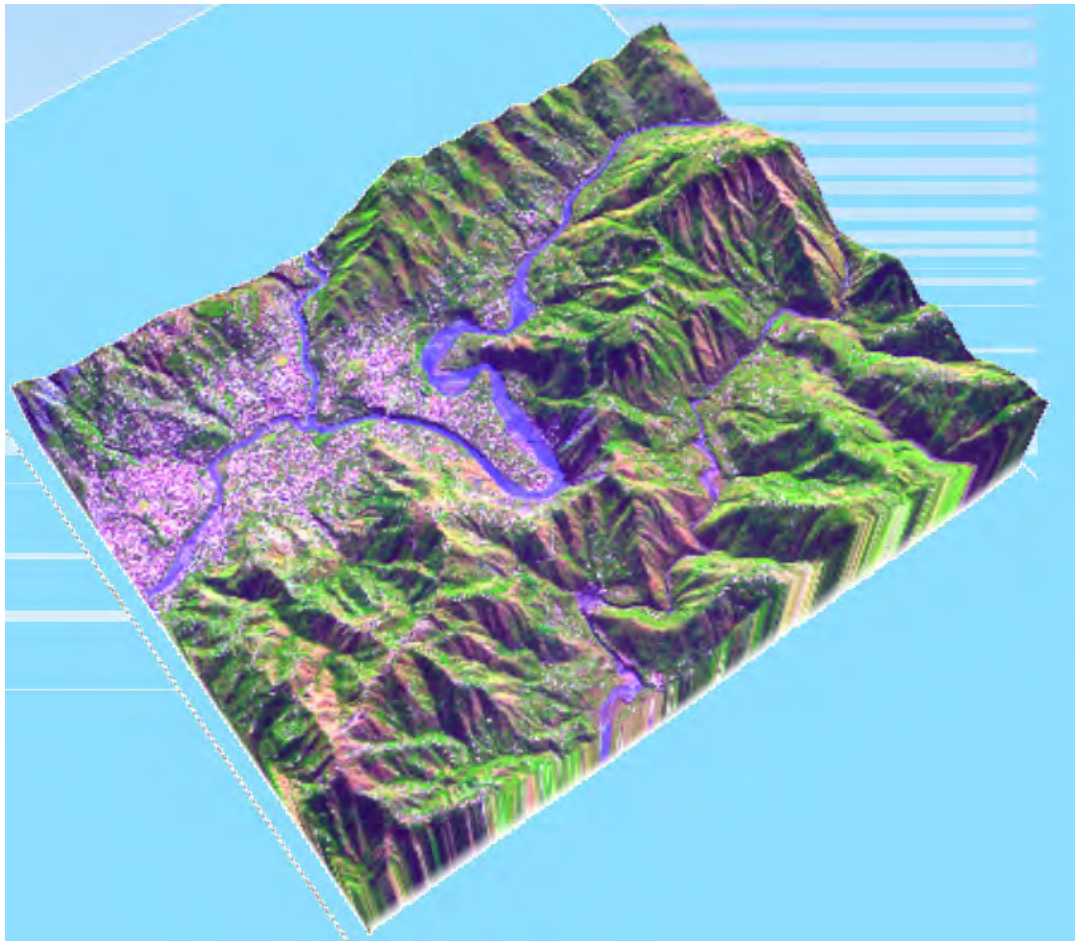
Annex-7

LAND SLIDE

STABILITY/CATCHMENT

MONITORING

147 MW PATRIND HYDROPOWER PROJECT



MONITORING OF LANDSLIDE/CATCHMENT STABILITY

ANNUAL REPORT

SEPTEMBER 2014

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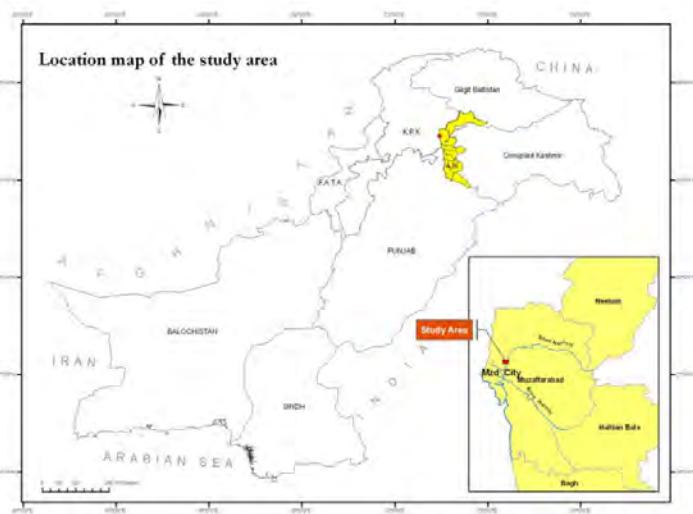
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Monitoring Purpose/Team:

The Edinburgh Direct Aid Muzaffarabad has been assigned a task to conduct land slide catchment stability annually after monsoon on both sites of the Project vicinity as part of Environmental Monitoring Plan for the Patrind Hydropower Project. For the aforesaid purpose a joint field investigation was carried out during last week of September 2014, comprising of field experts Mr. Badar Iqbal Geologist, Sardar Waqas Khan GIS/ Forest Expert, Mr. Saeed Qureshi, Soil & Environmental Scientist and Mr. Mushtaq Mughal Field Assistant from the platform of Edinburgh Direct Aid Muzaffarabad.

Introduction

The capital city Muzaffarabad, cradled by lofty mountains, lies 138 kilometers from [Islamabad](#) and about 76 kilometers from [Abbottabad](#). Muzaffarabad is positioned on the confluence of the Jhelum and Neelum rivers. The district is bounded by [Khyber-Pakhtunkhwa](#) in the west, by the [Kupwara](#) and [Baramulla](#) districts of Indian administrated Kashmir in the east, and the [Neelum District](#) of [Kashmir](#) in the north.



Most of the terrain is mountainous with the highest peaks exceeding 4500 m above sea level (asl). The landscape is deeply dissected with the main valley floors between 500 and 2000 m asl. The region is drained by the Jhelum River and its two tributaries the Neelum and Kunhar rivers (Kunhar forming the Kaghan Valley). These rivers flow westward forming deep antecedent valleys before flowing southwards along broader valleys to the Indo-Gangetic Plain. These three main rivers flow very rapidly with discharges of approximately 470, 240, and 80 m³/s, respectively. (Pakistan Water Gateway, 2007). This has resulted in intense fluvial incision and resultant high erosion rates, producing steep lower valley slopes that exceed 50°.

The population of Muzaffarabad is 0.168 million with the population density of approximately 350 people/km², which mainly concentrated along the valley floors, on river terraces and on areas that have gentle slopes.

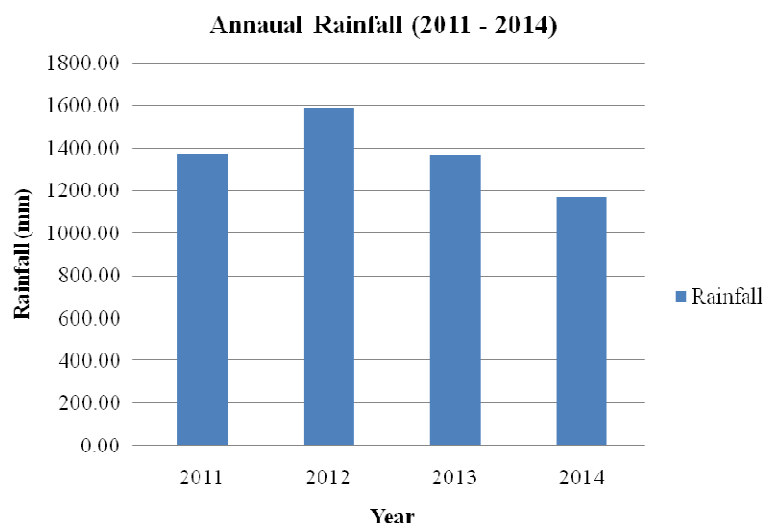
The high population densities place a severe environmental pressure on the mountain's ecosystems. The rugged terrain and intense summer rainfall make transportation extremely difficult through the region. Many roads are constructed along steep slopes often by excavating deep notches into the weathered bedrock and/or on fill that is perched precariously on steep slopes.

Climate of Area:

The study area has a monsoonal climate with very wet summers. The mean maximum and minimum temperatures during the month of July are about 35°C and 23°C; and in January 16°C and 3°C respectively. Northern parts of the district Muzaffarabad is much colder than the southern parts.

In July and August, heavy rainfall occurs with monthly extremes of up to 650 mm leading to rainfall-triggered landslides in the region. In September, rainfall declines, and by November conditions are dry, with minimal rainfall of 4 cm/month.

Muzaffarabad receives >1400 mm precipitation on average during the year, of which one-third falls as rain during the monsoon season from late



Source: Pak Met. Dept.

June until the end of August and sometimes till the mid of September. Also the cloud bursts can bring as much rain as 100mm during one shower, causing significant damage in the form of flash floods and debris flows. Intense rainfall patterns can occur throughout the year with the changing climatic conditions. This often results in severe flooding and landslides, notably debris flows which was experienced during early September this year also. During the winter, precipitation falls as snow at elevations above 1500 m asl. Little precipitation occurs in spring, but snowmelt provides abundant surface waters to slopes, which results in erosion and/or infiltration into slopes increasing the height of the groundwater table.

Geology of Area:

The topography of the study area is mostly undulating, with small pockets of flat areas. From the geological set up of area, the main geological formation in the study area is Hazara Formations. The Hazara Fm is composed of Precambrian argillite, slate, phyllites, greywacke, and siltstone overlaid by gypsum and limestone units and occupies large parts of an arcuate belt as which, together with

overlying younger rocks, extends southward from the vicinity of Garhi Habibullah through Abbottabad. It is obvious that subsurface lithology is mainly comprised of clay/shale, sand stone, slate and their admixture. The basement of Muzaffarabad Valley and its near surrounding is mainly consisting of metamorphic slates of Hazara Formation.

At some places, however, layers of varying thickness of gravel, boulder and conglomerate also exist, which extend in the deep horizon. Main formation exist in the whole area is sand stone and shale in alternate beds with varying thickness.

Lithologic Description:

The Hazara Formation consists mainly of slate, phyllite, un-metamorphosed shale, and some minor occurrences of limestone, graphite, gypsum and sandstone are also found at few places. Slates and phyllite are rusty brown and dark green on weathered surfaces while grey to greenish grey or black on the fresh surfaces. Slate units consisting of silt-sized material are somewhat lighter toned than those of clay-sized material. Bedding in slate and phyllite is identifiable at few places and are thin to medium bedded whereas intense deformation has obliterated the depositional features at most places and hence bedding is not clear. Shale layers, few centimeters to few feet thick, are present as precursor lithology where degree of metamorphism is low. Fine to medium grained and thick bedded Sandstone is also present at some places. Most of the rock units of Hazara Formation were possibly deposited as shallow-water argillaceous sequence.

Land Cover:

The landscape/ groundcover in landsliding area is dominated by medium sized broadleaved species of Shisham (*Dalbergia sissoo*), Phulai (*Acacia modesta*), Sanatha (*Dodonea viscosa*), Bhekar (*Adhatoda vesica*), Kamela (*Mallotus philippinensis*), Baroom (*Sorghum nitidum*), Chir pine (*Pinus roxburghii*) and shrub land/grassland on the top of the slope. Agricultural land is restricted to terraces towards Patreend village site, its surroundings and alluvial fans along the valleys floors, and terraced steeper slopes. The lower site of the project is the part of urban areas which mainly occur along the rivers.

In our analysis the majority of land sliding occurred in shrubland/grassland and on agricultural land. However, few land sliding occurred in forested areas.



Slope Failure and Risk Analysis of Landslides around the Project Area:

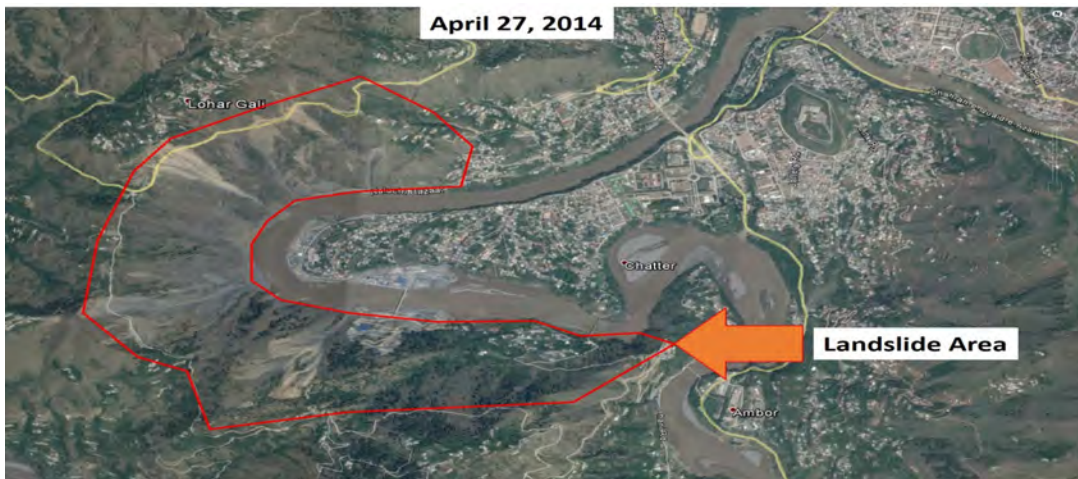
The occurrence of landslides in study area is a function of direct and indirect natural and human factors. These include, for example, lithology, structure, tectonics, geomorphology, topography, precipitation, temperature, infiltration, runoff, land cover, road construction and human induced vibration including other developmental engineering interventions. These are commonly referred to as event-controlling parameters.

Slope

Slope aspect has an effect on land sliding because it is related to such factors as insulation (weathering), weather conditions (precipitation, snow melt and free flowing water), land cover (forest, grassland, brush land, agricultural land), and soil conditions (infiltration capacity).

Slope gradient is one of the most important factors in mass wasting: movement is extremely common when slopes are steeper than the natural angle of repose of the substrate and when there is no enough

cohesion to inhibit slope failure. The angle of repose is typically 25–40° for unconsolidated materials. The most of the land sliding occurred on slopes of 25–35°.

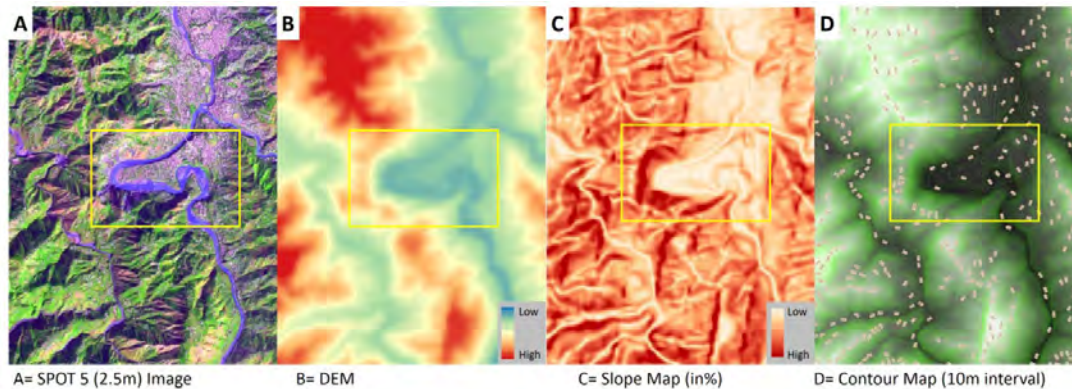


Elevation in the land sliding area ranges from a minimum of 650m asl in some river beds and surrounding flood plains to a maximum of 1128 asl in the surrounding top hills of the area on both of sides.

Comparison of the high resolution SPOT 5 (2.5m) images of 2006 and 2014 is given in the following figure:



A contour map with 10 m elevation intervals was generated and analyzed. The satellite image and DEM analyses for the study area revealed that there are more southeastern and eastern facing slopes than other directions. Furthermore, most of the land sliding (N70%) occurred on slopes facing southeastern directions. Precipitation might be higher on southern slopes due to the higher monsoon rainfall and on western slopes as a result of the westerlies, which enhances slope instability.



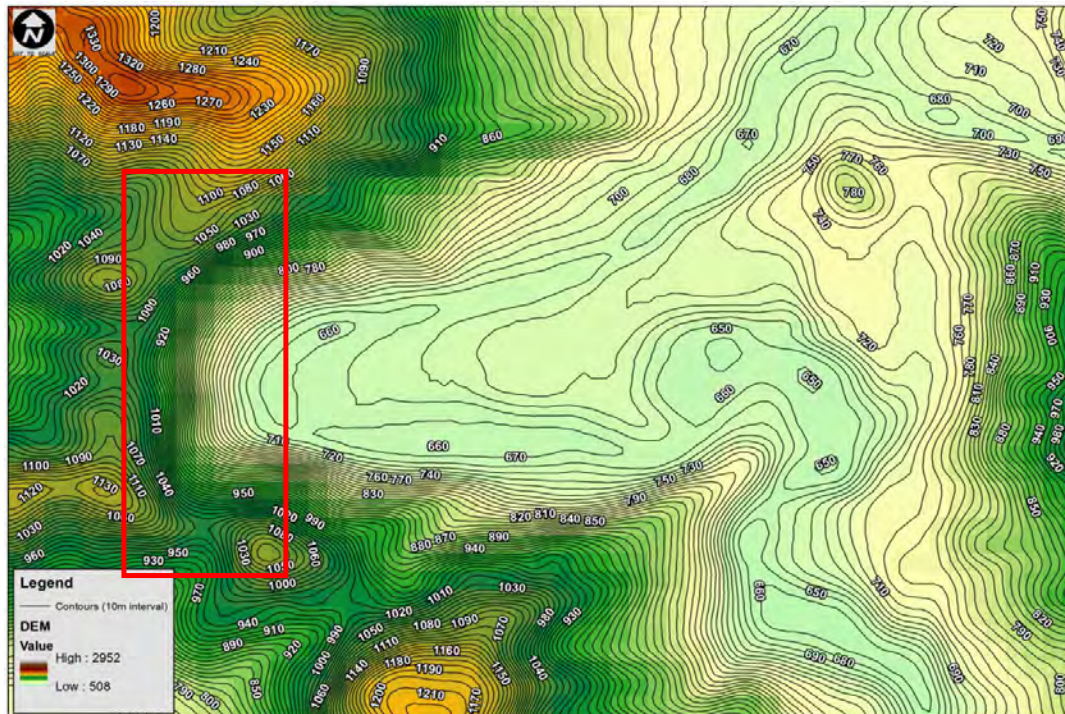
Methodology for Landslides and Slopes Monitoring:

Immediately after the devastating spell of torrential monsoon rains in the mid of September, 2014 our team visited the area and examined landslides at certain locations.

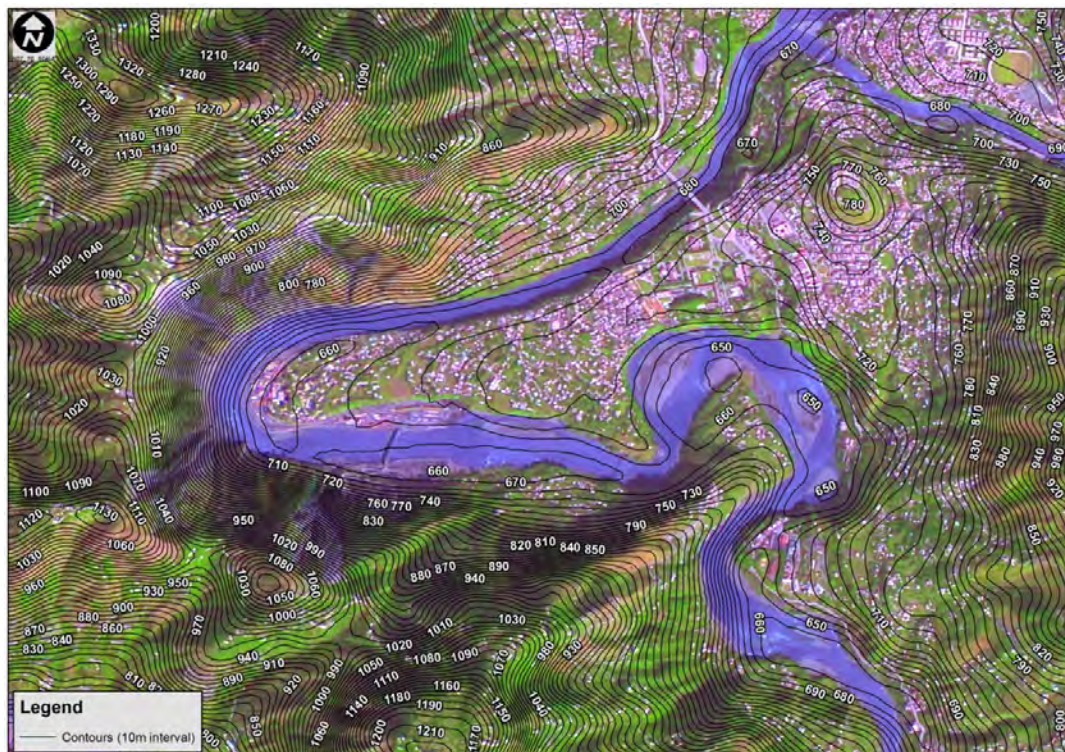
Our study builds on field photographs taken to assess slope conditions at certain selected locations and onsite observations after the monsoon rain-fall seasons.

Data Sources Preparation

In this study, remote sensing images were used for the landslide inventory preparation. A DEM was extracted from topographic sheet which was obtained from the SUPARCO Pakistan. The contours were generated from SRTM 90m DEM at an interval of 10m. Contours give a fairly good idea about the slope of an area. The closer the contours, the higher the slope and the more it is susceptible to land sliding. Slope of the land sliding area shown in the red box approximately ranges from 75-85% slope.



The following figure shows the contours overlaid on SPOT 2.5m image of October 09, 2014.



Findings and Observations:

The pre-earthquake landslide inventory shows that landslide activity is high in the area even before the earthquake. Directly after the Kashmir earthquake, an increase in debris avalanches and translational land- slides was observed. The earthquake generated unstable loose material and cracks on slopes. These materials and most of the visible cracks were triggered into landslides by monsoon seasons during last few years in the study area.

As the translational landslides and debris fall bodies present on hill slopes and in gullies started to wash away by the monsoon waters, the area covered by debris slides started to increase in size.

Majority of the debris avalanches are associated with bedding plane failures. Earthquake-induced acceleration produced additional downslope force, causing marginally stable slopes to fail. The low cohesion and high water content caused high increase in debris avalanches, which left behind many V-shaped scars. Down the slope, the debris avalanches spread and transformed into flow slides. Geologically these avalanches are located in the brown to dark gray rubbly slates, limestone and dolomite in the study area.



The increase in landslides area for the post few years, showing a very slight change in landslide activity except one massive landslide triggered right at the head of under-constructed power house site.

It signifies the fact that most of the rainfall-induced landslides were still related to the earthquake rooted disturb topography. The most abundant types of landslide are debris fall and slide (translational slides), which are increasing in the area and also causing occurrence of few new landslides which were observed just at the top of tunnel constructed at power house site.

However, the individual increase in the freshly triggered landslides after each monsoon and winter rainfall is increasing if compared to the previous period landslide area. The results demonstrate an abrupt increase in freshly triggered landslides after the winter rainfalls of 2013 and 2014 monsoon.

The following images show the changes in the landslide area through time



Furthermore, the other site of the hill slop (weir house site) can be considered safe from massive erosion as lot of land cover and vegetation prevents it to erode/wash away except the area where land vibration and engineering work is in progress.



Most of those are old landslides occurred in highly fractured shale, slate, clastic sediments, limestone and dolomite on slopes along river and roads.

On Muzaffarabad–Abbottabad road linking Muzaffarabad District to KPK at Lohargali point, massive landslides present along the right bank of river Jehlum in semi-circle shape in close pockets which are major irritant which remained always a source of disruption and hazardous where half kilometer portion is turned into permanent slide and slippage. This is the main supply artery for the transportation of heavy supplies to different ongoing projects including Patrind Hydro Power Project, which often remains suspended over the days. At least 2 to 3 villages having considerable population also located at the back of slide area and are also threatened due to persistent and excessive land sliding being reached to the toes of the inhabitant areas. During March 2014 this landslide was suddenly triggered and claimed two precious lives, one highly qualified Ph.D agriculture professional and his medical student daughter travelling to Muzaffarabad city for joining their duties, who were hit by huge land slide while the jeep was completely submerged into mud. This massive land/mud slide is a potential hazard that can be further triggered anytime which is a serious threat to the precious lives and public property and may increase the sediment load in the Jhelum River. Area opposite to this slide on the back is also prone to land sliding. Very high susceptibility to ongoing land sliding is predicted due to the steepness of the terrain, and the road itself. This point needs special arrangements to keep safe and out of danger.



In conclusion, it is established that areas around the lower site of project are still “highly” to “very highly” susceptible to future land sliding and warned of future landsliding hazard, especially after the summer monsoon seasons.

However, we agree with the fact that those slopes that still show fissures should be further investigated or monitored for management purpose .

We need to focused on

1. The spatiotemporal variations in landslide types, and
2. The influence of each subsequent monsoon on the landslide changes and new occurrences.

The monitoring and quantification of destabilized slopes after each consecutive monsoon seasons will provide evidence to conclude that disaggregated material and unstablized slope masses, eroded by rainwater and flash floods.

Discussion/ Conclusions:

Factors that contribute to slope failure are generally complex and difficult to assess with confidence but in general a steep sloop, high intensity of rain falls, undercutting of slopes by river erosion and human activities such as road construction, engineering interventions, deforestation, terracing and agricultural activities are probably the main reasons for these slope failures and has to be reached for triggering landslides.

We assumed that the ground conditions and the amount of rainfall received during monsoon and winter season is sufficient enough reasons to initiate any new or secondary landslides.

The extensive fissuring still poses a potential hazard in the region as the slopes are still susceptible to future landsliding under wetter conditions. Many settlements and major roads are still at risk to future landsliding, and future planning must account for this long-term potential threat.

Since the slopes in the area are subject to failure and can constitute a landsliding hazard. Hence it is important to assess these slopes for future potential failure.

Our study of the region showed that the bedrock lithology is the most influential and important landsliding-controlling parameter. Most of the landslides occurred in highly fractured shale, slate, clastic sediments, and limestone and dolomite.

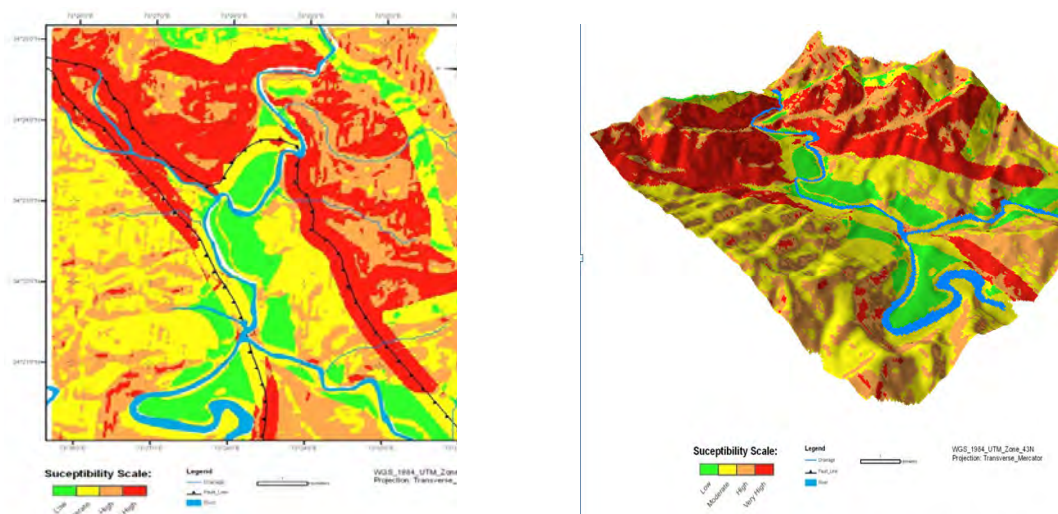
Slope gradient is the second highest influence as an event-controlling parameter, and most of the failures occurred at moderate elevations on southern slopes facing the summer monsoon precipitation. Shrub land, grassland, and also agricultural land are highly susceptible to land sliding and landslide susceptibility in the area.

The C shaped semi circle mountain strip across the river Jehlum at lower site is unsafe and it is likely that future land sliding will continue in this region. These unsafe areas require immediate mitigation action.

Reactivation of existing landslide sites and new land sliding, particularly along fissures, occurs following monsoon and winter season rains and a number of deep-seated landslides will continue to pose severe threat to main road and adjacent villages.

Following susceptibility map can provide a cheap and comprehensive assessment of the likelihood of future failures, which can be useful to planners for the rebuilding process and future zoning issues. Individual landslide areas can be remediated by employing engineering techniques, such as, the use of retaining wall, but these are expensive and need continuous monitoring.

Landslide Susceptibility Map



A notable proportion of landslides in the area were caused by human- induced factors, especially deforestation, poor terracing and habitations located on exposed slopes, and road construction. The negative impact of road construction, other developmental engineering work on slope stability resulting in land sliding causing physical, socio-economic and environmental losses.

Recommendations

Changes of landslide types and spatial distribution of slope failures are required to determine after each monsoon. These selected sites should be re-visited and re-photographed in same season during forthcoming years. This will allow us to make an assessment of the short-term changes that occurred during the period. The collected data and set of photographs will be used to compare landslide changes in coming years. Visual estimates and on-screen digitization of field photographs will be used to calculate percent changes in landslide surface area.





To manage and mitigate the potential impacts of landslide hazard, massive close spacing plantation of fast growing trees and appropriate engineering measures are recommended to mitigate the landslide hazard in future. There is a need to establish proper drainage pattern to reduce the instability of the area. Monitoring of slope movement and ground-water levels are required to assess potential movement of landslides. Discontinuing the landslide slope through terracing. Provision of cut off drains to divert the flow towards the natural course.

Annex-8

FISH STUDY IN KUNHAR RIVER

147 MW Patrind Hydro Power Project Pakistan



Quarterly Report

Study and Monitoring of Fish Fauna of Kunhar River

July-September 2014

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ABSTRACT

River Kunhar is one of the small rivers of Himalayas, which run for about 250 km from north to south and is drained by 19 small and large tributaries. The Himalaya has a greater diversity of coldwater fish. 218 fish species are listed for the whole Himalayas. Subsistence and commercial fisheries exploit the larger fish, such as the cyprinids *Labeodero*, *Torputitora*, *Tortor*, *Bariliusbendelisis*, *Schizothorax richardsonii* and *Schizothoraichthysesocinus*, as well as *Garragotyla* and *Crossocheilus diplochilus*. The other fish are smaller and of low economic value. The exotic brown trout is established in upper part of river Kunhar. Fish production in mountain streams is low and therefore commercial fishery is on a low scale only. Sport and recreational fishery targets the native mahseers *Tor tor* and *Tor putitora*, and brown trout. Organized brown trout fishing is confined mainly to the upper stretches of river Kunhar. If a better management of river fisheries is to be achieved, a better knowledge of fish stocks is needed. Protection and rehabilitation of some fish habitats is also needed. However, the future improvement in fish stocks will depend on regular stocking, as the presence of Mangla dam on river Jhelum has stopped the migrations of mahseers and schizothoracines. Sport/recreational fishery is considered an important factor in the effort to improve the economic status of the mountain regions.

INTRODUCTION

The province of Khyber Pakhtunkhwa is located in the north-west of Pakistan. The Khyber Pakhtunkhwa is largely located on the Iranian plateau and Eurasian land plate, while peripheral eastern regions are located near the Indian subcontinent and this has led to seismic activity in the past.

It covers an area of 74,521 km² (28,773 sq mi). According to the 1998 census, the total population of Khyber Pakhtunkhwa was approximately 17 million out of whom 52% are males and 48% females. The density of population is 187 per km².

The northern part of the province is snowy in winters, and also experiences heavy rain falls. Its valleys Swat, Kaghan, Chitral and Kohistan are surrounded by rugged mountains and have temperate climate, including cold winters. Upper reaches of rivers in these valleys carry clean cold water and are suitable for trout and schizothoracines (snow trout). Several lakes and reservoirs also provide suitable conditions for coldwater fish. As one moves to south, transitional or semi-cold waters are present, with snow trout and mahseers presence. Further south and at lower altitude warmwater fish species prevail.

There is subsistence coldwater capture fishery, but no statistical data are available on its extent. Recreational/sport fishery has been steadily increasing. In 1990 coldwater fish catches were estimated at about 200 t/yr (Akhtar, 1992), with the bulk formed by snow trout and indigenous small fish. In the same year Madyan fish farm produced 7.5 t and the private sector about 5 t of trout. With the completion of two more fish farms of trout fish in Swat and Kaghan, the private sector is expected to produce 50 t annually.

Brown trout introduction and subsequent stocking in Kaghan and Chitral at the beginning of the 20th century were very successful. Starting in 1962 at least three schemes initiated the development of trout in five districts, i.e. Mansehra, Swat, Dir, Chitral and Kohistan, resulting in five trout hatcheries. It is estimated that about 40 percent of the total fry produced from these hatcheries are released in various natural water bodies. Sport fishery has promoted tourism and its economic role is well established (Akhtar, 1992). It is recognized that at present the trout industry in Khyber Pakhtunkhwa is more advanced than elsewhere in Pakistan. There are now three trout hatcheries in Chitral Valley. The largest

trout hatchery-cum-farm is in Madyan in Swat Valley. There is a hatchery at Kalkot in Dir, and the Shinu hatchery in Kaghan, the oldest one in the Province. A new hatchery has been completed at Dobair in Kohistan.

No attention has been paid to develop hatcheries for the native cold water fish species anywhere in Pakistan. Province of Punjab has developed one Mahsheer hatchery and AJK Fisheries department is also planning to develop one Mahsheer hatchery to restock it in Poonch River and its tributaries. Nepal has worked on producing juvenile of *Shizothorax* species in Pokhara region but there is no plan of developing such hatcheries in Pakistan, AJK and Gilgit-Baltistan.

The river Kunhar flows in district Mansehra with a stretch of about 250 km. The river carries **clear water** with little silt during the winter (September-March), but it causes heavy floods during the monsoon season and summer snowmelt.

THE FISH

The fish species distribution in the Himalayan streams depends on the flow rate, nature of substratum, water temperature and the availability of food. In torrential streams Sehgal (1988) identified several zones on the basis of dominant fish species and the hydrographical features.

Menon (1954) related the distribution pattern of Himalayan fish to morphological characteristics which enable them to inhabit the torrential streams. He recognized six major groups: (a) fish dwelling in shallow, clear cold waters in the foothills without any striking modifications to current: *Labeo*, *Tor*, *Barilius* and *Puntius*; (b) fish inhabiting the bottom water layers in deep fast current, with powerful muscular cylindrical bodies: schizothoracines and the introduced trouts; (c) fish sheltering among pebbles and stones to ward off the strong current: *Crossocheilus diplocheilus*; (d) fish sheltering among pebbles and shingles in shallows, with special attachment devices: the loaches *Noemacheilus*, *Botia* and *Amblyceps*; (e) fish which cling to exposed surfaces of bare rocks in slower current, with adhesive organs on their ventral surface for attachment to rocks: *Garra*, *Glyptothorax* and *Glyptosternum*; and (f) fish which cling to the exposed surfaces of bare rocks in fast current, with limpet-shaped bodies and mouth, gills and fins highly modified to suit the habitat: *Balitora*.

Hora (1955) and Menon (1962) studied the evolution of schizothoracines and concluded that they appeared during the first interglacial period, when turbulent streams formed in Central Asia, necessitating the reduction of scales which is characteristic of schizothoracines. Primitive forms of this group occur today in South China. During the favourable environmental conditions of the second glacial period they migrated westwards as far as Kashmir and Sistan. The great proliferation of genera and species of the sub-family Schizothoracinae probably occurred during the second and subsequent interglacial periods. Today the schizothoracines are mainly Central Asiatic in distribution although a few species are present also along the southern face of the Himalayas.

The eastern Himalaya has a greater diversity of coldwater fish than the western Himalayan drainage. For the whole Himalayas, 218 species are listed (Menon, 1962). The subsistence and commercial fisheries exploit carps (*Labeo* and *Tor* spp.), lesser barils (*Barilius* spp.), schizothoracines (*Schizothorax* and *Schizothorachthys* spp.), garrids (*Garra* spp.) and sisorids (*Glyptothorax* and *Glyptosternum* spp.). The other genera are small-sized and of low economic value. The exotic brown trout (*Salmo trutta*) has established itself in some areas of the Himalayas.

The main factors which influence fish life in the Himalayan streams are: (i) current 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.

The need for shelter from the current has led to territoriality. Mahseers and schizothoracines chase intruders to defend the limited food resource and available shelter. Such behaviour develops after the young fish emerges from the eggs laid in gravel. During winter months all size groups of mahseers and schizothoracines are present in pools when the water level is at its lowest and water is highly transparent. Such pools are present in the rivers Jhelum, Neelum, Kunhar and Swat. This is one of the devices employed by these species to confuse predators. When a few fish are caught in a cast net, the rest disperse.

Water temperature is always an important limiting factor affecting geographical distribution and local occurrence within one water system. Cold stenothermic species such as the endemic schizothoracines (*Schizothoracichthys esocinus* and *Ditychus maculatus*) and exotic brown trout have an upper tolerance around 20°C. Carps, mahseers and lesser barils have a wider tolerance and even survive water temperatures over 25°C. Schizothoracines and brown trout remain active in the near-zero temperature which prevail in streams of northern Pakistan.

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* 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 warm and coldwater confluence, which receive warm 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 fast-swimming species of mahseer, trout and schizothoracines expend much energy in maintaining an upright position in the turbulent and fast current. The frequent occurrence of spates has proved deleterious to breeding and propagation of coldwater fish. The scanty population as indicated by the low density of fish in the Kunhar and Neelum rivers may result from the passage of these rivers through deep and narrow gorges, and the presence of cold glacier- and snow-melt water.

The fluctuating discharge of water and drying out of streams, leaving only isolated pools or no water at all, is another important matter. A general observation during the last three 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 required by coldwater fish (7.0-8.0 mg l⁻¹). As soon as the flow is restored with spring rains and snow-melt water a rapid recolonisation 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.

As a result of this study in river Kunhar showed 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: Following table shows the result: transparency; pH; water temperature (°C); dissolved oxygen;

Table-1 showing water parameters

S No	Point	Dissolved Oxygen (ppm)	pH	Temperature °C	Transparency
1	Boi	9	6.5	18.5	0.9
2	NallahBoi	6	8	25	0.6
3	Parri	12	6.5	18	1
4	Tunnel exit	14	7	18	1
5	Material Dumpin Site	11	6.5	18	0.8
6	Tarchella/Shorran	13	7	16	1.1

2. 1.Fisheries

Fisheries in the Himalayan rivers can be divided into (a) subsistence fishery; and (b) sport/recreational fishery. Fish production in mountain streams is low and therefore any commercial fishery is on a very limited scale. The low biological productivity results in the prevalence of small-sized fish, except in pools where fish have some shelter and resting place.

The fishing methods using nets, traps and poison are simple but well-suited to the turbulent nature of the streams. Cast nets of 1.0-2.0 m diameter, with mesh sizes 1.2 to 3.0 cm bar to bar and sinkers of a total weight of 5 kg are the most common gear used. The sinkers allow rapid settling of the net at the bottom, thus preventing it from being carried downstream by the rapid current. The fisherman upturns the stones on the stream bed covered by the net, which makes the fish come out of their hideouts below the stones and get trapped in the peripheral pockets of the net. The other types of nets used are: drag nets operated in conjunction with stake net (*kadh*), seines, stake nets, bag nets (*kochbi*), and some other types.

The various poisons used are lime, sap of *Euphorbia rogleana*, powdered seed of *Xanthoxylumalatum* and *Cascariatormentosa*, boiled tea leaves, etc. In addition, spears, horse hair nooses, harpoons with 4-5 barbed points and grain fishing are also used in different waters of the local rivers.

2.2 Fish catches and species composition

Fishing in the Kunhar river using cast nets of 1 m to 1.5 m diameter recorded a catch of two fish species only. The catch comprised mainly of *Schizothoraxplagiostomus*(80%) followed by *Schizothoraxcurvifrons*(20%) Large numbers of schizothoracines were captured during June 2014, probably on account of their downstream migration to avoid extremely low water temperatures of the glacial water, abundance of food due to flood water of seasonal tributaries and high level of turbidity.

2.3 Other Fish species of River Kunhar reported in the past:

Family: Salmonidae

Oncorynchusmykiss {*Salmogairdneri* }(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 kashmirensis

SPORT AND RECREATIONAL FISHERY

Trout

The trout, which is now acclimatized in the upper reaches of River Kunhar (upstream of Jared in Kaghan), is permitted to be caught on 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.

Organized brown trout fishing is confined mainly to the upper reaches of river Kunhar. As per fishing regulations, 'dry and wet' fly spinning, artificial and natural worms, etc. are the allowed baits for brown trout fishing. The number of anglers to be permitted in each beat is fixed on a daily, weekly or seasonal basis. The fishing season extends from March to October every year. The minimum legal size of trout to be caught ranges from 25-30 cm. The bag limit ranges from 5-7 fish of 25 cm and above in length. The number of undersized fish caught by each angler has to be returned in the river. However, there are very few anglers who follow such instructions.

4. THE IMPACT OF THE INTRODUCTION OF EXOTIC FISH

In river Kunhar several exotic fish species have been introduced without any consideration of the impact of such introductions on the endemic fish. Brown trout and rainbow trout were introduced to meet the requirements of sport fishing for the British who settled in India in the 19th century. In the absence of any fast-growing endemic species in cold waters, common carp was introduced into aquaculture. In the beginning such introductions remained limited to certain areas. Subsequently, these species were transferred to every suitable area of the Himalayas without taking into account the justification for such introductions, the interaction of the introduced fish with other members of the ecosystem and the role played by parasites and diseases.

Four species of salmonids were introduced in the Kunhar and Neelum Rivers between 1905 and 1980 from Europe, North America and Canada. These were: brown trout, rainbow trout, eastern brook trout (*Salvelinus fontinalis*), splake (hybrid between lake and brook trouts). Of these, brown trout is now well established, with a number of self-sustaining populations in the upper reaches of River Kunhar. Rainbow trout has failed to establish itself in the stream ecosystem but it is cultured in fish farms.

An opinion prevails that a sharp decline in catches of schizothoracine species in the River Kunhar is the result of brown trout preying upon their younger stages. Schizothoracines, notably *Schizothorax esomus*, *Schizothorax plagiostomus*, *Schizothorax micropogon*, *Schizothorax curvifrons* are the most important endemic species of fish occurring in the river waters. The fish may spawn in several batches. The main spawning, however, takes place when the stream water reaches temperatures of 10.0-21.5°C. The average fecundity is 30,000-40,000 eggs per kg body weight. The brown/rainbow trout release all the

eggs in a single stroke and fecundity ranges between 1800-2500 eggs per kg body weight. The two groups of coldwater fish differ considerably in their feeding habits. The various species of schizothoracines feed mainly on microbiota growing on bottom stones and rocks with a rasping action of the ventrally-placed mouth. Some of the associated smaller, soft-bodied insect larvae also find their way into the gut. Brown trout feeds principally on nymphs of mayflies (74.2% of the total food taken), followed by the larvae of caddisflies (13.7%), Diptera (7.9%), and miscellaneous items (4.2%). The same size group of Schizothoracines feed on green algae (54.2%), followed by blue-green algae (44.6%) and miscellaneous items (1.2%). Based on feeding habits and the mode of reproduction hardly any competition was observed between the two species. Considerable decrease in the trout fish population and its size has been observed for the last two decades in River Kunhar. The decline in average size may be attributed to the increase in angling pressure and the fast degradation of the ecological conditions of the river system. These observations, however, do not confirm the suggested adverse impact of brown trout on endemic species. More investigations are needed in order to fully clarify the interrelationships between brown trout and schizothoracines in the river Kunhar and its tributaries.

Very **serious** matters of species depletion during this study, before the construction of weir at Patrind in river Kunhar are:

1. Pollution
2. Use of explosives for killing the fish
3. Use of poisonous substances

One sample fish caught at the point of confluence of NallahBoi with Kunhar was encircled with a tin ring thrown into the river. Such other items were also noted especially where small streams and creeks join the river Kunhar. Plastic bottles, bags and nylon clothes are detrimental for the aquatic life.

A person near nallahBoi told that some parties come from outside and use the explosives and poisonous substances at some pools of nallahBoi killing fish of all sizes.



Fig: Fish encircled by a tin ring causing injury

5. Field Results:

5.1 Point-I (Boi)

This is the point situated at $34^{\circ} 18' 19''$ N, $73^{\circ} 26' 44''$ E at 723 meters of elevation above sea level. The water level is moderate and it is clear as compared to last sampling during June 2014. The fish has most probably migrated due to seasonal changes in the hydrology of the river water. Last time the fish catch was high which shows that the fish catch during June-August remains high. No fish has been caught during this month of September 2014 at this point.



Fig 2. Fishing with cast net at point 1



Fig 3. Testing of water parameters

5.2 Point-II (DomelBoi)

This is the point situated at $34^{\circ} 18' 36''$ N, $73^{\circ} 26' 43''$ E at 736 meters of elevation above sea level. This is the point where fish can migrate upstream in the BoiNallah during the spawning period and can have little impact of low river flow when tunneling of the water starts. The nallah was highly turbid and water temperature at this point was 25°C which is 7°C higher than the point 1 at Boi. Four samples were caught of two species, *Schizothoraxplagiostomus* and *S. curvifrons*. Evidences of existence of

*Glyptothorax*spp and common carp (*Cyprinus carpio*) were found in the Boinallah, with the interview of the locals. The species caught, their weight and sizes are given in table 2 below.



Fig 4. Turbid water of Nallah Boi



Fig 5. Netting at confluence of NallahBoi with Kunhar River

5.3 Point-III: (Parri)

This is the point situated at $34^{\circ} 19' 47''$ N, $73^{\circ} 25' 35''$ E at 750 meters of elevation above sea level. A small creek joins this point with a warmer temperature providing the chances of better food items to flow into the river. River also makes few small pools providing better chances for the fish to feed and spawn. This is again a good fishing point situated at about 3 km downstream of Patrind weir point. The catch of fish was 1 of *Schizothorax plagiostomus*.



Fig 6. Fish caught at parri

5.4 Point IV: (Outlet of river diversion)

This is the point situated at $34^{\circ} 18' 19''$ N, $73^{\circ} 26' 44''$ E at 766 meters of elevation above sea level. A small pool has appeared at the left side of the very fast flowing outlet of the diversion where survived fish from the roaring outlet can have the survival environment. Food scarcity has been observed so the growth of the fish will be stunted here. This diversion tunnel has a definite impact on the fish production but to maximum of 800 meters downstream.

Two very small fish of *Schizothoraxplagiostomus* were found here.



Fig 7. Netting at Outlet of Diversion Channel at Patrind



Fig 8. Fish caught from the pool appeared at the side of the outlet

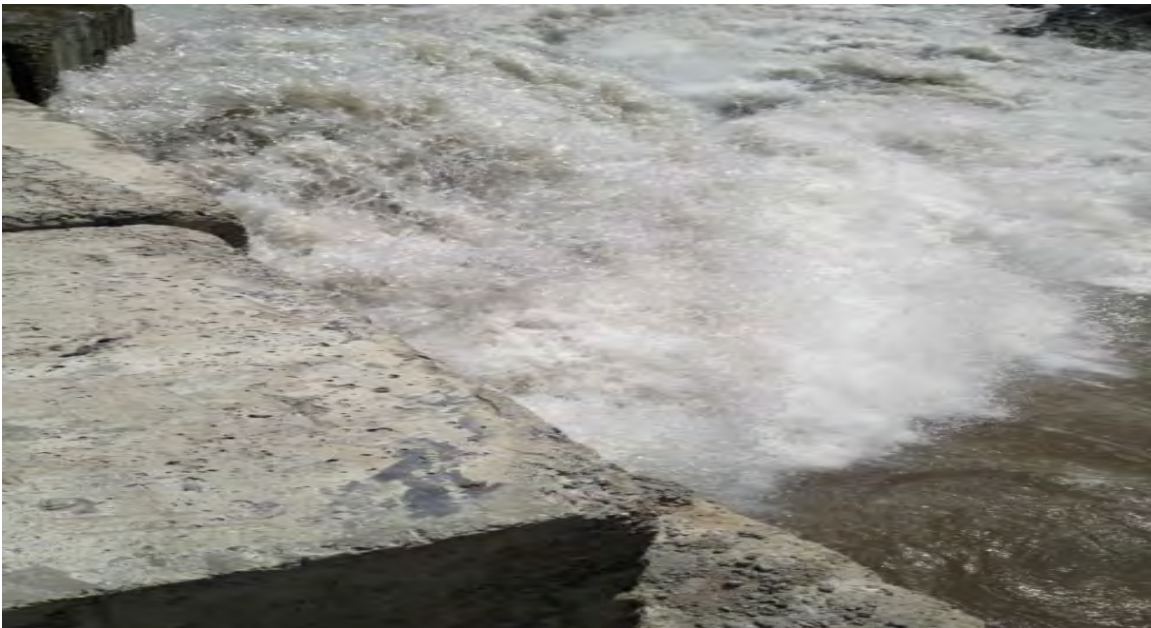


Fig 9. High speed flowing water at the outlet

Water hitting the side walls at outlet

5.5 Point-V: Material Dumping Site

This is the point situated at $34^{\circ} 20' 16''$ N, $73^{\circ} 25' 26''$ E at 772 meters of elevation above sea level. This is near to the inlet of the diversion tunnel. The inlet point has been closed to access because of increase in the water flow and blockage of the possible path leading to the point. Here two fish species were

caught, *Schizothorax plagiostomus* and *S. curvifrons*. Still the impact on aquatic life is not very high as the lake has not developed and course and flow of water has not changed here. When the lake will grow after construction of Patrind weir, this can harbour the Rainbow and Brown trout. If carefully planned, this can become commercial activity but needs expert input. Three small sized fish of were caught from here.



Fig 10. Release of caught fish back into the river by PES staff member

5.6 Point-VI (shoran/Tirchilla)

This is the point situated at $34^{\circ} 18' 19''$ N, $73^{\circ} 26' 44''$ E at 776 meters of elevation above sea level. This is a point of zero water level of the expected lake. The river has divided into two parts here this time. No fish sample could be collected from here this time as compared to two fish of species *Schizothorax plagiostomus* were caught during June 2014. This will have little impact by the construction of dam but better picture will appear after the construction of the weir.

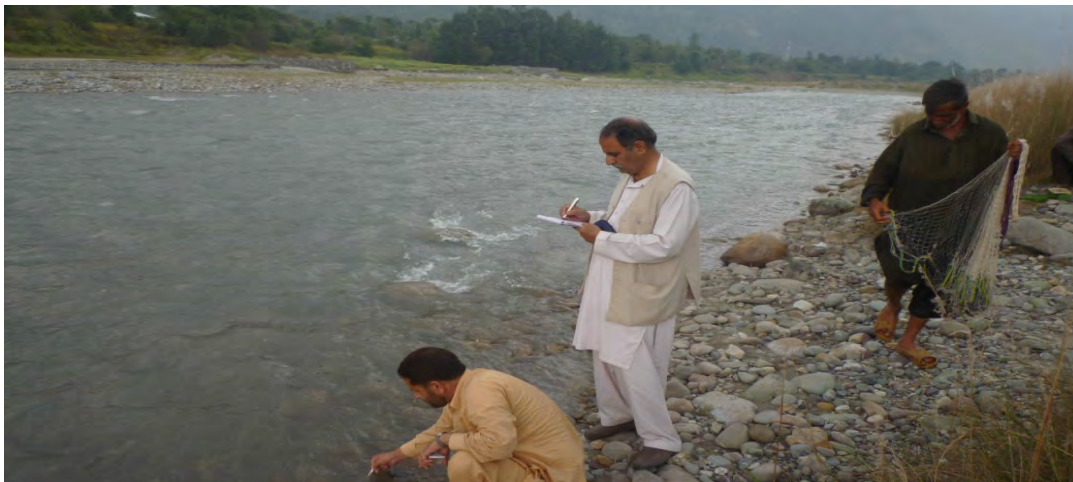


Fig 11. Sampling at Shorran/Tarchilla

Table-2 Showing record of fish caught at each sampling point

Point 1				
S no.	Name of Species	Weight gm	Length inch	Remarks
				No fish could be caught
Point 2				
1	<i>Schizothoraxplagiostomus</i>	170	9	
2	-do-	30	5.5	
3	-do-	250	12	
4	<i>Schizothoraxcurvifrons</i>	115	7	
Point 3				
1	<i>Schizothoraxplagiostomus</i>	100	7	
Point 4				
1	-do-	45	5.5	
2	-do-	30	3.5	
Point 5				
1	<i>Schizothoraxplagiostomus</i>	40	3.5	
2	-do-	100	8	
3	<i>Schizothoraxcurvifrons</i>	120	7	
Point 6.				
				No fish could be caught
Total Fish caught				
	<i>Schizothoraxplagiostomus</i>		8	
	<i>Schizothoraxcurvifrons</i>		2	

Species composition

Schizothoraxcurvifrons 2

Schizothoraxplagiostomus 8

6. MANAGEMENT AND CONSERVATION

Over the years uncontrolled and often indiscriminate fishing in the largely unmanaged river and streams has resulted in a sharp decline in catches of the important sport and subsistence fish. The increasing use of river water for irrigation, hydropower production, municipal and industrial purposes, and the inputs of pollutants, have also impacted on fish stocks. Among the difficulties that fishery managers are facing today is the shortage of data for a number of rivers and even whole areas of Himalayas. The most essential requirement is to estimate the resources which would enable the fishery scientists and planners to formulate a management policy. Another and an increasingly important aspects, is the need to evaluate the environmental impacts caused by human-induced changes in river and lake catchments, and how these have contributed to the decline in fish stocks. The use of destructive methods of fishing calls

for effective enforcement of legislative measures and for education of the fishing community. There is a need to improve the surveillance along the rivers in order to protect fish stocks. In this respect the role of voluntary agencies in conserving stocks must not be underestimated.

Fish ladders constructed on several weirs and barrages to facilitate migration of migratory fish species were found ineffective. The drawbacks of these fish ladders are their steepness and then narrow and inconspicuous inlets. These ladders were found to function as fish traps and as such used by poachers.

While the creation of a reservoir results in the creation of a new habitat for fish, at the same time many endemic species are adversely affected. To resolve this problem, priority should be given to the preservation of the diminished stocks of riverine fish species. This should include enforcement of legislative measures such as closed season, types of nets and mesh size regulation, and also the involvement of voluntary organizations, including fishing associations and clubs, in an effort to maintain the fish stocks at a healthy level. The stocks should be enhanced through regular releases of hatchery-produced fingerlings. Only in this way can the rising demands from subsistence and sport/recreational fishermen be satisfied. A programme of stream improvement to maintain optimal conditions for coldwaterfish is also needed, especially where such streams have been impacted by dams, channelization and pollution.

The practice of protecting fish stocks of brown trout and schizothoracines during the low water level period by creating deep pools, covering them with tree branches and protecting them from poaching, also has proved beneficial. The best way of improving the trout fishery in rivers and lakes is to regularly stock the waters with yearlings produced in hatcheries.

There is also need to improve infrastructure for recreational and sport fishermen, as this would attract more tourists to the areas. Kaghan Valley has already such facilities. There is a need to develop trout facility in Patrind when a pool is expected to appear as a result of Weir construction. This pool will change the ecology of the river system both up and down stream and some fish species are likely to disappear as a result of this. Permanent stocks of brown trout are required to be established in the near most suitable water to stock the fish in the upcoming lake. At present Kaghan Valley has 203 km of streams available for trout fishing. It is common knowledge that fishing tourism improves the economic status of a region. It is estimated that the economic benefits of sport fishing for trout is quite high and an angler spends about Rs. 2000 per week during the tourist season.

7. Comparison

There is no apparent difference in the results of the last three studies which shows that the impact has not significantly appeared on the aquatic environment of the River Kunhar. This is mainly because of the ecology of the river has not changed very much except at the outlet of the diversion at Patrind. The major change in ecology is expected after the weir construction 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. The species composition may change and some species may disappear with the change of river ecology.

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Annex-9

VEGETATION STUDY- PATRIND HPP

**Vegetation Study on the
Patrind Hydro Project Area**



Vegetation Study for July-September 2014

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VEGETATION STUDY OF PATRIND HYDRO POWER PROJECT

1. Abstract

Trees are the most precious gift of God to mankind. It is a resource much superior to other bounties and blessings because not only is it renewable but it also makes a very healthy contribution towards improvement of the environment. The immense impact of trees on the stability and development of a country like Pakistan cannot be denied. The countries which have thoughtfully preserved and regulated the use of their tree wealth are the most prosperous countries of the World today but those which have squandered their resource ruthlessly are mourning their loss and people are paying a very high price for their blunders.

Apart from their productive and protective benefits, trees have always played a very important role in the behaviors and mental resurgence of man. Poets, Sufies, mystics, and writers have drawn inspiration from trees and the environment there in. As the population grows and cities become congested, the need for open spaces, parks and gardens is increasingly being felt. The psycho-physiological influence of trees in the form of purified air, clean water, rest and recreation, scenic enjoyment, reduced noise levels, and spiritual replenishment are being fully appreciated. Trees are also considered to be the main source of water regulating reservoirs and are obviously making very positive contribution in this regard. Patterns of species composition and diversity in the lesser Himalayan subtropical forests of the project area were studied in relation to environmental variables and underlying anthropogenic influence. Forest composition, community structure and diversity patterns are important ecological attributes significantly correlated with prevailing environmental as well as anthropogenic variables.

The demand of wood has many times increased in the hilly areas of Pakistan mainly for timber, firewood and fodder. Forest Area of Pakistan is said to be 4-5% of its total land area whereas it is important to have at least 25% of the total land area under forest cover to meet the related need. This forest area is again under immense pressure of the human beings noticing high deforestation and disturbed regeneration area.

A sharp decline in forest vegetation attributes occurred with increased levels of human and livestock interference.

The area around Lohar Gali, including Alladra and Patrind lack the vegetation cover. Land cutting for opening the roads and base cutting by the river has destabilized the whole area and a bad picture reflects the negative picture of Muzaffarabad city. Receiving more than 60 inches of annual mean rainfall is a shame for having such denuded and slide areas of Muzaffarabad as a little attention can change the whole scenario and increase the green beauty of the area.

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.

2. Introduction

The study area is about 10 km up and downstream of river Kunhar from the weir point at Patrind ($34^{\circ} 20' 36''$ N and $73^{\circ} 25' 10''$ E) at an elevation of 2516-3123 fta.m.s.l) and around the outlet at Alladra ($34^{\circ} 20' 06.05''$ N, $73^{\circ} 27' 18.6''$ E) in AJK. It covers both the eastern aspects on the left bank of river Kunhar and right bank of river Jhelum in AJK. Total Area is about 100 Acres.



Site at Patrind



Site at Lower Chatter

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 labour 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. The area has badly been disturbed due to forest fire on both the sites at Patrind and at Alladra during the last few weeks after the second study of the area.

3. Forest Types (Ecological Zonation):

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

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

4. Vegetative Cover

Project site vegetation does not contain any species listed as endangered or threatened by the Government of Pakistan or IUCN. Only two species *Celtisaustarlus* (Batculd) and *Ficuscarica* (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. 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 conservation status of the vegetation of the area.

Following Tree species were documented in the project area both in Patrind and in Aladraduring the last three studies and an additional species, Sharole, has been seen in Patrind area during this study:

<u>Common Name</u>	<u>Botanical Name</u>	<u>Type of Tree</u>	<u>Status</u>
Sharol	<i>Alnusnitida</i>	Fodder	Common
Akhrot (Wallnut)	<i>Juglansregia</i>	Fruit	Common
Anjeer	<i>Ficuscarica</i>	Fruit	Rare
Batang	<i>Pyruspatia</i>	fruit	Common
Batculd	<i>Celtisaustralis</i>	soil binder	Rare
Beence	<i>salixspp</i>	Firewood	Common
Ber	<i>Zizyphusmauritiana</i>	Fruit	Common
Chir	<i>Pinusroxburglii</i>	Timber	Common
Dhaman	<i>Grewiaoppositifolia</i>	Fodder	Common
Drawa	<i>Ailanthus anus</i>	Firewood	Common
Drek	<i>Meliaazadrach</i>	Firewood	Common
Kangarr	<i>Pistaciakhunjak</i>	Soil binder	Rare
Kau	<i>Olea cuspidate</i>	Agri tools,	Common
Kiker	<i>Acacia nilotica</i>	Firewood	Common

Nim	<i>Azadirachataindica</i>	Firewood	Common
Phagwarr	<i>FicusPalmata</i>	Soil binder	Common
phulai	<i>Acacia modesta</i>	Firewood	Common
Pipal	<i>Ficusreligiosa</i>	Firewood	Common
Robinia	<i>Robiniapseudoacacia</i>	Firewood	Common
Shahtoot	<i>Morusalba</i>	Fruit	Common
Sherol	<i>Alnusnitida</i>	Firewood	Common
Snatha	<i>Dodonaeviscosa</i>	Soil binder	Common
Talli (shisham)	<i>Dalbergiasisso</i>	Furniture wood	Common

The main contributor grass species were *Heteropogoncontortus* (Sariala), *Cenchrusciliaris*(Dhaman), *Desmostachyabipinnata* (Dab ghaas), and *Cynodondactylon* (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.

5. Comparison of the studies

The vegetation of the area which was badly damaged by the forest fire during the month of June outside of both the project sites at Aladra and Patrind has been revived and green area has been emerged now. Fortunately the fire was of ground nature as was mentioned in the previous study so; it caused a little damage to the bushes and no damage to the trees.

The areas around the project sites are grazing land of the cattle of local communities. They deliberately burn the area for avoiding the grasses of low nutritional value like saryala (*Heteropogoncontortus*) and burning the dry needles of the Chir Pine. This is mostly the ground fire which is not much harmful for the forest cover. Even the bushes are not affected by this type of fire. But; when the quantity of combustion material is more, then the ground fire converts into crown fire. This fire burns all the under growth and soil becomes exposed to the heavy shower of rain during the monsoon. This type of fire also damages the foliage part of the bigger trees.

The intention of burning the area was to give better chances of growing the grasses of nutritional value and eliminating the domination of unwanted grass species but, this ground fire became the crown fire

damaging almost all the undergrowth of the tall tree species. Following are the plant species which are damaged to an extent of 90% in the fire affected area:

Ber	<i>Zizyphus mauritiana</i>
Snatha	<i>Dodonaea viscosa</i>
Sumbal	<i>Berberis lycium</i>
Bhakarr	<i>Adhatodavesica</i>
Timber	<i>Zanthoxylum</i>
Phulai	<i>Acacia modesta</i>

6. Effects of the Fire Hazard on the project:

During past quarter at Alra forest on 22nd of June 2014 was a crown fire. Somebody deliberately put the area under fire most probably for getting a better quality of grass. It could have come into the project area of Hydropower station and damaged the property but, the staff at the station has very efficiently extinguished the fire. By looking at the area it seems as if the fire did not cross the fence. The soil outside the project area is exposed to direct hit of the rain drops which can lead to the gulley erosion and project area may come under the threat of landslide. Similar type of fire has affected the Patrind site of the Hydropower area. Staff there has also controlled the fire using fire extinguishers and throwing water on the outer boundary of the area. Both sites are now in the danger of soil erosion and if proper measures are not taken, the area may get huge damage in the future.

7. Landslides

Most of the area around the project sites has been denuded of the tree cover. Soil erosion has become permanent problem for the area. Landslide at the left side of the powerhouse site has grown rapidly since the study of the area has been started. There are four possibilities of landslide acceleration in the area (a) River is cutting the side at its bank, (b) Tree cover loss over the area, (c) Cutting the stable sides for road opening and (d) blasting inside the tunnel has created cracks in sliding area which has allowed the water to percolate and detach the soil mass from the bed and soil mass movement has increased.

Mass movement control tends to be both expensive and far from simple. Unlike sheet or linear erosion control, mass movement control often means preventing rainwater from soaking into the soil, adding to the weight of the soil cover and rapidly reaching the slide bed-plane. The surface is therefore drained to evacuate runoff to less vulnerable zones, generally the convex sections of a slope. The zone over the

slide bed-plane can be drained in depth to prevent interstitial pressure from detaching the soil cover from the stable zone beneath the slide bed-plane.

Another method is that of drying the land by increasing plant evapo-transpiration, for example by planting eucalyptus or other plants with a high evapo-transpiration capacity. However, it is important to prevent such vegetation from becoming overwhelming, so shrubs must be kept on the edges of fields. If trees are introduced they must be coppiced, i.e., the vegetation must be kept young as it will then evapotranspire and produce maximum biomass. Very tall trees should not be kept on slopes where risks of sliding are high. When the slide bed-plane is close to the soil surface, tree roots can oppose strong mechanical resistance to shearing of the soil cover, whereas when the potential slide surface is too deep for the roots to reach, such resistance is no longer operative: overloading slopes with trees may even add to slide risks. Moreover, trees can shake in the wind, transmit vibrations to the soil and produce cracks that favor localized infiltration of runoff water down to the slide bed-plane. Quick-growing species with tap-root systems are preferable, and clear felling is to be avoided, for it destroys the whole root framework in the soil cover at one time. Trees not only increase resistance to shearing through the mechanical action of their roots, they also alter the water content of the soil: evapotranspiration is high in a forest and this keeps the interstitial pressure of water in the soil cover lower - which is why there is a sharp increase in soil humidity after clear felling.

Plantation along with bioengineering technology proves to be very effective in the erosion of mass movements of soil. Shrubs, grasses, hedges etc. combined with deep drains for controlling water penetration in the soil and gabion work can be the only tool of stopping the erosion of such types.

8. OUTCOME OF THIS STUDY

The area is again green but the major part of the area is covered by the grasses which the people prefer to have for grazing their cattle. They are least concerned for the damage to the bushes and the trees as the level of their awareness is very limited about that. There is a danger of sudden outbreak of the fire again which may cause a great damage to the project as well along with the surrounding forest area on both the sides i.e., Alada and Patrind.

The slide area at the left bank of the project area at Alda has further been expanded horizontally and vertically. This has come to the edge of the project area and mass movement of the soil can have serious impact on the project area. There is continuous water flow in the slide which needs a proper treatment. The soil of the slide area is shingle with a productive mixture of silt and clay. It is very difficult to control the slide with only engineering structures. Treating with short-crete instead of treating it with plantation and bio engineering will not be a permanent solution to it. The project is mostly looked after

by the Engineers and to them, it is the easiest and permanent solution for treating the slides. The loss of biomass quantum is not as significant as there has been a low vegetative cover in this area.

Most of the Chir pine trees in the area to be submerged were found in Pole stage (age 20-30 years) with few at tree stage. The same is the case with other broadleaved species. There are few trees noticed defective and leaning condition. Two of them are dead and lying on the ground.

No new removal of trees has been observed as some trees were harvested on the inlet and outlet of the tunnel before where land was been affected to some extent which still needs a careful treatment.

Project site vegetation does not contain any species listed as endangered or threatened by the Government of Pakistan or IUCN. Only two species *Celtisaustarlus* (Butculd) 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. 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 conservation status of the vegetation of the area except to a limited extent for which suggestions have been given below.

The present status of vegetation on Patrind side does not depend upon the water of river Kunhar but it depends on natural precipitation or water channels taken out of the side nallahs. 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 to be 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 will come under construction.

9. Possible Impact of the Project

The result indicate 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 the upstream and negatively at the downstream of Patrind. Downstream the vegetation composition along the banks will make a huge difference as some area which is under river water will have no more water and some invasive species may appear on the tract. Water retention capacity of the soil above the tunnel will reduce as the percolation rate will increase and drain out from the tunnel. This will definitely have a negative impact on the water loving plant species and species of low water requirement will dominate changing the ecology of small area. The blasting inside the tunnel will create cracks in the land and area may become destabilized, change of water courses, more slides and mass movement of the soil may appear. This will also have a negative impact

on the spring waters on and around the tunnel, affecting the vegetation fed by these spring waters. Ground water will be affected downstream of the Patrind, but the dependence on that water is not existing; so no social impact is expected.

10. Recommendations

Since the area close to the tunnel and inlet and outlet of the tunnel where working concentration is high, the impact on the vegetation and water courses will have negative impact. The lake will submerge some of the vegetation due to rise in water level. Similarly downstream at Patrind the water level will come down, so new species may appear along the banks of the river course. Landslides due to heavy construction and blasting inside the tunnel may become a hazardous. There is a need to compensate this loss by some possible measures listed below:

1. Landslide control calls for expertise and major funding in order to drain slide bed-planes - and this is beyond the reach of small farmers. State investment, in such measures is only justified where vital structures are at risk: road networks, villages, dams, powerhouses etc. There are, however, some measures well-known suitable for region: the use of trees - particularly eucalyptus, Shrole, salix and bamboo - to dry out the ground and stabilize the slow movement of soil cover on steep slopes and along river-banks. Careful choice of species should make it possible to transform these inhabited landscapes into a stable landscape dominated by hedges.
2. Two trees were found dead during the study. These trees may role down to damage the structures. It is recommended that these two trees, above the power house site, should be removed immediately. Some four other Chir Pine trees are leaning down in the forest.
3. A careful keeping eye on them is important as they get uprooted damaging some other adjacent trees and may damage the powerhouse site.
4. Areas of high working concentration (in-let and outlet of the tunnel) are facing the problem of soil erosion and these have been treated by shot creating. It was suggested in the first study to initiate the Bio-engineering technology to control these slides effectively which include vegetated soft gabions, 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. No attention has been paid to the recommendations. After a detail study of the slide, it is very important now to construct a deep drain on the upper side of the slide to divert the percolating water and control the mass movement of the soil. The slide is composed of shingle and silt. Presence of silt is good sign of growing trees and bushes. Some trees of high moisture consumption, like Shrole, salix and Eucalyptus are recommended to be planted in the slide area.



Fig: Bioengineering structure showing control of erosion

5. Forest fires in future may damage the areas inside the fence if it went beyond the control of any one. So it is recommended that;


- a) Control burning the area is another effective remedy of protecting it from the sudden fires.
- b) Plantation in the surrounding private and government land is very important. This area needs immediate plantation during this plantation season (January)
- c) There is a need of awareness campaign for the community residing around the project sites to avoid burning the forest instead they can grow some useful trees giving them good economic return.
- d) Deep rooted and web rooted species should be planted inside and outside the project site to avoid the exposure of the soil as they are the fire resistant species like, Anjeer, Phagwarr, Dhaman, Kahu etc.

The slide area around the power house site is very badly affected by the erosion and the rate of erosion is increasing with the passage of time. This may affect the project site as well. This issue of land sliding needs immediate attention.

Annex-10

IMPLEMENTATION PLAN OF SOCIAL UPLIFT PLAN

Implementation Plan of Social Uplift Plan

SR.	PROPOSED ACTIVITY	STATUS
1.	BRIDGE ACROSS JHELUM RIVER	<p>✓ The bridge has been connected Lower Chatter Muzaffarabad to Alda village on the right bank of Jhelum river. Now, vehicular traffic access is available for the locals to across the river.</p>  <p>✓</p>
2.	CONNECTS SARATI VILLAGE (KP) TO PATRIND VILLAGES (AJK)	<p>✓ Downstream cofferdam is being used temporary access bridge and after the completion of the construction there will be a permanent bridge on the weir deck which will be used by the locals to cross the Kunhar river between both the sides</p>
3.	IMPROVEMENT OF EXISTING ROAD	<p>✓ The road from Supreme Court to Children Park will be improved and upgraded where possible.</p>

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SR.	PROPOSED ACTIVITY	STATUS
4.	CONSTRUCTION OF NEW ROAD	<ul style="list-style-type: none"> ✓ New road will be constructed beyond the Children Park located in Lower chatter to the location of the Access Bridge for Powerhouse. The road will be available for physical use by the locals. ✓ At present unpaved has been constructed for construction activities which will be improved after construction phase
5.	IMPROVEMENT OF THE SITES	<ul style="list-style-type: none"> ✓ After construction phase
6.	MEDICAL TREATMENT FOR LOCAL RESIDENTS	<ul style="list-style-type: none"> ✓ HSE Clinic and ambulances are available in case of any emergency on both sites ✓ A doctor and male nurses are placed in HSE office and local people can visit to get emergency treatment.
7.	LOCAL EMPLOYMENT	<ul style="list-style-type: none"> ✓ Unskilled jobs have been provided to local residents whereas preference has been given to locals for technical positions but subject to availability.
8.	SCHOOL SUPPORT	<ul style="list-style-type: none"> ✓ School located at Sarati village (Deedal) has partially been completed by EPCC
9.	IMPROVEMENT OF WATER SUPPLY	<ul style="list-style-type: none"> ✓ Water pipe line had been developed from existing water tank to Sarati village (GI Pipe : D50mm, L230m) ✓ The well had been developed at Batching Plant area during construction period and it will be transferred to local residents. ✓ New wells will be developed soon as plan has already been submitted and after due process work will be started on new wells. ✓ Water quality tests of all sources in project vicinity and adjacent villages have been undertaken and results have been shared.
10.	IMPROVEMENT OF AREA AFTER COMPLETION OF CONSTRUCTION	<ul style="list-style-type: none"> ✓ Project area used for stocks, temporary buildings, equipment storage and other various activities will be changed to the park, playground etc after construction work.
11.	EMBANKMENT PROTECTION	<ul style="list-style-type: none"> ✓ From the Access Bridge area along the riverside, slope protection and embankment will be provided for avoidance erosion of river bank and inundation of Lower Chatter during flood season. The rip-rap protection will be installed at the surface of embankment and gabion protection will be installed around Access Bridge. Partial works have been undertaken.

Annex-11

HRT WASTE WATER MEASUREMENT

HRT GROUND WATER MEASUREMENT AT POWER HOUSE SIDE

First week of July 2014

1. Estimation of Flow

B=Width of open channel=

0.7 m

H=Water head on the V-Notch=

0.040 m

h1=Depth of the V-Notch from the water way=

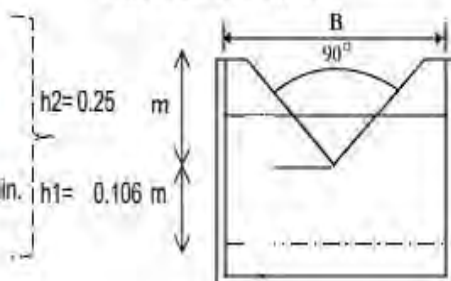
0.106 m

Q=Flow rate=

? m³/min.

L1=Excavated length=

500 m




Co-efficient of Discharge=K:

$$\begin{aligned}
 &= 81.2 + 0.24/h + (8.4 + 12/\sqrt{D}) \times (h/B - 0.09)^2 \\
 &= 81.2 + 6.000 + 0.05 \\
 &= 87.25
 \end{aligned}$$

Q1=Flow rate=

$$\begin{aligned}
 &= Kh^{5/2} \\
 &= 0.03 \text{ m}^3/\text{min.} \\
 &= 0.00047 \text{ m}^3/\text{sec.} \\
 &= 1.675 \text{ m}^3/\text{HR} \\
 &= 40.2 \text{ m}^3/\text{day}
 \end{aligned}$$

Water Head on the V-Notch at Power house side

Date	Time	H(cm)	Photogrpah	Remarks
3-Jul-2014	7:00:00 AM	4.0 cm		Mucking work

HRT GROUND WATER MEASUREMENT AT WEIR SIDE

First week of July 2014

1. Estimation of Flow

B=Width of open channel=

0.540 m

H=Water head on the V-Notch=

0.030 m

h1=Depth of the V-Notch from the water way=

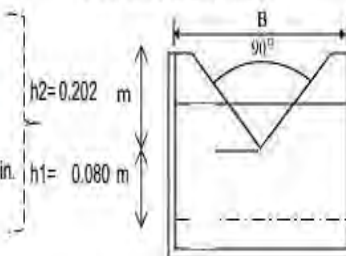
0.080 m

Q1=Flow rate=

7 m³/min.

L1=Excavated length=

100 m




Co-efficient of Discharge=K:

$$\begin{aligned}
 &= 81.2 + 0.24/h + (8.4 + 12/\sqrt{D}) \times (h/B - 0.09)^2 \\
 &= 81.2 + 8.000 + 0.06 \\
 &= 89.26
 \end{aligned}$$

Q1=Flow rate=

$$\begin{aligned}
 &= Kh^{5/2} \\
 &= 0.03 \text{ m}^3/\text{min.} \\
 &= 0.00046 \text{ m}^3/\text{sec.} \\
 &= 1.67 \text{ m}^3/\text{HR} \\
 &= 40.07 \text{ m}^3/\text{day}
 \end{aligned}$$

Water Head on the V-Notch at Weir side

Date	Time	H(cm)	Photogrpah	Remarks
3-Jul-14	7:00:00 AM	3cm		charging and Blasting

Annex-12

SAMPLE WATER QUALITY

MONITORING



Water Quality Testing Section

WATER QUALITY TEST REPORT

Ref #: EDA/II - 011

SAMPLING DETAIL			
Client Name & Address	Patrind Hydro Power Project Muzaffarabad		
Sampling Source	Hoondi Natural Spring near Batching Plant		
Sampling Date	24-09-2014	Sampling Time	01:00 PM
Sample Receipt Date	25-09-2014	Reporting Date	09-10-2014
Date(s) of Analysis	25-09-2014		

WEATHER CONDITIONS & FIELD OBSERVATIONS	Now	Past 24 hours	Has there been a heavy rain in the last 7 days?
	<input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) 55% <input type="checkbox"/> %cloud cover <input checked="" type="checkbox"/> clean/sunny	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> ____% <input type="checkbox"/> Other	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Air Temperature 19 °C.

PHYSICAL & AESTHETIC PARAMETERS					
S#	Water Quality Parameter	Unit	Permissible Limits (PSQCA, 2008)	Results	Remarks
1.	Color	-	Colorless	Colorless	
2.	Odor	-	Odorless	Odorless	
3.	Taste	-	Tasteless/Unobjectionable	Tasteless	
4.	Electrical Conductivity	(µS/cm)	NGVS	4.90	
5.	pH	-	6.5-8.5	7.76	
6.	Turbidity	NTU	<5	BDL/Clear	
7.	Temperature	-		17°C	

MAJOR CHEMICAL PARAMETERS					
S#	Water Quality Parameter	Unit	Permissible Limits (PSQCA, 2008)	Results	Remarks
8.	Alkalinity	mg/L	500	260	
9.	Calcium	mg Ca/L	200.00	93	
10.	Chloride	Mg Cl/L	250	58	
11.	Total Hardness	mg/L	500	200	
12.	Magnesium	mg Mg/L	150	36	
13.	Potassium	mg K/L	100	53	
14.	Sodium	mg Na/L	200	33	
15.	Sulfate	mg So ₄ /L	200	13	
16.	Nitrate (N)	mg No ₃ /L	10 (≅ 44.2mg/L Nitrate as Nitrate (No ₃) (USEPA)	2.9	
17.	TDS	mg/L	1000	214	
18.	Chlorine	mg/L	0.3	0.27	
19.	Fluoride	mg F/L	1.5	1.36	
20.	Iron Total	mg Fe/L	0.3	0.0	
21.	Biological Oxygen Demand (BOD)	mg/L	80	7.50	

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