

Environmental and Social Monitoring Report

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Quarterly Report (April – June 2020)
June 2020

Pakistan: Patrind Hydropower Project

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

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147 MW PATRIND HYDROPOWER PROJECT

Environmental & Social Monitoring Report April 2020 to June 2020

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A COMPANY OF KOREA WATER RESOURCES CORPORATION

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List of Abbreviations

AJK	Azad Jammu & Kashmir
CEO	Chief Executive Officer
CLO	Community liaison officer
CSR	Corporate Social Responsibility
E-flow	Environmental flow
ERP	Emergency Response Plan
ESMP	Environmental & social management plan
HSE	Health safety & environment
KPK	Khyber Pakhtunkhwa
NEQS	National environmental quality standards
OHSP	Occupational health & safety plan
POPL	Patrind Operation & Maintenance Private Limited
PHSP	Public health & safety plan
PTW	Permit to work

1. Health, Safety and Environmental (HSE) Performance Indicators

Table 1: HSE Performance Indicators

Indicators	Data (Reporting Period)	Data (From November 08, 2017 to June 30, 2020)
Plant Safe Man-Hours	39264 (0.039264)	409104 (0.409104)
Plant Safe-Days	91	971
Lost Time Injury (LTI)	0	00
HSE / Environmental Accidents	0	00
Fire	0	00
Spills	0	00
HSE Audits / Inspections	06	43
HSE Training Sessions	04	32
Emergency Drills (Evacuation, Firefighting & First Aid)	00	04
PTW Issued	00	161
Community Consultations	00	52
Note: As mentioned in the revised 1 st quarter report, near-miss data will be included from 3 rd quarter report.		

2. Compliance NOC Conditions issued by EPA AJK

Table 2: Compliance Status of NOC Conditions

EPA Condition No	EPA NOC Conditions	Compliance Status	Compliance Action/Notes
I.	Compliance to National Environmental Quality Standards (NEQSSs)	Yes	Compliance with NEQSSs is being monitored internally and through third-party.
II.	2 Cumecs water as E-flow, downstream during the operational phase	Yes	2.2 Cumecs environmental flow is being released from the weir. Please refer to Annex-1 for E-flow data. Data shows compliance with the NOC condition.
III.	Metering arrangement to ensure and verify the release of approved E-flow downstream	Yes	<p>The metering arrangement is in place.</p> <p>Sensors are installed on five (05) different locations. Data is being recorded on a real-time basis on a 10-minute interval.</p> <p>Data is being shared with lenders and EPA-AJK on quarterly basis through quarterly reports.</p> <p>Please refer to Annex-2 for calibration certificates, sensors locations and evidences of manual / visual flow monitoring.</p>
IV.	Strictly adhered to mitigation measures,	Yes	Quarterly compliance reports verify adherence to the mitigation measures.

EPA Condition No	EPA NOC Conditions	Compliance Status	Compliance Action/Notes
	as suggested in the Operational Environmental Management Plan (OEMP)		
V.	Environmental Management & Monitoring unit headed by an Environmental Monitoring Expert	Yes	Qualified and competent HSE team has been formulated which consists of HSE Manager, Environmentalist, HSE Officer and two Community Liaison Officers in the O&M team. Qualified and competent Senior Manager-E&S from SHPL is also monitoring the compliance from the SHPL side.
VI.	Carry out Fish Study through certified Fish Expert/Firm throughout the operational period of the project	Yes	<p>The fish studies are being conducted every quarter and reports are being submitted.</p> <p>During the reporting period, one (01) fish study was conducted. The study discusses the impacts on fish & aquatic fauna in reservoir & downstream; and required mitigation measures. Please refer to Section 8 for study summary and Annex-3 for study report.</p>
VII.	Environmental Audit through 3rd party consultant after every 05 years during the Operational Phase of the Project	Yes	The requirement will be effective after November 2022 and will be complied when required. Still, the operation is in its third year. Before conducting the audit, audit terms of reference (ToR) will be prepared and shared with lenders.
VIII.	Plantation (of indigenous species) activity, in consultation with Forest Department, Govt. of AJ&K, both at the Weir & Powerhouse	Yes	<p>Annual plantation campaign is an activity which has been carried out since the start of project. Only indigenous species are being planted. Campaigns are conducted under the supervision of third-party expert. The plant species are recommended by the vegetation expert as per the characteristic of the species.</p> <p>During 1st quarter, plantation campaign and bio-engineering works were conducted. Reports and details of these activities were given in 1st quarter report.</p> <p>Please refer to Section 8 for results of these activities.</p>
IX.	Continuous monitoring & submission of quarterly compliance report	Yes	Quarterly compliance reports are being prepared and submitted.
X.	Adequate arrangements for addressing	Yes	Grievance redressal procedure is in place. The grievance redressal

EPA Condition No	EPA NOC Conditions	Compliance Status	Compliance Action/Notes
	public grievances		committee (GRC) has been formulated and functional. Three (03) complaint boxes have been installed at powerhouse area and two (02) complaint boxes have been installed at weir site area. Further two (02) complaint registers have been placed at powerhouse area and one (01) complaint register has been placed at the weir site area. Community Liaison Officers (CLOs) have also been deputed on powerhouse and weir site areas. No complaint was received in the reporting period.
XI.	Findings of third-party monitoring shall be shared with AJK- EPA	Yes	Third party monitoring i.e. fish, vegetation, landslide, water quality and air quality is being conducted on quarterly basis. The results / measurements of the reports from the third party are being shared with AJK-EPA and lenders. The ESCR referred in the comments of 1 st quarter report is a different report which has already been submitted to EPA-AJK in March 2019 and no comments further comments received.
XII.	Arrangements in-place for the execution of CSR plan	Yes	CSR procedure is in place. Based on the CSR procedure, annual CSR plan is developed and implemented. Annual CSR plan is developed and finalized in consultation with local communities and based on the needs of local communities. General areas of focus are education, health, livelihood, living conditions, water, and cultural, etc. The O&M operator develops its annual CSR plan each year in the month of March after consultations with local communities. However, this year CSR plan was not developed in the reporting period due to Covid-19 pandemic situation. Tentatively the CSR budget of O&M Operator for year 2020 may be approximately USD 4,000-5,000. However, SHPL has its separate budget for CSR and for this year i.e. 2020 the approx. figure is 50,000 USD.
XIII.	Efficient Occupation Health & Safety Plan	Yes	Occupation health and safety plan is in place. The plan has been developed based on the findings of risk assessment. The plan has been proved effective as the operations are smooth and safe. As

EPA Condition No	EPA NOC Conditions	Compliance Status	Compliance Action/Notes
			the plan is live document it will be updated when required.
XIV.	Local Employment	Yes	<p>Hiring is being done keeping the locals on priority. Currently, the total staff is 73, out of which 66% from AJK, 18% from KPK and 16% from other parts of Pakistan.</p> <p>Total 10 persons from the affected villages have been employed in the plant operational phase out of which 06 household affected have been employed by the O&M operator.</p> <p>Please refer to the <u>Annex-4</u> for details regarding the local employment. This annexure depicts information about (10) local people employed and effected households employed in the company as regular and permanent staff. The annex also shows the levels and designations at which these local people are working in the company. In short, local people are working from junior to senior roles including drivers, sub-technicians, technicians, operators, officers, assistant managers, and managers etc.</p> <p>Currently, no female staff is employed. However, there is no gender discrimination during job advertising and hiring process. Please refer to the <u>Annex-4</u> for photo of job advertisement. In addition, 12 unskilled and 14 security staff are also working, all of them are locals. These 12 unskilled staff are daily labors and while the security staff belongs to third-party security company and Police.</p> <p>There is no restriction on female employment however, the local communities did not show any interest in hiring of female CLO.</p>
XV.	Liable for the correctness and validity of the information provided in EMP	Yes	Agreed.
XVI.	Facilitate EPA team for any visit for inspection/monitoring, etc.	Yes	The Company will always facilitate all the stakeholders including EPA for site

EPA Condition No	EPA NOC Conditions	Compliance Status	Compliance Action/Notes
			visits.

3. Compliance with Environmental and Social Management Plan (ESMP)

Table 3: Compliance Status of ESMP

ESMP Reference #	ESMP Requirement	Compliance Status	Compliance Action/Notes
Section 6.1	Quarterly Fish and Fauna assessment (Kunhar River)	Yes	Please refer to Row VI of Table 2, Section 2.
	Bi-Annual drinking & waste Water Quality	Yes	Bi-Annual drinking and waste water analysis will be conducted in next reporting period and report will be shared in 3 rd quarter report.
	Quarterly Flora / vegetation monitoring	Yes	During the reporting period, one (01) Flora/vegetation monitoring study was conducted. The study reports that impact reported on the weir side is low and in some aspects it is positive. Please refer to Section 8 for study summary and Annex-5 for study report.
	Annual Landslides monitoring	Yes	Annual landslide and catchment study will be conducted by the end of this year.
	Quarterly noise monitoring and noise impact management	Yes	Noise monitoring is being done monthly and data is being maintained. Monitoring locations include process area (Basement 1, 2 & 3), office building (Ground floor and first floor) and Alda village (village area close to the powerhouse). This monitoring is being done internally by the HSE team. Turbine units are installed at Basement areas 1, 2 & 3. The noise level exceeds in the area depending on the unit operation. Keeping in view the noise level, necessary instructions are communicated to the staff working in that area and proper PPEs are ensured. Noise level in rest of the areas is within the limits. Please refer to Annex-6 for the noise monitoring reports. Ear-plugs have already been provided to all staff. Ear-muffs have also been provided to the staff working in the basement areas. For vibration, phase-wise installation of anti-vibration mates will be done. Meetings with various vendors on anti-vibration mates have been conducted.

			Once the samples are received, these will be shared and discussed with the Management for approval.
	Environmentally-friendly disposal of solid waste	Yes	Waste generated on both sites is being disposed of in an environmentally friendly manner through a third-party waste contractor. Please refer to Annex-7 waste transfer notes. During the reporting quarter 3.5 tons of non-hazardous waste was generated. Out of which 83 KG was recycled and remaining was disposed of by the approved waste contractor.
	Development and implementation of CSR Plan and procedure /Community Development Programs	Yes	Please refer to Row XII of Table 2, Section 2 and Section 6.
	Labors / Employees management as per applicable regulations and standards.	Yes	Labors / Employees are being managed as per applicable regulations and standards. An internal grievance redressal mechanism is also in place. Internal GRC has been formed and the complaint box has been installed. No internal complaints were received in the reporting period.
	Workers/Staff Health & Safety as per applicable regulations and standards	Yes	Please refer to Row XIII of Table 2, Section 2.
	Grievances from communities and any affected people Grievances from civil society organizations Grievances from labor/employees	Yes	For the external grievance redressal mechanism, please refer to Row X of Table 2, Section 2. An internal grievance redressal mechanism is also in place. Internal GRC has been formed and the complaint box has been installed. No internal complaints were received in the reporting period.

4. Compliance with Operational Requirements of EIA

(Environmental Monitoring and Management Plan during Operations Phase)

Table 4: Compliance Status of EMP of EIA Addendum

EIA Addendum Reference #	Impacts	EMP Requirement	Monitoring Frequency	Compliance Status	Compliance Action/Notes
Table: 6.4	Water Impoundment	Water Elevation Level Incoming/outgoing flow	Monthly	Yes	Water impoundment is being monitored via sensors. Every ten-minute data is being uploaded on the system. Sensors are being calibrated annually through third-party experts while all the sensors are being inspected/ checked visually by maintenance team on monthly basis. For details on sensors, please refer to the Annex-2 .
	Environmental Flow	Water flowing down-stream in Kunhar river	Monthly	Yes	Please refer to Row II of Table 2, Section 2 .
	Aquatic Fauna	Fish, upstream-downstream and in the pond	Quarterly	Yes	Please refer to Row VI of Table 2, Section 2 .
	De-sanding	Accumulation of silt and de-siltation process	—	Yes	Bathymetric surveys are being conducted to check the level of silt / sand in the reservoir.

5. Compliance Actions against other HSE Plans

Table 5: Compliance Actions against other HSE Plans

S. N	Plan	Compliance Actions in the Reporting Period
1	OHS Plan	<ul style="list-style-type: none"> Implementation of permit to work system (PTW) is in place and during the reporting quarter no PTW was issued. Except near-misses, data on all other indicators are given in section 1 of the report. Near-misses, UA & UA reporting program will be launched in third-quarter and data on these indicators will also be included in section 1 of the report accordingly. HSE trainings and awareness sessions for staff were conducted. During the reporting period 04 training sessions were conducted. During the reporting period 06 HSE inspections were carried out and highlighted issues were rectified by the concerned department. Implementation of lockout-tagout procedures (LOTO) 03 Monthly Fire extinguishers inspections were conducted. 03 Monthly noise monitoring's conducted during the reporting period and all the readings were in compliance to NEQs. Atmospheric testing in confined spaces Implementation of PPE policy and procurement of required PPEs
2	Traffic Management Plan (TMP)	<ul style="list-style-type: none"> Defensive driving training of all drivers Installations of warning signboards like speed limits, overtaking restriction etc. Prohibition on use of short-cuts and unsafe routes Installation of reverse alarm in all vehicles Regular vehicles inspection Regular vehicles maintenance
3	Annual CSR Plan	<ul style="list-style-type: none"> CSR Plan for the year 2020 and its budget will be finalized by K-water Head Office. Tentatively the CSR budget of O&M Operator for year 2020 may be approximately USD 4,000-5,000. However, SHPL has its separate budget for CSR and for this year i.e. 2020 the approx. figure is 50,000 USD
4	Waste Management plan	<ul style="list-style-type: none"> Segregation of wastes being generated During the reporting quarter 3.5 tons of non-hazardous waste was generated. Out of which 83 KG was recycled and remaining was disposed of by the approved waste contractor. Placement of colored waste bins Collection, transportation, recycling and disposal of wastes by company hired waste contractor Data management of waste consignment notes being provided by company hired waste contractor

S. N	Plan	Compliance Actions in the Reporting Period
5	Public Health & Safety Plan	<ul style="list-style-type: none"> Waste management monitoring by HSE team Deputation of security / watch guards in weir downstream Continuous monitoring of seismic movements at weir sites by maintenance team (Accelerometer helps to grasp the magnitude of the earthquake that occurred near the dam and monitors the safety of the dam. At Weir site, three (03) seismic Accelerometers are installed at three locations as follows: <ul style="list-style-type: none"> ➤ Accelerator 01 Elevation: 742 masl , Location: Weir Gallery ➤ Accelerator 02 Elevation: 765 masl , Location: Weir Crest ➤ Accelerator 03 Elevation: 769 masl , Location: Weir Right Side ➤ Data Recorder: In control room <p>Monitoring of accelerometer is being carried out every week. From the date of operations, only 02 events recorded by the accelerometer. Both the events were within the safety limits. If any events occur, detail inspection is carried out to ensure the Dam safety.</p> <ul style="list-style-type: none"> Regular community consultations and meetings Continuous liaison with communities by CLOs Compliance with local norms Slopes protection measures through third-part experts Access control to prevent communities from high risk areas Management of public grievances Vehicular operation and driver's management as per the TMP for public safety
6	Fisheries Management Plan (FMP)	<ul style="list-style-type: none"> Regular interaction and coordination with fisheries departments of AJK & Mansehra (KPK) Regular interaction and coordination with local fishery expert Fish breeding grounds / sites were developed at three (03) locations on weir downstream after detailed survey conducted in last quarter through third party fish expert and representatives from fishery departments of AJK and KPK. Contract of work was awarded to third-party fish expert. The work was carried out in coordination with fishery departments. Please refer to Section 8 for further details.

6. Stakeholder Engagement and Corporate Social Responsibility (CSR)

- No grievance from the local communities was recorded (both at powerhouse and weir site areas) in the reporting period.
- Due to prevailing Covid-19 pandemic situation, no community training and consultation was conducted in the reporting period.

7. Health, Safety and Environment (HSE)

- Compliance with HSE plans is being ensured for staff and public safety. Please refer above the **Section 5**.
- All the fire extinguishers of powerhouse were inspected. Discharged cylinders were replaced with new fire extinguishers.
- Three (03) monthly noise monitoring surveys were conducted by HSE in power complex and nearby community. The noise level was found above the NEQS in process area (at turbine units' areas) while noise level remained within NEQS in other areas. All staff working in the process area have been provided with necessary PPEs (ear-muffs). Increase in noise level depends on unit operation and variation in process parameters / conditions.
- Waste generated during operations at sites is being managed in accordance with environmental and waste management plans. Different color waste bins are placed for segregation of waste. Waste collection and transfer by the waste contractor is in accordance with environmental standards. During the quarter, 3.5 tons of non-hazardous waste was generated. Out of which 83 KG was recycled and remaining waste was taken by waste contractor to government approved waste disposal site. No hazardous waste generated during the reporting period.
- A total of six (06) HSE inspections were conducted in the reporting period. Overall HSE compliance was satisfactory and no major HSE issues were recorded. Some minor issues observed include:

Sr. No	Inspection	Observation	Corrective Action
1.	Fire Extinguisher Inspection	Empty fire extinguishers found at power house site	Refilled fire extinguishers were placed with the empty one. Empty fire extinguishers were sent for the refill.
2.	General Hygiene Inspection	Littering observed around O&M residency	Cleaned the surrounding area of O&M residency
3.	General Hygiene Inspection	Growing weeds observed at powerhouse site residency	Extra weeds were cut down by the civil department.
4.	Electrical Inspection	Some electrical cords found with damaged insulation	Damage cables were replaced with new one

5.	Electrical Inspection	Welding holder found in damage condition	Replaced and installed new holder
6.	General Inspection	PPEs non-compliance observed at powerhouse during the routine working	Warn employees and labors to use PPEs while working

All aforesaid issues were rectified by the relevant departments.

- Total four (04) HSE training sessions were conducted in the reporting period. Trainings are summarized in the below table:

Please refer to **Annex-8** for trainings attendance sheets (with training topic and names

Serial #	Training Topic	Date	No of Participants
01	Safe Manual Handling	17/04/2020	07
02	Power & Hand Tools Safety	29/05/2020	05
03	Electrical & Mechanical Safety	29/06/2020	06
04	General Hygiene and COVID-19 Awareness	04/06/2020	04

of participants)

- A new contract has been signed between POPL and Qadri enterprises for the year 2020 for the collection of waste and disposal in an environmentally friendly manner in a government approved / designated landfill site.
- Covid-19 management and prevention plan were revised and updated in light of lenders' comments and suggestions. Please refer to **Annex-9** for the revised and updated plan. No Covid-19 positive case was reported among the working staff at company premises. It was ensured that all measures mentioned in the plan are being implemented.

8. Fish and Vegetation Studies

- Quarterly fish fauna study / monitoring was undertaken in Kunhar River (Up & downstream of weir site) in the reporting quarter. Sampling was carried out at six (06) study points. Some insignificant changes in the fish catch and quality of water observed during the study; that is only due to the irregular seasonal changes and pattern of water turbidity due to the intensity of rain or drought. The fish catch during the study of reporting period shows that the fish has come to the developed breeding points which is very encouraging. The breeding points are located at such places

where company guards have regular supervision & monitoring and this will help the fish to get safety from poaching and fish will be comfortable in breeding.

The new fish breeding grounds have shown good results for catch of fish and fish was healthy. This is a very encouraging result within a short spell of time of four months. If there is no heavy flood in the area during the monsoon, the breeding points will not be disturbed much.

Upstream catch is up to the standards of expectations. The new development of dam near Balakot will disturb the area and fish may disappear here altogether as the fishing pressure by locals is also very high in this area and migration restriction. Detailed report is attached as **Annex-3**.

- Summary of fish breeding grounds development was given in the 1st quarter report. For detailed report, please refer to **Annex-10**.
- Quarterly flora study/monitoring was undertaken at both (Powerhouse & weir) sites in the 2nd quarter. Overall, there is no significant negative impact of operational activities however due to annual plantation campaigns and presence company security guard's vegetation cover on both sites has been improved significantly. The vegetation response upstream and downstream is identical as moisture-loving plants have increased their canopy cover upstream beside the lake and some new plant canopies have appeared on the closed sides of the river where it was a riverbed before the construction of the dam. No impact on the riparian species of the river Kunhar has been observed downstream at the farther areas. Lack of sedimentation or sudden floods will have impact on the plant regeneration. Opening of the flushing tunnel may leave sediment downstream, which provides a medium of new growth for plants and this vegetation can survive up to the next flooding cycle. A detailed report is attached as **Annex-5**.
- The plantation and bioengineering works carried during the planting season of December 2019 to February 2020 is very successful. The eroded part of the slide immediate behind the powers house shows very healthy green picture. This will strengthen the soil stability as the plants grow up and their root system penetrates into the deep soil. Some fast-growing species like Robinea (Robinea pseudoacacia), drawa (Alanthus anus) have got a good size while mulberry plant (Morus alba) is coming with passage of the time. Narri (Arunda donax) will make a hedge, which will stop the rolling down of the soil or small stones. Once this is established, it spreads through its roots and becomes an excellent soil binder. All these species are local and have no negative impact on the environment.
- The plantation done in the area had a success percentage of above 60 percent, which is very satisfactory. This was only possible with introduction of fertile soil in the pits brought from outside. This soil was placed in between the soft gabions as well to produce good results. The success percentage is very much visible.

9. Livelihood Restoration Program

Apart from the employment to male members of Aps, the Company started an initiative to enhance the skills of female members of APs as part of the livelihood restoration strategy.

SHPL implemented programs related to stitching, hand and machine embroidery for females of not only the APS but for the entire villages of neighborhood. To start with, 6-months program in Alda village-AJK (powerhouse area) and 6-months program in Sarati village-KP (weir site) were completed in 2018.

During the year 2019, four programs (3 months each) were conducted in the local communities (AJK and KP). Deedal & Dalola villages in KP area and Patrind and Shoran villages in AJK were the villages where these programs were completed successfully.

This initiative has shown very positive results as the female members of the area are very much satisfied with the programs and suggested to continue the same in future as through this, they not only earn some money but they are now capable to stitch for their families which is a cost saving side of the program.

No new session could be started in the communities due to Covid-19 situation. The sessions will resume once the situation is stabilized.

10.Land Acquisition

Payment status for the land acquisition during the reporting period is presented below.

According to the details provided by the revenue departments in AJK and KP 97% and 90% payment has been done in AJK and KP respectively.

Village	Area (Kanal)	Award Amount (PKR)	Disbursed (PKR)	%age	No. of Persons
1. AJ&K					
A. Land/Property					
Powerhouse (Alda Village AJ&K)	81.80	92,479,824	89,397,034	96.67%	196
Head pond (Shoran Village AJ&K)	130.75	75,181,250	74,159,019	98.64%	611
Weir + Head pond (Patrind Village AJ&K)	341.10	204,037,798	203,670,449	99.82%	
Forest land for Surge Tank (Alda village)	47.75				
B. Additional Land/Property					
Weir + Head pond (Patrind Village AJ&K)	3.70	2,127,500	1,955,000	91.89%	3
Weir + Head pond (Patrind Village AJ&K)	10.30	6,076,540	5,562,233	91.54%	3
Head pond (Shoran Village AJ&K)	4.66	6,054,188	6,054,181	100.00%	3
B. Trees					
Alda		1,815,089	1,804,468	99.41%	
Alda		75,546	75,546	100.00%	
Shoran		757,391	685,073	90.45%	
Shoran		106,053	106,053	100.00%	1
Patrind		837,882	829,515	99.00%	
Sub-Total	620.06	389,549,061	384,298,571	97.04%	817
2. KPK					
Land/Property/Trees					
Weir + Head pond (Sarati Village KPK)	188.70	128,557,081	114,613,320	89.15%	196
Head pond (Deedal Village KPK)	5.45	3,133,750	Under Acquisition Process		1
Head pond (Deedal Village KPK)	65.45	37,633,750			16
Head pond (Dalola Village KPK)	1.40	805,000			1
Head pond (Naroka Village KPK)	16.30	9,372,500			7
Sub-Total	277.30	179,502,081	114,613,320	89.15%	221

11.Additional Land Acquisition in KP

The status of additional land acquisition has not changed as there has been no progress shown by the revenue department regarding the acquisition process. The land is still in the possession of the owners and their property. The acquisition process will only move forward once the Agreement U/S-41 of LAA 1894 is executed which was submitted to DC Abbottabad office on June 26, 2019 duly signed by the CEO of SHPL. Till date there has been no progress by the revenue department as the cabinet has to authorize the signatory on behalf of GoKP.

We can only share the timelines of sections under LAA-1894 when the Agreement under section-41 is executed which for now (due to pandemic) is clearly uncertain.

12. Photographs



Powerhouse Area Inspection



Fire Extinguishers Inspection



Waste Management



Fish and Vegetation Contract Renewed



Community Consultations at Powerhouse Site



Fish Monitoring Study



Awareness session on COVID-19 to Mess staff



Awareness session on Safe Manual Handling



Awareness session on Hand and Poer Tools Safety

Annexures

Annex-01 Environmental Flow Data

Environmental Flow Data- 2nd Quarter-2020			
April 2020		May 2020	June 2020
Day / Sensor	Water Flow (m3/s)	Water Flow (m3/s)	Water Flow (m3/s)
1 Day	15.33	30.50	42.03
2 Day	16.82	36.28	42.98
3 Day	19.28	86.92	39.98
4 Day	17.96	34.59	44.49
5 Day	15.24	23.49	57.09
6 Day	14.16	4.42	87.30
7 Day	14.01	8.76	116.21
8 Day	11.73	26.62	139.63
9 Day	12.19	18.50	106.05
10 Day	11.94	59.14	11.98
11 Day	11.62	31.55	31.2
12 Day	11.44	19.06	90.05
13 Day	10.59	19.13	77.88
14 Day	9.91	86.97	103.73
15 Day	10.52	91.99	65.00
16 Day	8.21	27.38	64.08
17 Day	8.27	14.60	89.87
18 Day	9.00	3.20	92.66
19 Day	8.55	2.49	101.44
20 Day	8.23	17.06	87.47
21 Day	7.21	9.04	98.46
22 Day	5.33	34.15	88.98
23 Day	5.32	34.59	130.38
24 Day	5.25	15.71	136.76
25 Day	5.17	42.47	148.77
26 Day	5.09	81.39	141.15
27 Day	5.37	92.12	145.02
28 Day	5.17	84.98	99.94
29 Day	5.12	98.27	101.48
30 Day	6.41	45.17	94.32
31 Day		49.89	

Monthly Discharge Measurement at Bella (Boi)

Sr. No	Month	Flow Reading (Cumecs)	EPA Requirement (Cumecs)
1.	April, 2020	High flow season during 2 nd quarter the average flow is (47.2 Cumecs)	3.7
2.	May, 2020		3.7
3.	June, 2020		3.7

Note: Please refer below to the flow measurement methodology.

Methodology of Discharge Measurement at Bella (Boi)

Weir Downstream

Pakistan Patrind Hydropower Plant



Patrind O&M Private Limited

1. General

Measuring flow using digital current meter involves wading across a stream and taking velocity measurements at multiple places. Both velocity and water depth measurements are taken at the same time and place in multiple locations across the stream.

There are many types of current meters. The cup or propeller types determine flow velocity by the number of revolutions of the cups (or propeller) over a given period of time.

2. Purpose

The main purpose of discharge measurement at Bella (Boi) downstream of weir structure is to verify that enough environmental flow is being released by Patrind hydropower project.

3. Site selection



After visiting to several locations, one site i.e. Bella (Boi) has been selected for discharge measurement at weir downstream considering the following aspects.

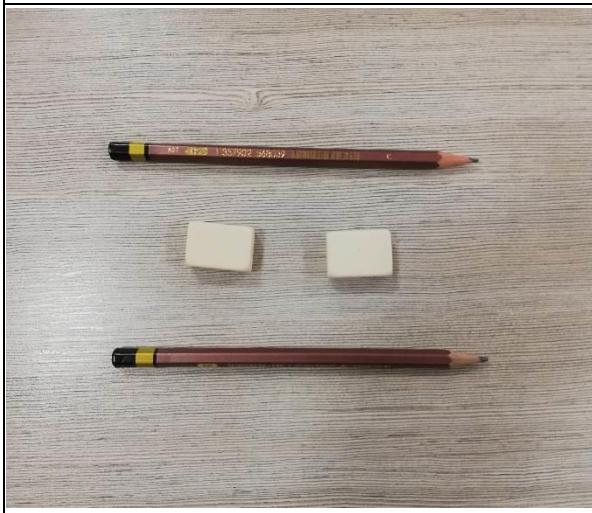
- The site should be safely accessible and should be in a section of the stream that is free flowing.
- Stream should be straight enough to have uniform form.
- The flow should not be affected by tributaries or tides.

- There should not be any side channels so that all the water flows through the main channel.
- Areas, where there are large boulders, logs, or thick brush which can create eddies, slack water, turbulence or disturbed flow, should be avoided.



4. Equipment

- Measuring tape
- Digital Current Meter
- Top-setting rod (if available) or measuring stick
- Paper and pencil for record keeping
- Waders (waterproof garment)



5. Procedure

- 1) Tighten a measuring tape across the stream at right angles to the flow. It should be snug and not sag in the middle.
- 2) Measure the total stream width and record this measurement.
- 3) Divide the total stream width into equal segments. If the stream is less than 10 feet wide, use ½ foot intervals. For streams greater than 10 feet, use 1 foot or greater intervals.

(Note: The standard method is to divide the width by 20, however ½ foot or 1-foot intervals are sufficient for the purposes of this guide.)

- 4) Step out to the first measuring point and position the rod. Stand downstream from the measuring tape with the rod next to the tape. The rod should be held vertically, the meter should face upstream and you should be standing off to the side or behind the meter.
- 5) Record the distance to the bank. Measure total stream depth and record this depth. Multiply the total depth by 0.6 and set the propeller at this depth. (Note: 0.6 times the total depth is considered the point of average discharge in a spot that is less than 2 feet deep. If the depth is greater than 2 feet, two different velocity measurements are required one at 0.2 times the depth and one at 0.8 times the depth.) Read and record the velocity at this depth. (Note: If your meter is attached to a “top setting rod” the propeller can be easily set at this 0.6 depth without calculation by you. Directions on using a top setting rod should be provided by the manufacturer.)
- 6) Move to the next measuring point and repeat the process. (Note: The standard method is to obtain three velocity measurements at each point and average them.) Make sure to record the distance to the bank, the total stream depth and the velocity at the 0.6 depth for each point across the stream.

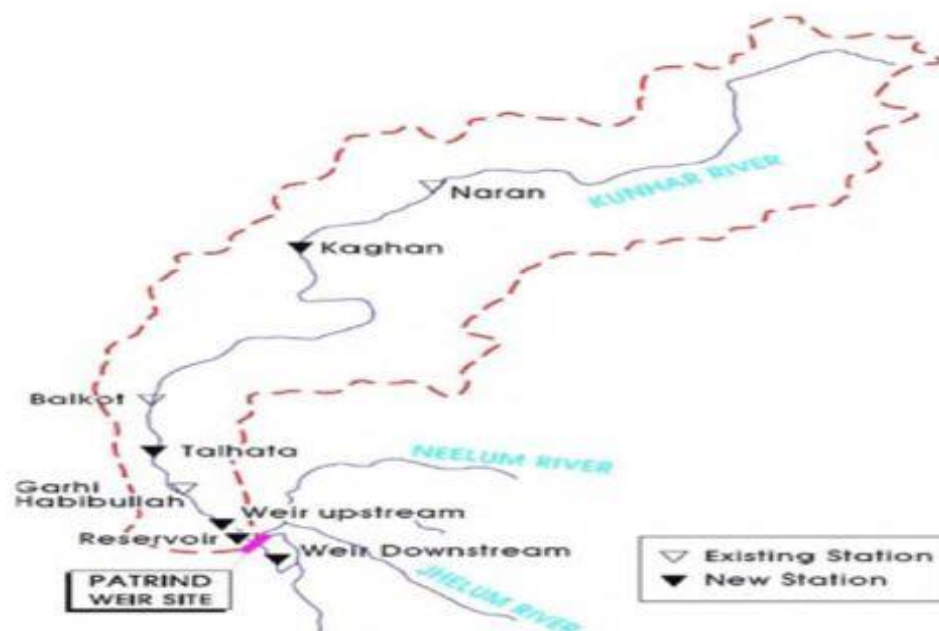
6. Calculation & Conclusion

For more accurate results, discharge measurement will be carried out for three times. Following steps will be taken to calculate the discharge at Bella (Boi) downstream of the weir structure.

- Calculate area for each section = width of section x depth of section
- Calculate flow for each section = area of section x velocity of section
- Determine total stream flow = Sum of the flow of each section

Annex-02 Sensors Location

Sensors Location, Photographs and Calibration Certificates



✚ Gauging stations and the reason for selection is given in below table.

Location	Purpose	Installed gauges	Calibration
Kaghan station	Forecasting of floods	Rainfall, Water Level, Temperature	Calibration of each sensor will be on annual basis by third party
Talhata station	Forecasting of floods	Rain & Water Level	
Weir upstream	Monitoring Water flow into reservoir	Water Level	
Reservoir	Monitoring Water flow into reservoir	Rainfall, Water flow, Temp & Humidity, Wind Speed & Direction	
Weir downstream	environmental flow	Rain & Level and e-flow	

❑ Assumption Diagram



❑ Purpose

Kaghan measuring station will be located at 74km upstream side of the weir. The flood from the Kagan station comes into the weir site after 4.5 hours later. Therefore it will provide necessary precaution time against floods situation from upstream of Kunhar river.

❑ Measurement Item

- (1) Water Level (Pressure Type)
- (2) Rainfall
- (3) Air Temperature

5. Talhata Measuring Station

☐ Assumption Diagram



☐ Purpose

Talhata measuring station is located at 13km upstream side of the weir. More accurate water flow data can be achieved from this station.

☐ Measurement Item

- (1) Water Level (Pressure Type)
- (2) Rainfall

6. Weir Upstream Measuring Station

☐ Assumption Diagram




☐ Purpose

Weir upstream measuring station will be located at the reservoir inlet. The water level signal from pressure type level transmitter would be converted into flow rate.

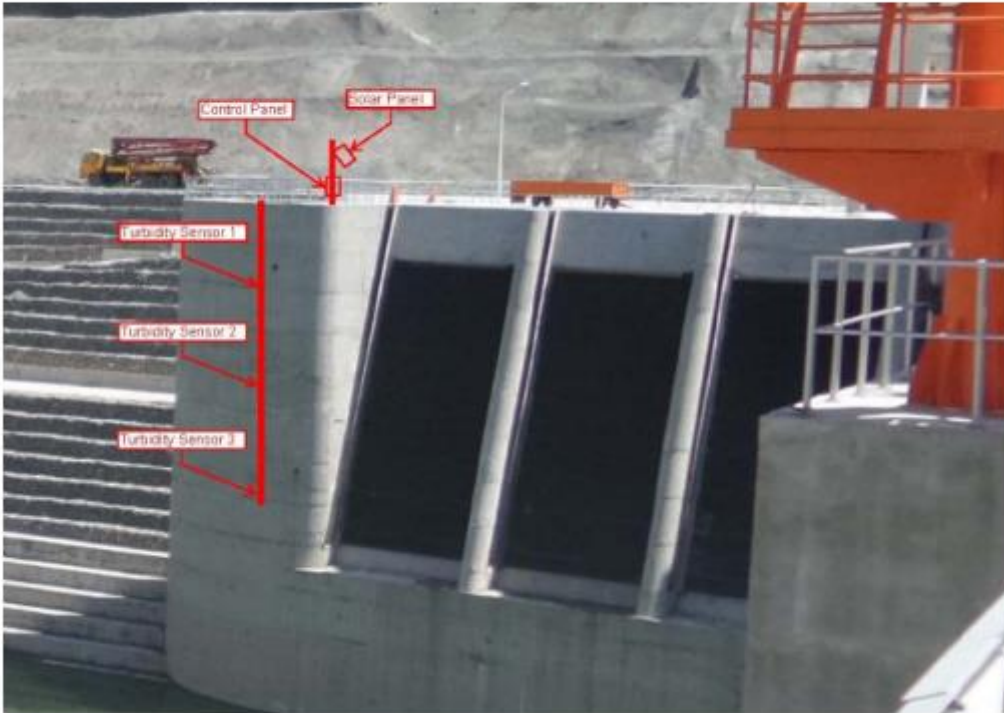
☐ Measurement Item

(1) Water Level (Pressure Type)

7. Reservoir Measuring Station

<p><input type="checkbox"/> Assumption Diagram</p> 
<p><input type="checkbox"/> Purpose</p> <p>The flow rate into the reservoir will be measured by the flow meter. Doppler type flow meter will be installed at the cofferdam as the section of the upstream cofferdam is a concrete structure and it will not be affected against sedimentation. Although the station is located in the reservoir, the shape is similar to the canal so no turbulence will occurred during the normal operation. Thus, it provides stable measurement.</p>
<p><input type="checkbox"/> Measurement Item</p> <ul style="list-style-type: none"> (1) Water Flow (Doppler Type) (2) Rainfall (3) Air Temperature and Humidity (4) Wind Speed and Direction

8. Weir Intake

<p>❑ Assumption Diagram</p> 
<p>❑ Purpose</p> <p>Weir intake measuring station is located at the weir intake. Total three (3) turbidity sensors measure the turbidity of water into the HRT (Head Race Tunnel). Turbidity sensors are positioned at the high, middle and low points of the intake screen respectively.</p>
<p>❑ Measurement Item</p> <p>(1) Turbidity (High, Middle, Low Points)</p>

9. Weir Downstream Measuring Station

☐ Assumption Diagram



☐ Purpose

Weir downstream measuring station is located at 4km downstream of the weir for the measurement of environmental flow of 2.2 m³/s. As this flow rate is too small for measurement, the water level signal from pressure type level transmitter need to be converted into flow rate. It can be achieved comparing with gate opening rate. The location was decided considering of security against thief.

☐ Measurement Item

- (1) Water Level (Pressure Type)
- (2) Rainfall

10. Flood Warning at Powerhouse

☐ Assumption Diagram




☐ Purpose

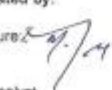

Issue a warning alarm for residents to prevent flood damage. Air raid siren will be manually operated by operator before power generation.

☐ Equipment




(1) Air raid siren

11. Flood Warning at Weir

<input type="checkbox"/> Assumption Diagram

<input type="checkbox"/> Purpose <p>Issue a warning alarm for residents to prevent flood damage. The air raid siren will be manually operated by operator before gate operation.</p>
<input type="checkbox"/> Equipment <p>(1) Air raid siren</p>


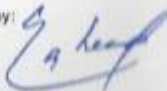
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Client	Patind O&M PVT Limited. Near Thori Park, Lower Chatter Muzaffarabad AJ&K, Pakistan																																						
Equipment Detail	Level Transmitter Model / Type WL-400-060-XXX Manufacturer Global Water Instrument Serial No. 164900469 Code LT-179 Reference Procedure No. Call/SCP/055 Job Location Patind O&M PVT Limited Equipment Location Down Stream																																						
	Job No.	11663/23																																					
	Data Sheet No.	12-113081																																					
	Calibration Date	November 19, 2019																																					
	Next Calibration Date	November 19, 2020																																					
Calibration Results		Calibrated by: Muhammad Usman																																					
Range 0~60 Feet		Resolution																																					
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Client	Patind O&M PVT Limited Near Thori Park, Lower Chatter Muzaffarabad AJ&K, Pakistan				
Equipment Detail	Level Transmitter				
Model / Type	WL-400-060-100	Job No.	11663/22		
Manufacturer	Global Water Instrument	Data Sheet No.	12-113080		
Serial No.	1649004693	Calibration Date	November 25, 2019		
Code	LT-242	Next Calibration Date	November 25, 2020		
Reference Procedure No.	Call/SCP/055				
Job Location	Patind O&M PVT Limited				
Equipment Location	Kaghan Station				
Calibration Results	Calibrated by: Muhammad Usman				
Range 0~60 Feet	Resolution				
Set Value (Standard) Unit: FtH2O	Measured Value Unit: mAmp	Standard Value Unit: mAmp	Converted Value Unit: FtH2O	% Error F.S	
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15.00	7.89	7.71	14.89	-0.18	
30.00	11.46	11.44	30.06	0.10	
45.00	15.20	15.17	45.11	0.18	
60.00	18.91	18.90	60.04	0.06	
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Calibrated by: Signature:		Approved by: Signature:			
Lab. Analyst		Manager C & T Lab			
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Client	Patind O&M PVT Limited. Near Thori Park ,Lower Chatter Muzaffarabad AJ&K, Pakistan																																						
Equipment Detail	Level Transmitter Model / Type MPM-4700 Job No. 11663/20 Manufacturer Micro Sensors Data Sheet No. 12-113078 Serial No. 6B3216 Calibration Date November 19, 2019 Code LT-180 Next Calibration Date November 19, 2020 Reference Procedure No. Call/SCP/055 Job Location Patind O&M PVT Limited Equipment Location Power Intake																																						
Calibration Results Range: 0~15 mH2O			Calibrated by: Muhammad Usman Resolution																																				
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Client	Patrind O&M PVT Limited. Near Thori Park ,Lower Chatter Muzaffarabad AJ&K, Pakistan																																						
Equipment Detail	Level Transmitter Model / Type: MPM-4700 Job No: 11663/19 Manufacturer: Micro Sensors Data Sheet No: 12-113077 Serial No: 8C6696 Calibration Date: November 19, 2019 Code: LT-178 Next Calibration Date: November 19, 2020 Reference Procedure No: Call/SCP/055 Job Location: Patrind O&M PVT Limited Equipment Location: Tail Bay Level																																						
Calibration Results	Calibrated by: Muhammad Usman Range: 0~15 mH2O Resolution																																						
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Client	Patind O&M PVT Limited. Near Thori Park ,Lower Chatter Muzaffarabad AJ&K, Pakistan			
Equipment Detail	Level Transmitter			
Model / Type	N/A	Job No.	11663/21	
Manufacturer	Global Water Instrument	Data Sheet No.	12-113079	
Serial No.	N/A	Calibration Date	November 20, 2019	
Code	LT-242	Next Calibration Date	November 20, 2020	
Reference Procedure No.	Call/SCP/055			
Job Location	Patind O&M PVT Limited			
Equipment Location	Talahata Station			
Calibration Results	Calibrated by: Muhammad Usman			
Range:	0~60 Feet			
Resolution				
Set Value (Standard) Unit: FtH2O	Measured Value Unit: mAmp	Standard Value Unit: mAmp	Converted Value Unit: FtH2O	% Error F.S
0.00	3.99	13.99	0.00	0.00
15.00	7.74	7.72	15.10	1.15
30.00	11.50	11.44	30.20	0.36
45.00	15.25	15.17	45.30	0.52
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* Instrument under test Note(s) <ul style="list-style-type: none"> Instrument is "used" and in good condition on receiving. No adjustment is carried out and measurements in this certificate are as received figures. has been calibrated against Process Calibrator Model No. Fluke 753 Serial No. 2581005 which is traceable to Certificate No. 84116 of GMES(Qatar).				
Calibrated by: Signature: Lab. Analyst		Approved by: Signature: Manager C & T Lab.		
-----End Of Certificate-----				
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INSPECTEST (PRIVATE) LIMITED 18-km, Ferozepur Road, Lahore, Pakistan.		UAN: +92 42 111 INSPEC, 111 467 732 Fax: +92 42 581 4487 e: inspectest@inspectest.com.pk www.inspectest.com.pk			
Client	Patind O&M PVT Limited. Near Thori Park, Lower Chatter Muzaffarabad AJ&K, Pakistan				
Equipment Detail	Level Transmitter Model / Type: WL-400-060-XXX Job No: 11663/24 Manufacturer: Global Water Instrument Data Sheet No: 12-113082 Serial No: 1634002538 Calibration Date: November 19, 2019 Code: LT-177 Next Calibration Date: November 19, 2020 Reference Procedure No: Call/SCP/055 Job Location: Patind O&M PVT Limited Equipment Location: Up-Stream				
Calibration Results	Calibrated by: Muhammad Usman Range: 0-60 Feet Resolution:				
	Set Value (Standard) Unit: FtH2O	Measured Value Unit: mAmp	Standard Value Unit: mAmp	Converted Value Unit: FtH2O	% Error F.S
	0.00	4.01	3.99	0.08	0.13
	15.00	7.75	7.72	15.13	0.22
	30.00	11.48	11.44	30.14	0.23
	45.00	15.21	15.17	45.15	0.25
	60.00	18.94	18.90	60.16	0.27
* Instrument under test Note(s) <ul style="list-style-type: none"> Instrument is "used" and in good condition on receiving. No adjustment is carried out and measurements in this certificate are as received figures. has been calibrated against Process Calibrator Model No. Fluke 753 Serial No. 2581005 which is traceable to Certificate No. 84116 of GMES(Qatar). Has been calibrated against Multimeter (Digital) Model No. Fluke-8846-A Serial No. 9422011 which is traceable to Certificate No. 82298 GMES (Qatar).					
Calibrated by: Signature:  Lab. Analyst		Approved by:  Signature: Manager C & T Lab.			
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Annex-03 Fish Monitoring Study

Fish Monitoring Study Patrind Hydro Power Project April-June, 2020



By
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Director Fisheries ® Govt. of AJK

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1. Executive Summary

The fish study in River Kunhar at the project area of the Patrind Hydropower intake side is a series of periodic quarterly studies. The last due study in March 2020 could not be conducted because of lockdown imposed because of COVID 19 corona Virus pandemic. Limited access was possible in June 2020, so the study was conducted after following the SOPs. This is the first study after the establishment of three fish breeding grounds downstream of the Weir at Patrind. The water flow at this time of the year is normal as the water is released from the side tunnel at the weir. The breeding ground established are covered by the water but are intact. Hopefully, they will prove to be efficient in the coming season for *Schizothorax* fish breeding during October 2020.

The water temperature is 16°C as the high side streams are joining the river. The fish catch shows that the fish has come to the developed breeding points which is very encouraging. The *Schizothorax* fish species are the slow growing fish and they get a size of average 10 cm in a year and get mature for breeding after three years of age. The proper results appearance will take time. The breeding points are located at such places where HSE guards have a regular watch and ward and this will help the fish to get safety from poaching and fish will be comfortable in breeding. The stress of safety in fish also effects the breeding process in it. HSE officials of the Patrind project are trying their best to act on the recommendations of the report and take timely measures which head towards getting the positive results in achieving the goal. They have tried their best to involve the Fisheries departments of KP and AJK but the response is not that proactive in playing their role for fish population improvement in River Kunhar. The construction of new dam near Balakot will further deteriorate the situation if this ignorance of the department will continue.

2. Introduction

The project of the hydropower is situated in the rugged mountains where speed of River Kunhar is very fast making some cascades. River flow is very high during the summer and low during the winter. Similarly, the turbidity percentage is high during the summer and low during the winter. The study periods are set with the seasonal changes of the river Kunhar so that a clear picture could be obtained for the impact assessment.

The management authority of the Patrind Hydropower Project is very responsible in trying its best to restore the depleted fish population in river Kunhar due to stoppage of fish movement

in the river by the construction of dam at Patrind. The fish had a migration distance of about 100 km upstream from its point of confluence with river Jhelum at Domeshi before the construction of the dam. Beyond that, Trout fish area starts and trout fish has an aggressive carnivorous habit which does not allow the *Shizothorax* to multiply satisfactorily. Now the distance of migration is about 13 km from Domeshi to the weir point at Patrind. The sizeable reduction in the river flow due to water diversion, has affected the downward flow pattern which has ultimately caused the disappearance of breeding grounds for *Shizothorax* fish species. The construction of new three breeding ground spots will defiantly improve the position and some fish migrating from Domeshi will get a place in 1st pool at Boi to breed and some will further migrate above to the 2nd and third breeding pool. These will also compensate the fragmentation in the movement process of the fish to some extent. The fish population in the river is very low at the moment and proper breeding will improve to a certain level and it can be enriched by stocking the fingerlings of the species collected from other rich points of river Kunhar, River Jhelum or River Neelam.

Total reported species of river Kunhar are about 12 but the recent catches under the assessment studies could find only three species of *Schizothorax*. (*Shizothorax plagiostomus*, *S. curvifrons* and *S. dilatata*). The last several studies have shown that the *S. curvifrons* and *S. dilatata* is disappearing and only a single species, *S. plagiostomus* could survive under these changed scenarios of the river ecosystem.

Departments of fisheries in AJK and KPK have not shown their interest for doing so. If the project takes an initiative to develop such facility as they are working hard in restoring the depleted fish population downstream, this will become an attractive economic activity and will support the local community and relevant Government departments to take part in this.

Reservoirs provide significant contributions to fisheries. The main challenges to maintaining and enhancing reservoir fisheries and associated social and economic benefits are fish habitat and environmental degradation, inadequate fish assemblages, inefficient harvesting systems, stakeholder conflicts, and insufficient institutional and political recognition. These issues need to be addressed by the project authorities for promoting the activities of economic and social uplift of the area.



Close view of Breeding ground constructed at Weir Site. The water is staying behind the stone wall which helps the fish to breed during the breeding season

3. Objectives of the study

The objectives of the study in relation to dams are of two types. First the conventional objectives which apply to almost all types of dams and secondly specific objectives which apply to the localized conditions of the dams.

These objectives are:

- 3.1 To maintain stock abundance at high levels.
- 3.2 To reduce the risk of overexploitation and stock collapse.
- 3.3 To achieve possible sustainability of production of valued fish species.
- 3.4 To reduce the impact of the loss of fish biodiversity.

A Fisheries Management Plan had been developed to achieve these objectives in the project area of river Kunhar under the Patrind Project.

4. Methods & Materials

The sampling size covers an area of about 14 km up and downstream. Six sampling points have been fixed for repeated comparable studies. Four sampling points are existing downstream of the weir point and two upstream. The points selected were based on the potential of existence of the fish based on abundance of food ingredients, confluence of side streams and migration possibility of the fish. The team was consisting of fisheries biologist, Environmental Officer and a professional fisherman. No support members could be taken on board because of the restrictions imposed due to COVID 19 virus.



Picture showing study area (Points of sampling)

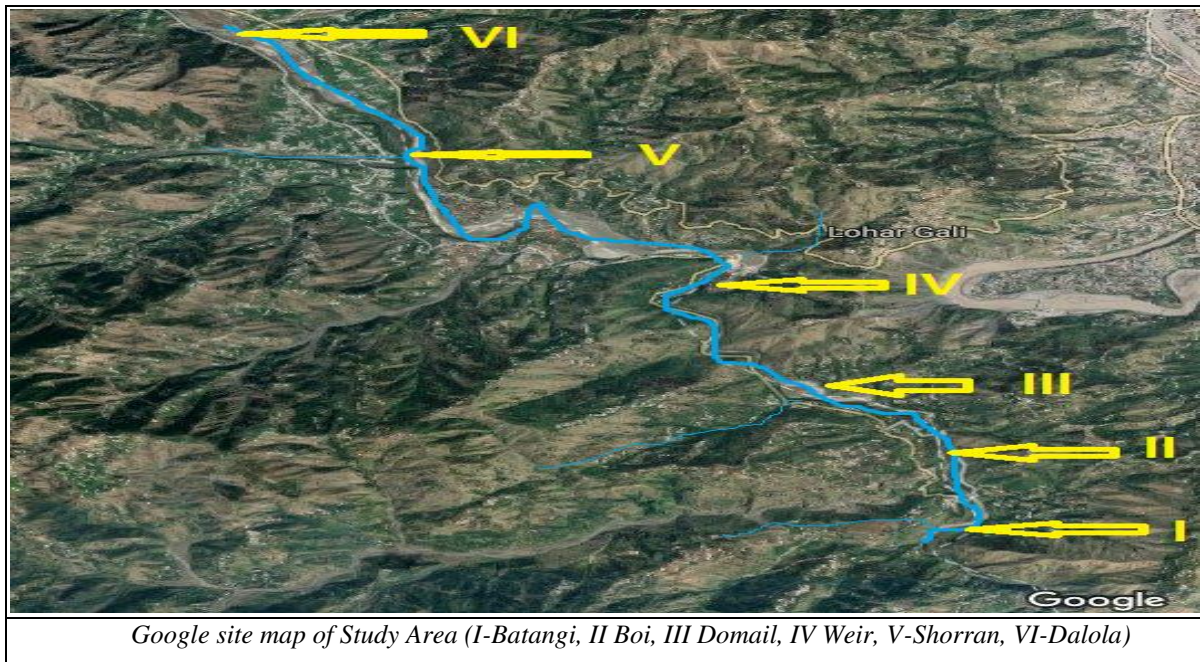
A cast net of 2x2 inch mesh size with a weight of 6 kg has been used and gill net of 1.5x1.5-inch mesh size and 30-meter length was used at Point-IV (Weir) to catch fish. A professional fisherman, Mr. Sajid Mehmood was engaged for catching the fish at the sampling points of the river Kunhar. Electronic balance was used to weigh the caught fish and normal tap to measure the length. pH paper and pH meter were used to measure the hardness and TDS meter was used to measure the total dissolved solid and DO meter for the dissolved oxygen in the stream water. Normal thermometer was used to measure the temperature of the water.



The Cashnet used by the fisherman during the study

5. Field Results of Sampling points

The points for the sampling are shown in the below image:



5.1 Sampling Point 1- Batangi

This point is situated at $34^{\circ}18' 8.12''$ N $73^{\circ}26'32.79''$ E with an altitude of 2371 ft above sea level. The water flow is faster than its usual flow and fish catching points have become difficult for casting the net. The water is muddy and temperature is 16°C . TDS is 459, and pH is 7.7. One fish was caught here with a weight of 127 grams and length 27 cm.



Measuring water temperature at point-I



Fish catch and measuring of length at point-I

5.2 Sampling Point 2- Boi

This second sampling point of the study is situated at 34° 18' 19" N, 73° 26' 44" E at an elevation of 2422 ft above mean sea level. Watercolor is muddy and water fast. flow is slow, air temperature at this point is 31°C, water temperature 16°C and pH 7.5. Two fish of *Shizothorax plagiostomus* species could be caught here including the first breeding point of Boi. Size of the fish are 117 grams with 25 cm length and 87 grams with 23 cm length respectively.



Fish catch at point-2



Weight measurement of fish at point-2



Water staying at breeding ground at point-2



Fish caught near breeding ground

5.3 Sampling Point 3- Domail Boi

The third point of sampling is Domail at the junction of Nallah Boi with River Kunhar. This point is situated at 34° 18' 36" N, 73° 26' 43" E at an elevation of 2398 ft above sea level. The color of the river water is muddy while joining Boi Nullah is clear. River water size is almost

normal due to release of extra water from the weir point. Air temperature is 30°C and water temperature 16.°C. No fish could be caught here.



Fisherman Casting net at point-3 Domail Boi (Nallah)

5.4 Sampling Point 4- Weir Outlet

Fourth point of sampling is situated at 34° 20' 30" N and 73° 25' 43" E. with an elevation of 2519 ft above mean sea level. A Gill net of 30m length and 1. m width was placed here one day before the sampling day to catch the fish for assessment. The water flow is very fast and access to the area was not possible. The gill net erected last night had to be dragged out and there was no fish caught here as was expected due enormous speed of water.



Increased river flow at the outlet of Weir site

5.5 Sampling Point-5 Shorran

This sampling point is at the tail of the reservoir and is situated at 34° 21' 09" N and 73° 24' 1" E with an elevation of 2556 ft above mean sea level. Flow of water is 1 meter per second. The sides of the river are rich and thick in vegetation. The air temperature is 31°C and water temperature was 16°C with pH 7.5. A small juvenile fish of *Shizothorax plagiostomus* was found here.



5.6 Sampling Point- 6 Dallola

This sampling point is situated at 34° 22' 27" N and 73° 23' 34" E with an elevation of 780 meters. The river flow is quite fast here 35km/h. water temperature is 16°C and pH 7.5. TDS 376. One fish of 23 grams with 14 cm length and one 15 grams with 12 cm length were caught here.



6. Water Quality

PARAMETER	POINT -1	POINT- 2	POINT- 3	POINT- 4	POINT- 5	POINT- 6
ELECTRICAL CONDUCTIVITY (MS)	68	68	69	68	70	71
TEMPERATURE (°C)	16	16	16	16	16	16
AIR TEMPERATURE	31	31	30	31	31	31
DISSOLVED OXYGEN (MG/L)	9	9	9	9	9.5	10
PH	7.5	7.5	7.5	7.5	7.5	7.5
TOTAL DISSOLVED SOLIDS (MG/L)	186	186	190	186	193	187
TRANSPARENCY	turbid	turbid	turbid	turbid	turbid	turbid
ODOR	No	No	No	No	No	No
TASTE	No	No	No	No	No	No

7. Discussion

The KPK and AJK Fisheries departments were taken in confidence for developing fish breeding grounds on technical basis. They were of the same view for taking remedial actions in improving the fish population in River Kunhar to a possible level. Relevant Patind Hydropower project authorities have played their best role in coordinating the responsible officials of the Fisheries departments of both AJK and KPK Government. The new fish breeding grounds have shown good results for catch of fish and fish was healthy. This is a very encouraging result within a short spell of time of four months. If there is no heavy flood in the area during the monsoon, the breeding points will not be disturbed much.

Upstream catch is up to the standards of expectations. The new development of dam near Balakot will disturb the area and fish may disappear here altogether as the fishing pressure by locals is also very high in this area, migration restriction and no remedial actions will deteriorate the water ecosystem.

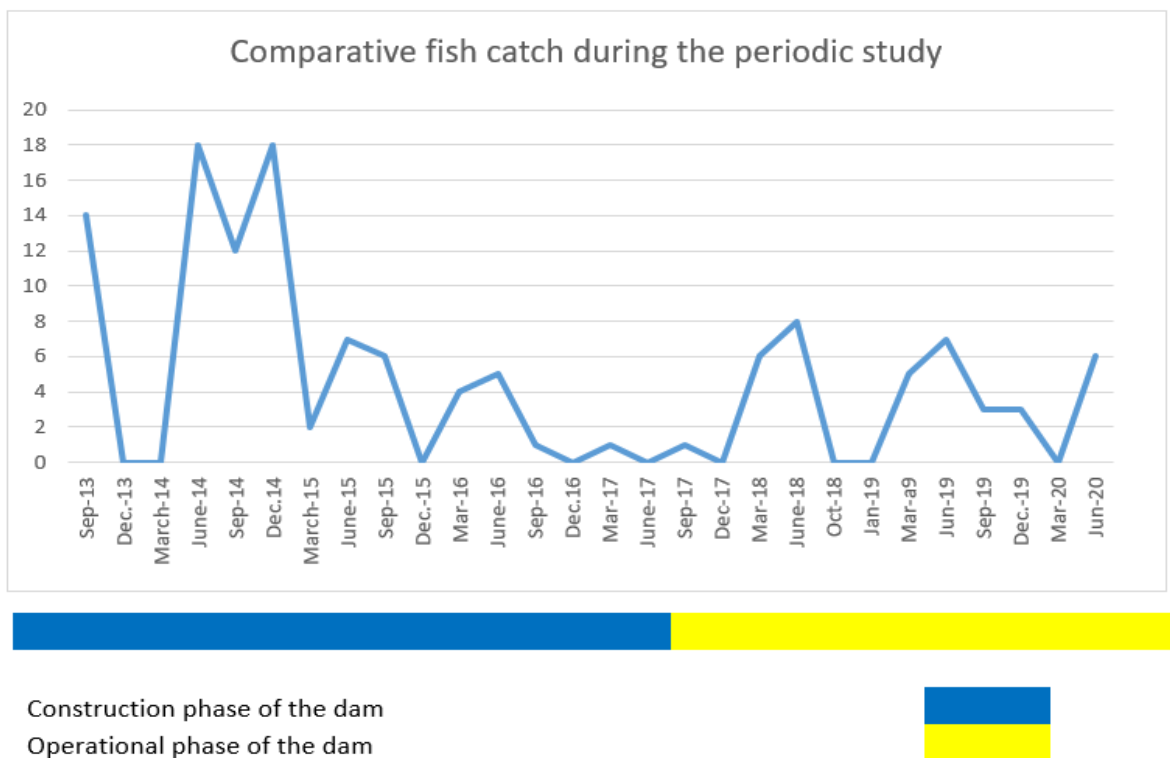
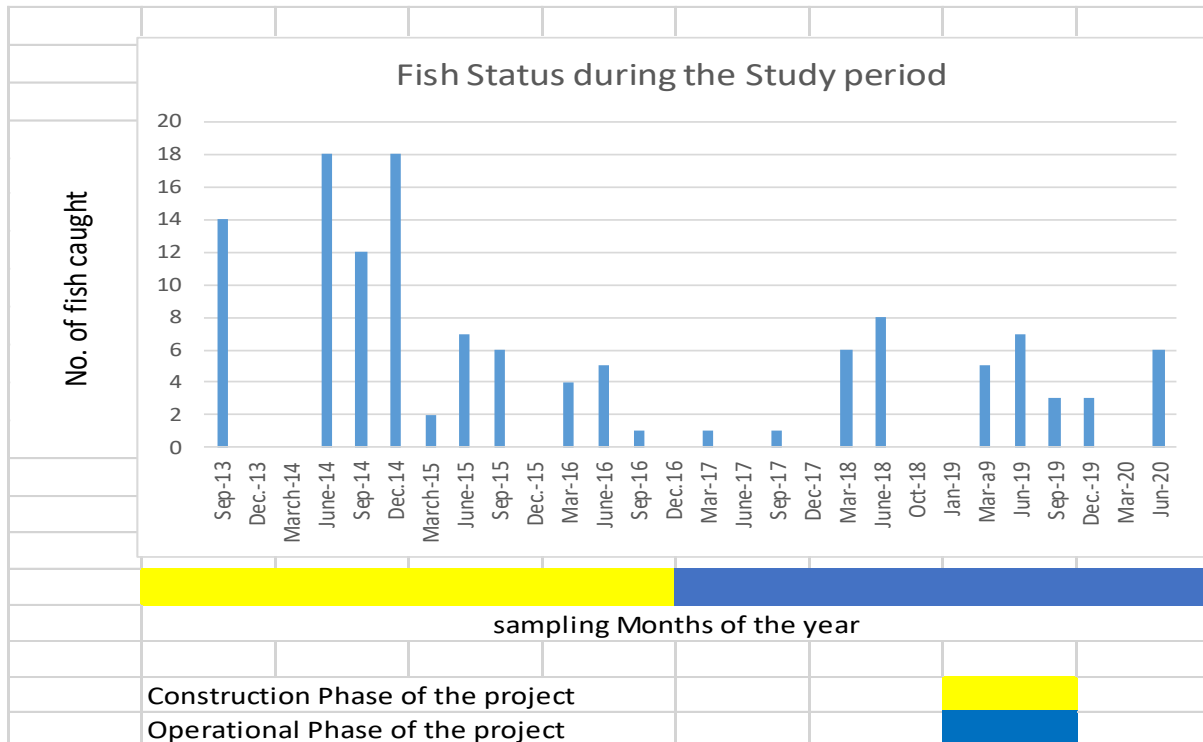
Continuous absence of catch of two other found species (*Schizothorax curvifrons* and *S. dilatata*) during the last few studies is very alarming. The next studies during the year 2021 will give a better picture of the situation.

8. Comparative findings and results

The trend of fisheries catch has decreased over the time. The fish catch was high during the first pre dam construction phase. As the dam construction progressed and obstruction came into being, the fish catch has decreased. The table given below reflects the catch of fish of periodic study at six sampling points of the area.

S.#	Study Month	Sampling Point						Total
		1	2	3	4	5	6	
1	September 2013	3	6	4	0	1	0	14
2	December 2013	0	0	0	0	0	0	0
3	March 2014	0	0	0	0	0	0	0
4	June 2014	5	7	4	0	0	2	18
5	September 2014	0	4	1	2	3	2	12
6	December 2014	6	5	0	4	0	3	18
7	March 2015	2	0	0	0	0	0	2
8	June 2015	3	1	1	0	0	2	7
9	September 2015	4	1	1	0	0	0	6
10	December 2015	0	0	0	0	0	0	0
11	March 2016	0	3	3	0	1	0	4
12	June 2016	4	0	0	0	0	1	5
13	September 2016	0	0	0	0	0	1	1
14	December 2016	0	0	0	0	0	0	0
15	March 2017	1	0	0	0	0	0	1
16	June 2017	0	0	0	0	0	0	0
17	September 2017	1	0	0	0	0	0	1
18	December 2017	0	0	0	0	0	0	0
19	March 2018	1	0	1	4	0	0	6
20	June 2018	1	0	0	6	0	1	8
21	October 2018	0	0	0	0	0	0	0
22	December 2018	0	0	0	0	0	0	0
23	April 2019	1	1	0	2	0	1	5
24	June 2019	1	4	1	0	1	0	7
25	September 2019	0	3	0	0	0	0	3
26	December 2019	0	0	0	3	0	0	3
27	June 2020	1	2	0	0	1	2	6

The graph below shows the trend of fish catch over the study period of September 2013 to June 2020



9. Recommendations

- Expansion of cold-water aquaculture will help local people and sustain livelihood of fisher communities
- Fish breeding grounds developed during February-March 2020 should be paid special conservation status by putting guards in the area. The guards already deputed should continue their jobs in the protection with special attention in the protection of these spots.
- Establishment of a regional cold-water fish center in the upper reaches of Kunhar river would help in the conservation and development of cold-water fishery in the river.

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Annex-04 Local Employment Status

Employment Summary

Departments	AJK	KPK	Other	Total
CEO				
Service Support	14	4	3	21
Maintenance	13	3	7	23
Operation	17	5	2	24
HSE (inc CLO)	4	1	0	5
Total	48	13	12	73
Total %	65.75%	17.81%	16.44%	

Departments	Chatter	Alra	Patrind	MZD	Mirpur	KPK	Other	Total
CEO								
Service Support	6	3	2	3		4	3	21
Maintenance	6	0	0	7		3	7	23
Operation	3	0	2	11	1	5	2	24
HSE (inc CLO)	0	1	1	2		1	0	5
Total	15	4	5	23	1	13	12	73

Employment from Affected Households

Sr. No	Affected Name (Name initials)	Village	Designation/Working Role	Department
1.	MA	Alda	CLO	HSE
2.	MoA	Alda	Driver	Support Services
3.	TA	Alda	Office Boy	Support Services
4.	I	Sirrati	Driver	Support Services
5.	Z	Patrind	Driver	Support Services
6.	JA	Patrind	Office Boy	Support Services
7.	F	Patrind	Security Guard	Security
8.	S	Patrind	Security Guard	Security
9.	J	Sirrati	Security Guard	Security
10.	U	Sirrati	Security Guard	Security

Sr.NO	Title	Village	Address	Province
1	1 st Engineer	Tarbela	House # B-12, R.V.C Tarbela KPK, Pakistan.	KPK
2	Shift Charge Engineer	Chatter	House # B-12, Upper Chatter Housing Scheme Muzaffarabad, Ajk.	AJK
3	Shift Charge Engineer	Mirpur	House # 129-A. Sector F-1, Mirpur, AJK.	AJK
4	Shift Charge Engineer	MZD	Ward # 5, Near Zibah Khana, Eid Gah Road, Muzaffarabad, Ajk.	AJK
5	Shift Control Engineer	MZD	Airport Road, Manak Pian, Muzaffarabad, AJK.	AJK
6	Shift Charge Engineer	MZD	D2 Electricity Colony, Gojra bypass road, Muzaffarabad, AJK.	AJK
7	Shift Control Engineer	Nawsher	S.S House, Karachi Wala Colony, Lower Muhallah Shoaibzai, Nawansher Abbottabad, Pakistan.	KPK
8	Junior Operator	MZD	Village & P.O.Box, Lawat Balla, Tehsil Athmuqam, District Neelum, AJK.	AJK
9	Junior Operator	MZD	Village Kiamanja, Ghari Dupkata, Muzaffarabad, AJK.	AJK
10	Sub-Engineer	Thanda Choha	Village Thanda Choha Post Office Nawana Shehr Tehsil and Dist Abbottabad	KPK
11	Senior Charge Engineer	Chatter	House# 13-A, Near MLA Hostel, Lower Chatter, Muzaffarabad, AJ&K	AJK
12	3 rd Engineer	MZD	Rasheedabad, Muzaffarabad, AJK	AJK
13	Shift Control Engineer	Bhakar wali	Chak No. 136 RB Bhakrewali Tehsil Chak Faisalabad, Punjab, Pakistan	Other
14	Shift Control Engineer	MZD	Ward # 18, Chella Bandi, Muzaffarabad, AJ&K	AJK
15	Junior Operator	Sararti	Sarati Rehmanabad Boi, District Abbotabad, KPK	KPK
16	Shift Control Engineer	Patrind	Village Patrind, AJ&K	AJK
17	Shift control Engineer	Kumgran	Anderwan Hussain Aghahi house No. 797/3 muhalla kumgran Multan	Other
18	Sub Engineer (Weir)	Nakra Janderbari	Village Nakra Janderbari P.O.Box Nakra Janderbari Abbottabad	KPK
19	Shift Charge Engineer	Chatter	Upper Chatter Qureshi Muhalla, Muzaffarabad, AJ&K	AJK
20	Junior Operator	MZD	kangar serameel, Muzaffarabad AJK	AJK
21	Block Operator	MZD	Darra Battangi, Muzaffarabad	AJK
22	Junior Operator	MZD	village Sarrar, Muzaffarabad	AJK
23	Block Operator	Patrind	village Patrind, Muzaffarabad	AJK
24	Junior Operator	MZD	P.O.Box Lawat Tehsil Athmuqam, District Neelum, AJK.	AJK
1	2 nd Engineer (Mechanical)	Darya Khan	Farooqabad Darya Khan, Distt. Bhakkar Punjab, Pakistan.	Other
2	2 nd Engineer	Abbotabad	House # 377, Link Road, Abbotabad	KPK

Sr.NO	Title	Village	Address	Province
	(Electrical)		KPK, Pakistan.	
3	3 rd Engineer (Mechanical)	Lahore	House # 11-B, Hashmi Street # 17, Tajpura Shad Bagh, Lahore,Pakistan.	Other
4	3 rd Engineer(C&I)	Chatter	Near Patrind Hydro Power Project, Lower Chatter, Muzaffarabad Ajk.	AJK
5	3 rd Engineer (Electrical)	Abbotabad	CB-500, Emplpyee colony Jhangi seadain,Abbottabad	KPK
6	Sub-Engineer (Mechanical)	MZD	Ward No 18, Chella Bandi, Muzaffarabad, AJK.	AJK
7	2 nd Engineer (Civil)	Abbotabad	S.S House, Karachi Wala Colony,Lower Muhallah Shoaibzai,Nawansher Abbottabad,Pakistan.	KPK
8	Sub-Engineer (Civil)	MZD	ward 18, Chella Bandi ,Muzaffarabad,AJK	AJK
9	Senior Officer (Civil)	Chatter	Nisar Karyana Store, Lower Chatter, Muzaffarabad	AJK
10	Officer (Civil)	MZD	Mohala Shahnara, Ward No.14, Muzaffarabad	AJK
11	Sub Engineer (C&I)	Lahore	House No. 78-F1 Model Town,Lahore	Other
12	Foreman(Electrical)	Minwali	Pakki Shahmardan, Mianwali,Pakistan.	Other
13	Foreman (Mechanical)	MZD	Ward#19, Rajpoot House,Mohala Shaukat Lines, Muzaffarabad, AJK	AJK
14	Sub-Technician (Electrical)	Chatter	Lower Chatter, Muzaffarabad, AJK	AJK
15	Technician (Electricial)	Mianwali	Mianwali,Pakistan.	Other
16	Technician (Mechanical)	Bhakar	Daggar Shada, Bhakkar,Pakistan.	Other
17	Crane Operator	Mianwali	Kala Bagh, Mianwali,Pakistan.	Other
18	Sub-Technician (Electrical)	MZD	Mohala Nisar Chela Bandi,Muzaffarabad	AJK
19	Sub-Technician (Mechanical)	MZD	Meeran Kalla Muzaffarabad,AJ&K	AJK
20	C&I Technician	MZD	Ambore, Muzaffarabad	AJK
21	Sub-Technician(C&I)	Chatter	Lower Chatter, Muzaffarabad, AJK	AJK
22	Sub-Technician (Electrical)	Chatter	Upper Chatter Sundgali Ward No 3, Muzaffarabad	AJK
23	Sub-Technician (Mechanical)	Chatter	Ward No.2 Lower Chatter Muzaffarabad AJK	AJK
Sr.NO	Title		Adress	
1	Sr. Manager	Lahore	Garhi Shaho , Lahore	Other
2	Manager	Lahore	House#485, Nasheman Iqbal housing Socity, Lahore	Other
3	Senior Officer	Rawalpindi	House#E 65/16, E block Sattlitetown, Rawalpindi	Other
4	Senior Officer	MZD	Dahriyan syedian ward 13, Muzaffarabad	AJK
5	Senior Officer	Chatter	Ward 3, Chatter Domail,muhalla sund Gali, Muzaffarabad	AJK
6	Officer	MZD	Dak-khana	AJK

Sr.NO	Title	Village	Address	Province
			Domail,sanwan,Muzaffarabad,AJ&K	
7	Officer	Tili Kot	Tili Kot,Dakhkhana Chinari,Hatian Bala,AJ&K	AJK
8	Driver	Swabi	Swabi Dar Kala.Po box Dobian,Tehsile Lahore,Distt Swabi	KPK
9	Driver	Chatter	Ward No 2, Gazi Chok,Lower Chatter	AJK
10	Driver	Alra	PO Box Muzaffarabad Alra, Tehsil & district Muzaffaraabd	KPK
11	Driver	Patrind	Village Patrind, Muzaffarabad	AJK
12	Driver	Sararti	Village Didal Sarati Po Dulola, Abbottabad	KPK
13	Driver	Chatter	Mohala Lower Chatter, Muzaffarabad	AJK
14	Driver	Chatter	Ward 2, Lower Chatter, Muzaffarabad	AJK
15	Driver	Chatter	Ward No 02, Lower Chatter, Muzaffarabad	AJK
16	Cleaner	Alra	Alra Dakkhana,Muzaffarabad	AJK
17	Cleaner	Alra	PO Box Muzaffarabad Alra, Tehsil & district Muzaffaraabd	AJK
18	Cleaner	Patrind	Dakhkhana Muzaffarabad,Patrind, Muzaffarabad	AJK
19	Cleaner	Chatter	Ward No 2, Lower Chatter, Muzaffarabad	AJK
20	1 st Cook	Sarati	Burj, Dalola, Abotabad	KPK
21	2 nd Cook	MZD	Jaho, Kanynia, Dakkhana Ghari Dupata, Hytia Bala, Ajk	AJK
1	Senior Manager	Swabi	Shah Gram Karokaly P.O madeen , tehsil bahreen, Dist Sawat KPK Pakistan	KPK
2	Senior Officer Environment	MZD	Ward No 18, Chella Bandi, Muzaffarabad, AJK.	AJK
3	Senior Officer HSE	MZD	Majhui,Dakkana Ghari Dupata,Muzaffarabad	AJK
4	CLO	Alra	Alra Muzaffarabad	AJK
5	CLO	Patrind	Village Boi Tehsil & Distt Abbottabad	AJK

CAREER OPPORTUNITIES AT HYDRO POWER PLANT

A hydro power sector company is looking for hire the services of experienced professionals for the following positions for O&M of Patrind Hydro Power Plant:

Sector	Minimum Qualification	Position & Experience
Maintenance	DAE Electronics or Equivalent	Possesses high skill and sound knowledge in all maintenance aspects of hydro Power Plant (HPP). Well versed with operating of HPP facilities (PLC, Excitation, Protection, Sensors, CCTV, Telephone Exchange, and Networking). (Sub Technician Control and Instrumentation) Having minimum 2 years of experience in O&M of HPP/CCPP Preference shall be given to HPP personal.
Maintenance	DAE or Equivalent	Possesses high skill and sound knowledge in all maintenance aspects of hydro power plant (HPP). Well versed with operating of HPP facilities (troubleshooting of 0.4kV switchgear, 11kV switchgear, 11kV transmission line and all other electrical facility in Powerhouse). (Elec. Sub Technician) Having minimum 2 years of experience in O&M of HPP/CCPP Preference shall be given to HPP personal
Support Service	BA/BSc. in Business Management or Equivalent	(Officer -Administration, Finance & Procurement) Graduation in business management or related field from a recognized university with more than 60% marks.

- I. Fluency in written and spoken English is mandatory.
- II. Only shortlist candidates will be call for test and interview.
- III. Proficient in computer application skills including Word, Excel, Power Point, etc.
- IV. Send your latest CV mentioning current & expected salary along with photograph, contact number and current job title to the following: powersector11@gmail.com latest by **31th July 2018 with clear job title** in email "subject".
(If the CV has not include information mentioned above, it may be a disadvantage during the document review)
- V. Management can cancel any or all positions at any time without prior notice.
- VI. Use of any influence during the selection process would immediately result in disqualification of the candidate

Only shortlisted candidates will be contacted.

The company will not respond to any query or email.

Annex-05 Vegetation Monitoring Study

Patrind Hydropower Project
Vegetation Monitoring Study (April-June, 2020)



By

Muhammad Yousaf Qureshi

Director ® Wildlife & Fisheries Department

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1. Abstract

This is the fifth year of vegetation case study to find out the impact of damming on River Kunhar. The vegetation response upstream and downstream is identical as moisture-loving plants have increased their canopy cover upstream beside the lake and some new plant canopies have appeared on the closed sides of the river where it was a riverbed before the construction of the dam. No impact on the riparian species of the river Kunhar has been observed downstream at the farther areas. Lack of sedimentation or sudden floods will have impact on the plant regeneration and this may destroy it. Opening of the flushing tunnel may leave sediment downstream, which provides a medium of new growth for plants and this vegetation can survive up to the next flooding cycle. The bare vegetation on the bottom of the reservoir has submerged altogether and there is no tree or any plant in the reservoir area but vegetation downstream has found a suitable substratum to grow there as moisture content and rainwater is enough to support the survival and growth of the plants. Plant communities changed rapidly during the first two years of the damming but now they have established and there is no danger of their dieback.

The authorities of the Patrind project are committed to cover the barren areas in the project with proper vegetation, which can protect the landslide and increase the biomass. The landslide protection through vegetation and bioengineering works have been initiated at the base of the hill and gradually covering the upland. The base of the hill is almost stabilized with this work and great change in vegetative cover is visible. The photographs below are showing the difference between the position of the land before and after the intervention carried out in the area.



Initial position of the slide behind the powerhouse



Land position before bioengineering works in the slide



Landslide position after the Bioengineering works in December 2019



Same slide in June 2020 after the growth of vegetation planted, and germination of sown seeds

The area above the treated part is difficult because of its terrain and steep slope. Working will have to be done in this area as well during December 2020 to February 2021. Early works during this year have produced wonderful results and same has to be replicated in the coming season of the works.

2. Introduction

The Patrind Hydropower Project area lies in the Hazara rock formation where slate, dolomite, and shale are its dominant characteristics. The loose gravel and shale hardly allow the steep mountains to get stable. Once the angle of their repose is disturbed, then it becomes very difficult to control the erosion. The mass movement along the hill carries away the boulders and shallow rooted plant species as well. Deficiency of fertile soil, texture of soil and slope gradient makes it entirely impossible for the natural growth of the native plant species unless they are planted after special treatment. Heavy monsoon showers carry away the top layer of the soil, which has nutritional value for the vegetation, so the new germination of seeds is also not possible here. New plantation also requires the enrichment of soil fertility by mixing organic material in the pits of the plants as been done during the present plantation and sowing process.

The area toward the spillway side has mostly been covered with concrete and more or less stabilized for the rest of the age of the project. Small patches left over on this side have already been covered with vegetation.



Success in plantation on the right side of the water creek

The plantation done on the right side of the creek just at banks of the river is successful while middle and left side plantation has been destroyed by the mass movement of the slide.

The plantation done in the area had a success percentage of above 60 percent, which is very satisfactory. This was only possible with introduction of fertile soil in the pits brought from outside. This soil was placed in between the soft gabions as well to produce good results. The success percentage is very much visible with the dedicated work of the staff of Patrind Project along with the expert in vegetation.

Hopefully the administration will contribute its responsibility as has been done during the last two years to continue the landslide stabilization process in the same way so that the expansion of the present slide could be controlled effectively.

3. Study Site

The weir is constructed on River Kunhar situated at 34°20'31" North Longitude 73°02'54" East latitude with an elevation of 2500 ft. This study area is covered 6 km upstream and 8 km downstream of this weir point plus area behind the powerhouse near Alda village in AJK at 34°20'06" North Longitude 73°02'08" East latitude with an elevation of 2250 ft. Mean annual precipitation ranges from 50–60 inch, more than 70% of which falls between April and September. Summer in the study area is typically hot, with a mean July maximum of 39°C. Winter is characteristically cool to cold with a mean minimum January temperature of 6°C and extreme winter minimum temperatures as low as –2°C (Metrological Department). The area is lying in scrub and Chir pine zone.

The transition zone between Patrind and Alda physiographic regions are the Scrub to Grassland and is characterized by a gradual change in elevation and a shift from grassland to Chir pine zone with steep slopes and landslides on the Alda side. The rock is of Hazara formation with dolomite, sandstone, limestone and slate. It lies on the fault line and susceptible to high tectonic incidents.

1.2 Objectives

- Immediate objective of the study is to assess the impact of the Patrind Hydropower Project on the vegetation of the area and to restore it by appropriate means.
- To suggest measure to overcome the losses in shape of land erosion and green belts due to the project activities.

4. Vegetation Cover

The dominant species of the area is Chirpine (*Pinus roxburghii*) associated with broadleaved species and bushes. Major associates on the Patrind side are Walnut (*Juglan regia*), Drek (*Melia azedrach*), Phagwarr (*Ficus palmata*). Density of the Chirpine forest behind the powerhouse is quite good with some wide gaps. This is the forest area up to the top of the hill and other side of the hill is private land.

5. Plant Species of the area

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

<u>Common Name</u>	<u>Botanical Name</u>	<u>Type of Tree</u>	<u>Status</u>
Akhrot (Wallnut)	<i>Juglans regia</i>	Fruit	common
Anjeer	<i>Ficus carica</i>	Fruit	rare
Batang	<i>Pyrus patia</i>	fruit	common
Batculd	<i>Celtis australis</i>	soil binder	rare
Beence	<i>salix spp</i>	Firewood	common
Ber	<i>Zizyphus mauritiana</i>	fruit	common
Chir	<i>Pinus roxburghii</i>	Timber	common
Dhaman	<i>Grewia oppositifolia</i>	Fodder	common
Drawa	<i>Ailanthus anus</i>	firewood	common
Drek	<i>Melia azadrach</i>	firewood	common
Kangarr	<i>Pistacia khunjak</i>	soil binder	rare
Kau	<i>Olea cuspidate</i>	Agri tools,	common
Kiker	<i>Acacia nilotica</i>	Firewood	common
Narri	<i>Arundo donax</i>	Hedge	common
Nim	<i>Azadirachata indica</i>	Firewood	common
Phagwarr	<i>Ficus Palmata</i>	soil binder	common
phulai	<i>Acacia modesta</i>	firewood	common

Pipal	<i>Ficus religiosa</i>	Firewood	common
Robinia	<i>Robinia pseudoacacia</i>	firewood	common
Shahtoot	<i>Morus alba</i>	Fruit	common
Sherol	<i>Alnus nitida</i>	Firewood	common
Snatha	<i>Dodonaea viscosa</i>	soil binder	common
Talli (shisham)	<i>Dalbergia sisso</i>	furniture wood	common
Toot (mulberry)	<i>Morus albe</i>	Soil binder	common

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

Comparatively low vegetation cover was recorded in the flat area and high from steep slope areas (74.29%) followed by gentle slope and gully bed areas.

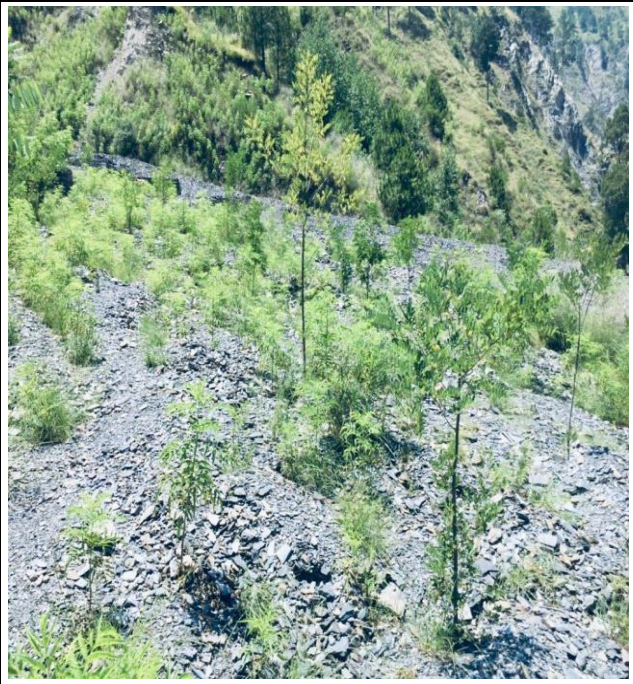
6. Discussion

The plantation and bioengineering works carried during the planting season of December 2019 to February 2020 is very successful. The eroded part of the slide immediate behind the powers house shows very healthy green picture. This will strengthen the soil stability as the plants grow up and their root system penetrates into the deep soil. Some fast-growing species like Robinea (*Robinea pseudoacacia*), drawa (*Alanthus anus*) have got a good size while mulberry plant (*Morus alba*) is coming with passage of the time. Narri (*Arunda donax*) will make a hedge, which will stop the rolling down of the soil or small stones. Once this is established, it spreads through its roots and becomes an excellent soil binder. All these species are local and have no negative impact on the environment.

The bioengineering work carried out is producing good results. The area has been taken in a gradual process for treatment against the erosion.



Beating up of the dyed off plantation



Plantation established on the right side of the nallah at the base

7. OUTCOME OF THIS STUDY

The vegetative cover on the dam side is getting established as the lifestyle of the people have mostly changed in the use of energy resources. The Liquid petroleum gas has mostly replaced the fuel wood. This shows a very good impact on the environmental improvement in the area.



Green patch of the vegetation along the river Kunhar

Downstream of the weir point, riparian plant species change their pattern of growth with the change in water level. Flooding due to seasonal change or flushing of the reservoir wash away all new established vegetation at the immediate side of the river. This flooding also changes the species combination pattern as the roots or seeds of different plants are drifted down by the floods and gets established every time with the water level change.

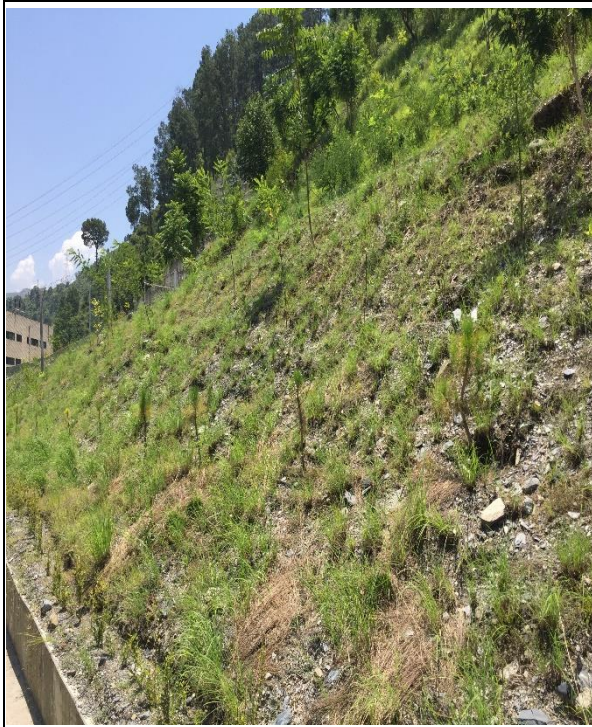


Last year's Google image of the slide area

Bioengineering works done on the site show a beautiful patch establishment and hopefully this will give good results next year when the planting, sowing and dibbling carried out in the area show results.



Slide treatment with wire gabion check dam and soft gabions with sowing and planting before germination



Successful Plantation carried out by SHPL around O&M building



Green patches and plantation in front of O&M building

Different interventions have to be carried out for the rest of the big landslide patches behind the treated one. A cut of drain construction has to be carried out to collect the slide water and drain it into the main channel. Retaining walls, check dams, soft gabions, sodding tufting, sowing planting etc., are the some of the biological and bioengineering techniques to be applied in the entire slide to stabilize it effectively.

8. Recommendations

1. A gradual progress in the landslide stabilization through plantation and bioengineering intervention has shown very good results. This practice should be continued for the next few years till the slide is fully treated and erosion problem goes off.
2. Some gabions have been placed in the wider base of the landslide adjacent to powerhouse but it needs more intensive work with more plantation and bioengineering works so that it could be stabilized.
3. Next planting season of 2020 and 2021 must not be missed and in time actions are required to be taken.
4. Attention should be paid in the months of October and November to take care of the forest fires.

9. Acknowledgment

We are thankful to Patrind Power Generation authority to have their confidence in us for conducting this study and continuous support during the studies time. We are thankful to Mr. Atif, Mr. Qamar and Mr. Imran Yousaf for their full-time company and support during the study. Our special thanks to all those who have been supportive for conducting the studies.

10. References

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Annex-06 Noise Monitoring Report



Monthly - Noise Survey Report

Date: 14th April 2020

Sr. No	Location	Type	Time Day/Night	1 st Reading db (A)	2 nd Reading db (A)	3 rd Reading db (A)	Average Reading db (A)	NEQS db (A)	Remarks
1.	First Floor	Office Area (Commercial)	Day	56.6	60.3	60.9	59.2	65	
2.	Ground Floor	Office Area (Commercial)	Day	55.3	58.2	57.1	56.8	65	
3.	Basement-1	Process Area (Industrial)	Day	86.6	86.8	85.9	86.4	85	The noise level in these areas are above the minimum exposure limits. All staff is instructed to work in the area only when required and use ear plugs. Maintenance department is advised to ensure regular maintenance of the plant equipment's & Operation department is required to ensure the maximum efficiency of operational equipment's as per SOPs.
4.	Basement-2	Process Area (Industrial)	Day	84.9	85.7	86.8	85.8	85	
5.	Basement-3	Process Area (Industrial)	Day	85.7	85.8	84.7	85.4	85	
6.	O & M Building	Residential Area	Day	53.6	52.6	53.7	53.3	55	
7.	Korean Accommodation	Residential Area	Day	53.2	51.9	52.9	52.6	55	
8.a	Alda Village Point 1 Day Time	Residential Area	Day	51.3	52.6	50.4	51.4	55	
8.b	Alda Village Point 1 Night Time	Residential Area	Night	44.8	44.6	44.1	44.5	45	
9.a	Alda Village Point 2 Day Time	Residential Area	Day	53.2	53.9	53.7	53.6	55	
9.b	Alda Village Point 2 Night Time	Residential Area	Night	42.3	42.9	43.4	42.8	45	

Note: 03 turbines are being operated at full capacity (125 MW)

Monitored By: Imran Yousaf

Signature: 



Monthly - Noise Survey Report

Date: 12th May, 2020

Sr. No	Location	Type	Time Day/Night	1 st Reading db (A)	2 nd Reading db (A)	3 rd Reading db (A)	Average Reading db (A)	NEQS db (A)	Remarks
1.	First Floor	Office Area (Commercial)	Day	62.5	64.1	63.5	63.3	65	
2.	Ground Floor	Office Area (Commercial)	Day	61.2	63.5	64.6	63.1	65	
3.	Basement-1	Process Area (Industrial)	Day	86.8	87.1	85.9	86.6	85	Staff working or visiting these areas must wear ear plugs. Unnecessary exposure must be avoided
4.	Basement-2	Process Area (Industrial)	Day	88.6	88.9	87.9	88.9	85	
5.	Basement-3	Process Area (Industrial)	Day	85.7	85.3	86.3	87.9	85	
6.	O & M Building	Residential Area	Day	54.6	53.4	54.1	53.1	55	
7.	Korean Accommodation	Residential Area	Day	53.8	51.4	54.6	53.2	55	
8.a	Alda Village Point 1 Day Time	Residential Area	Day	51.8	50.9	52.1	51.1	55	
8.b	Alda Village Point 1 Night Time	Residential Area	Night	43.6	44.3	44.9	44.8	45	
9.a	Alda Village Point 2 Day Time	Residential Area	Day	53.8	54.9	53.5	54.0	55	
9.b	Alda Village Point 2 Night Time	Residential Area	Night	44.1	43.6	43.8	43.8	45	

Note: 03 turbine are in operation at 69% efficiency and generating 104 MW

Monitored By: Imran Yousaf

Signature: 



Monthly - Noise Survey Report

Date: 15th June, 2020

Sr. No	Location	Type	Time Day/Night	1 st Reading db (A)	2 nd Reading db (A)	3 rd Reading db (A)	Average Reading db (A)	NEQ86 db (A)	Remarks
1.	First Floor	Office Area (Commercial)	Day	55.5	59.2	60.1	58.2	65	
2.	Ground Floor	Office Area (Commercial)	Day	56.5	57.6	57.3	57.1	65	
3.	Basement-1	Process Area (Industrial)	Day	80.6	82.6	81.0	81.4	85	
4.	Basement-2	Process Area (Industrial)	Day	84.6	83.9	84.2	84.2	85	
5.	Basement-3	Process Area (Industrial)	Day	82.9	84.1	83.7	83.5	85	
6.	O & M Building	Residential Area	Day	53.1	52.8	53.6	53.1	55	
7.	Korean Accommodation	Residential Area	Day	52.3	53.2	50.2	51.9	55	
8.a	Alda Village Point 1 Day Time	Residential Area	Day	50.2	51.6	50.2	50.6	55	
8.b	Alda Village Point 1 Night Time	Residential Area	Night	43.9	44.2	41.5	43.2	45	
9.a	Alda Village Point 2 Day Time	Residential Area	Day	52.8	53.2	53.9	53.3	55	
9.b	Alda Village Point 2 Night Time	Residential Area	Night	41.3	41.9	42.6	41.9	45	

Note: 03 Turbines are being operated at full capacity (150MW)

Monitored By: Imran Yousaf

Signature: 

Annex-07 Waste Transfer Note



M/s. QADRI ENTERPRISES
PEST CONTROL, WASTE MANAGEMENT & WATER TANK CLEANING SERVICES

Certificate of Waste Management Service

M/S QADRI ENTERPRISES

WASTE COLLECTED FROM PATRIND HYDROPOWER PROJECT WAS DISPOSED OFF AT SHADRA DISPOSAL SITE (GOVERNMENT APPROVED DISPOSAL SITE) AFTER SEGREGATION HAVING PARTICULAR LISTED BELOW:

MONTH OF MAY-2020

**WASTE MANAGEMENT SERVICE
PARTICULARS**

DATE	WASTE TYPE	WEIGHT	RECYCLE WASTE
04- MAY -20	NON HAZARDOUS WASTE	295 KG	27 KG
11- MAY- 20	NON HAZARDOUS WASTE	323 KG	
16- MAY- 20	NON HAZARDOUS WASTE	312 KG	
21- MAY- 20	NON HAZARDOUS WASTE	327 KG	
28- MAY- 20	NON HAZARDOUS WASTE	357 KG	



AUTHORIZED SIGN

STAMP

ISSUE DATE 1, JUN, 2020

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Main Bazar Chowk, Chatta
Bakhtawar Park Road,
Chak Shahzad Islamabad.

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0355-8113085, 0355-8117474,
0346-8182071

M/S QADRI ENTERPRISES

Waste Management Service

Dry, Food, Oily Rags & Recycle Waste According to Waste Tracking From

DRY TRASH		MONTH OF MAY-2020				
Date	4-May-20	11-May-20	18-May-20	21-May-20	28-May-20	TOTAL KG
KG	215	228	220	245	257	1165
FOOD WASTE						
KG	70	82	78	70	85	385
OILY RAGS						
KG	10	13	14	12	15	64
	295	323	312	327	357	1614

Description	DRY	FOOD	OILY RAG	TOTAL	RECYCLE
Total Kg	1165	385	64	1614	27



M/S QADRI ENTERPRISES

WASTE COLLECTED FROM PATRIND HYDROPOWER PROJECT WAS DISPOSED OFF AT SHADRA DISPOSAL SITE(GOVERNMENT APPROVED DISPOSAL SITE) AFTER SEGREGATION HAVING PARTICULAR LISTED BELOW:

MONTH OF APRIL-2020

WASTE MANAGEMENT SERVICE PARTICULARS

DATE	WASTE TYPE	WEIGHT	RECYCLE WASTE
02- APRIL -20	NON HAZARDOUS WASTE	268 KG	32 KG
09- APRIL -20	NON HAZARDOUS WASTE	326 KG	
16- APRIL -20	NON HAZARDOUS WASTE	368 KG	
23- APRIL -20	NON HAZARDOUS WASTE	359 KG	
29- APRIL -20	NON HAZARDOUS WASTE	365 KG	



AUTHORIZED SIGN

STAMP

ISSUE DATE 5, MAY, 2020

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0346-8182071

Waste Management Service

Dry, Food, Oily Rags & Recycle Waste According to Waste Tracking From

MONTH OF APRIL-2020						
DRY TRASH						
Date	2-Apr-20	9-Apr-20	16-Apr-20	23-Apr-20	29-Apr-20	TOTAL KG
KG	200	237	260	255	263	1215
FOOD WASTE						
KG	60	78	95	88	90	411
OILY RAGS						
KG	8	11	13	16	12	60
	268	326	368	359	365	1686

Description	DRY	FOOD	OILY REG	TOTAL	RECYCLE
Total Kg	1215	411	60	1686	32



Certificate of Waste Management Service

M/S QADRI ENTERPRISES

WASTE COLLECTED FROM PATRIND HYDROPOWER PROJECT WAS DISPOSED OFF AT SHADRA DISPOSAL SITE (GOVERNMENT APPROVED DISPOSAL SITE) AFTER SEGREGATION HAVING PARTICULAR LISTED BELOW:

MONTH OF JUNE-2020

WASTE MANAGEMENT SERVICE PARTICULARS

DATE	WASTE TYPE	WEIGHT	RECYCLE WASTE
03- JUNE -20	NON HAZARDOUS WASTE	294 KG	24 KG
10- JUNE- 20	NON HAZARDOUS WASTE	302 KG	
18- JUNE- 20	NON HAZARDOUS WASTE	317 KG	
24- JUNE- 20	NON HAZARDOUS WASTE	308 KG	
29- JUNE- 20	NON HAZARDOUS WASTE	329 KG	


AUTHORIZED SIGN

STAMP

ISSUE DATE 8, JULY, 2020

First Floor, Haji Saeed Plaza,
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0355-8113085, 0355-8117474,
0346-8182071

M/S QADRI ENTERPRISES

Waste Management Service

Dry, Food, Oily Rags & Recycle Waste According to Waste Tracking From

DRY TRASH		MONTH OF JUNE-2020				
Date	3-June-20	10-June-20	18-June-20	24-June-20	29-June-20	TOTAL KG
KG	210	220	239	228	235	1126
FOOD WASTE						
KG	75	70	69	70	80	364
OILY RAGS						
KG	9	12	15	10	14	60
	294	302	317	308	329	1550

Description	DRY	FOOD	OILY RAG	TOTAL	RECYCLE
Total Kg	1126	364	60	1550	24

Annex-08 Trainings Attendance Sheets

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Training Attendance Sheet

[illegible]

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Annex-09 COVID-19 Management and Prevention Plan

COVID-19

Management and Prevention Plan

(Version 02: June, 2020)

A: COVID-19

The World Health Organization (WHO) has declared a global health emergency and pandemic over the COVID-19. The virus reportedly originated in a seafood market in Wuhan, China. Person to person transmission has also been confirmed. Coronavirus tends to mutate, this makes it difficult to treat and to develop a vaccine against it.

How does it spread? When a person who is infected sneezes or coughs, mucus saliva and respiratory aerosols which contain the virus are sprayed into the surrounding environment. These can then be inhaled by another person, settle on their skin or surrounding surfaces and be transmitted by contact.

What are the Symptoms? The virus causes a flu like illness which develops into pneumonia and can lead to death, especially in older people and young children. Since it is a virus, antibiotics are not going to work against the infection. The COVID-19 symptoms are shown below in comparison to flu & allergies:

COVID-19	FLU	ALLERGIES
<ul style="list-style-type: none"> Fever Dry cough Difficulty breathing Fatigue <p>Less Common: Aches, runny or stuffy nose, sore throat or diarrhea</p> <p>Note: Some people with coronavirus might not develop any symptoms</p>	<ul style="list-style-type: none"> Sudden fever Cough Headache Muscle and joint pain Sore throat Runny or stuffy nose 	<ul style="list-style-type: none"> Sneezing Cough Red water or itchy eyes Runny or stuffy nose
Source: WHO, CDC, NIH		

Treatment: There is no specific treatment for the COVID-19. However, many of the symptoms can be treated based on the patient's clinical conditions. Supportive care for infected persons can also be highly effective.

B: Management and Prevention Strategy

Company management and prevention strategy is based on:

- Raising awareness among staff and surrounding communities
- Proactive symptoms monitoring among staff and visitors
- Improvement of personal and workplace hygiene
- Procurement and maintaining stock of necessary monitoring & protective items / apparatus
- Shift operation
- Continuous coordination with relevant government departments and surrounding communities

C: Roles and Responsibilities

- All staff are responsible to follow instructions mentioned in this plan.
- Support Services department is responsible to procure the resources required for implementation of this plan.
- Support Services department is responsible to facilitate staff with regard to protocols mentioned in **Sections D-4 and D-5**.
- HSE department is responsible to provide awareness to staff & surrounding communities; and provide advisory to Management for implementation of this plan.

D: Management and Prevention Actions

D-1: Prevention Guide for Staff

Following health tips and instructions are being shared regularly with all staff:

- Clean hands with soap and water for at least 20 seconds or use alcohol-based hand rub.
- Cover nose and mouth when coughing and sneezing with tissue or flexed elbow.
- Use / wear mask. (Please refer below at the end of this section for WHO advice on usage of masks)
- Avoid close contact with anyone with cold or flu-like symptoms.
- Avoid handshake.
- Thoroughly cook meat and eggs.
- Avoid unprotected contact with live wild or farm animals.
- Maintain a healthy lifestyle.
- Rest and avoid overexertion.
- Drink enough water.
- Try to keep a minimum distance of 6 feet from other colleagues / people (in meetings, trainings, mosques, dining hall, and public places etc.)

- Avoid smoking and smoky areas.
- Avoid close contact with anyone who has returned from an affected area (where there are significant number of positive cases reported or which has been declared affected area by government).
- Avoid travelling to the area which is affected by the COVID-19.
(Any of the staff member coming from affected area will have to go through the steps mentioned below in **Section D-6.**)
- If any staff member suffering from any or some or all symptoms of the COVID-19, he must report to his departmental Head or Head HSE. Such staff member is encouraged to avail sick leaves.

WHO Advice on When and How to Use Mask:

- You only need to wear a mask if you are taking care of a person with COVID-19.
 - Wear a mask if you are coughing or sneezing.
 - Masks are effective only when used in combination with frequent hand-cleaning with alcohol-based hand rub or soap and water.
 - If you wear a mask, then you must know how to use it and dispose of it properly.
 - Before putting on a mask, clean hands with alcohol-based hand rub or soap and water.
 - Cover mouth and nose with mask and make sure there are no gaps between your face and the mask.
 - Avoid touching the mask while using it; if you do, clean your hands with alcohol-based hand rub or soap and water.
 - Replace the mask with a new one as soon as it is damp and do not re-use single-used masks.
 - To remove the mask: remove it from behind (do not touch the front of mask); discard immediately in a closed bin; clean hands with alcohol-based hand rub or soap and water.
- Please see **Annexure-1** for details.

D-2: Protection and Prevention Measures for Staff

- Company management has issued written memorandum to share important instructions with staff. Please refer to the **Annexure-2** for CEO approved memorandum.
- HSE department has shared written informatory materials with all staff in both English and Urdu languages (Emails, notice boards and hard copies).
- HSE department visited / met with all staff individually to raises their awareness level.
- HSE department has conducted several sessions for staff awareness. Refresher sessions will be conducted periodically.
- HSE department is regularly updating all staff about Covid-19 situation in the country and AJK.

- Support Service department is ensuring to maintain the social distance of 6 feet as much as possible between employees during working hours such as in meetings, trainings, mosques and dining hall etc.
- Support Services department have removed carpets from all the mosques in company premises.
- HSE and Support Services departments are maintaining sufficient stock of surgical and N-95 masks.
- Support Services department has procured four (04) state of art apparatus for staff body temperature monitoring.
- HSE and Support Services departments have initiated staff body temperature and symptoms monitoring program. Body temperature and symptoms of staff are being monitored on daily basis. Please refer to the **Annexure-3** for sample of temperature and symptoms monitoring sheet. If any staff member is showing continuously temperature above the threshold & symptoms, in that case steps mentioned below in **Section D-4** will be followed.
- Support Services department has installed sanitizers units at key locations in the company premises.
- Support Services department have procured two (02) spray pumps for improving work place and surrounding areas hygiene.
- Support Services department is ensuring regular disinfection of floors, surfaces etc. in company premises. Department is ensuring that janitorial staff performing these jobs are using / wearing all necessary personal protective equipment's (PPEs).
- Support Service department is conducting periodic fumigation for improving work place and surrounding areas hygiene.
- Support Services department are ensuring that all entrance doors are being kept open during working hours.
- Covid-19 disinfectant walk-through gates have been installed at both sites.
- HSE and Support Services departments are also conducting symptoms monitoring of visitors. Temperature monitoring gun and data recording sheet are provided at main-gate for this purpose).
- Company is proactively monitoring the situation closely and continuously in surrounding communities and Muzaffarabad. For this purpose, company CLOs and HSE department are closely coordinating with government designated hospitals, local press / media people and local community members. "Novel Coronavirus-AJ&K Official Portal" is also being regularly visited for this purpose. Covid-19 updates (Statistics and dashboard) in AJ&K are being shared with all staff on daily basis.
- Company CEO has given approval for installation of Covid-19 related safety awareness signages within company premises.

- Company CEO has approved the gate pass concept to restrict and control in & out movement.

D-3: Protection and Prevention Measures in Surrounding Communities

- Company community liaison officers (CLOs) has pasted informatory materials in Urdu language at company public notice boards and key locations in the surrounding communities. Awareness materials have also been distributed among surrounding communities.
- Company CLOs has initiated awareness sessions among the surrounding communities. A total of four (04) sessions were conducted. One (01) at Alra, one (01) at Lower Chatter, one (01) at weir upstream and one (01) at weir downstream. However, for staff health protection and safety, these sessions have been discontinued.
- Company CLOs are proactively monitoring the situation closely and continuously in surrounding communities. For this purpose, company CLOs and are closely coordinating with government designated hospitals, local press / media people and local community members. “Novel Coronavirus-AJ&K Official Portal” is also being regularly visited for this purpose. Covid-19 updates (Statistics and dashboard) in AJK are being shared with all staff on daily basis.

D-4: Protocols (if suspected case (s) identified among staff)

If any suspected case (s) identified, following actions will be taken:

- Immediate report to his departmental Head or Head HSE
- Immediate isolation of case (s)
- Case (s) leaving in company accommodation to be isolated in their individual allotted room (s) and case (s) leaving outside company accommodation should isolate themselves in separate room (s) at his / their home (s)
- Services of ambulance (s) will be hired to take case (s) from company premises to government designated hospital. Staff will not interact directly with such case (s).
- Detailed check-up at nearby government designated hospital.
- Case (s) to avail sick leaves or work from home until confirmation of negative (The staff is entitled to additional sick leave if it exceeds 12 days.).
- Resumption of duty if found negative without any symptoms
- Follow **D-5 Protocols** if found positive from nearby government designated hospital.

D-5: Protocols (if positive case (s) identified among staff)

If any positive case (s) identified, following actions will be taken:

- Immediate isolation of case (s) from company premises

- Company should inform the local health authorities of positive case (s) and follow instructions of health authorities.
- Case (s) leaving in company accommodation to be isolated in their individual allotted room (s) and case (s) leaving outside company accommodation should isolate themselves in separate room (s) at his / their home (s) **or** both type of cases will be sent to nearby government designated hospitals / private health hospitals having isolation, testing and treatment facilities.
- Services of ambulance (s) will be hired to take case (s) from company premises to government designated hospital. Staff will not interact directly with such case (s).
- Procedures / process mentioned in Section 3 of “Contingency Plan for COVID-19” will be followed. Please refer below for Section 3 of “Contingency Plan for COVID-19”.
- Temporary prevention of case (s) from entry on company premises.
- Case (s) to avail sick leaves until complete recovery (The staff is entitled to additional sick leave if it exceeds 12 days).
- Resumption of duty after complete recovery with supporting health fitness certificate

Notes:

- (1) Staff expenses, incurred in above protocols (**D-4 & D-5**), will be reimbursed by the company. Company will provide maximum facilitation to staff, where required.
- (2) There will be no isolation / quarantine facility on site to avoid health risks associated with management of such facility. Isolation on site mentioned in above sections will only be temporary until ambulance (s) arrive at site. Room (s) used by suspected / positive case (s) will be prohibited for use until cleaning as per standard protocol in consultation with qualified medical doctor.

Section 3 of Contingency Plan for COVID-19:

In case when the outbreak of COVID-19 encompassed the complex by infecting the Operator including security personnel, subsequently it would be deemed as Force Majeure event. The Operator shall request Owner for issuing notification of Force Majeure to power purchaser for further stopping of generation. The procedure shall be followed, as mentioned below:

1. First of all, the Operator shall approach local health authority for the screening of the entire relevant staff.
2. Pursuance to O&M Agreement 8.2 within 30 hours, the Operator shall notify the Owner about Force Majeure event, i.e. epidemic COVID-19 and shall request for stopping generation from the complex as well.
3. The entire staff shall get a medical check-up from the local health authority.
4. Owing to the outbreak of COVID-19, the concurrence of the Owner will be required for the complete shutdown of the complex.

5. As per stipulation regarding COVID-19, the complex will remain complete shutdown state for the period of at least 14 days.
6. After a complete shutdown with Owner's permission, the entire staff should be self-quarantined or go to the hospital as per the instructions of health authorities.
7. Side by side, the complex will be put on sterilization for 2 days or more.
8. After completing the stipulated period of quarantine, the healthy staff will join back for the restoration of the generation with the permission of health authorities.
9. During the quarantine period, if the need arises for some repair/maintenance, the Operator after getting permission from health authority will attend/check it.

D-6: Protocols for Visitors Coming from Affected Areas

- They must follow the government procedures such as screening etc. when entry to Pakistan. (In case coming from outside Pakistan)
- Additionally, they must keep themselves in quarantine for 14 days before entry to site. (In case coming from outside Pakistan).
- They must get permission from Company before entering company premises.
- If such person (s) coming within an area which is located inside the country and has travel history to affected area from home; he must go through all necessary medical tests to rule out the possibility of the viral infection. He or they must share test reports in advance with site management.
- When entering company premises such persons and persons accompanying them must not have any or some of the symptoms of the COVID-19 (Fever, dry cough, difficulty in breathing and fatigue etc.).

D-7: Shift Operation

- To reduce the staff numbers and ensure social distancing, staff has been divided into shifts to work safely.
- Staff has been divided into two (02) shifts namely Shift A and Shift B. Please refer to the **Annexure-4** for details.
- Shift rotation is every two (02) weeks. Each shift carries out work for consecutive 14 days on site and other shift works at home for 14 days and vice versa.
- Self-monitor sheet has been developed for the shift working at home to record their daily body temperatures and symptoms. Please refer to the **Annexure-5** for the sheet. They must share their sheets in advance with site management before entry into site.
- Please refer to the **Annexure-6** for some of the memos being issued in this regard each month.
- Control room operators have also been divided into shifts and their shift rotation is also every two (02) weeks.

E: Government Designated Hospitals

- Government of Pakistan has designated various hospitals in different parts of the country. Details of these are given in the **Annexure-7**.

- In Muzaffarabad, designated hospitals are Abbas institute of medical sciences (AIMS) and Sheikh Khalifa Bin Zaid (SKBZ) / Combined Military Hospital (CMH).
- These hospitals were visited by HSE department and consultations were made with doctors. HSE department will be periodically visiting these hospitals.
- Isolation units have been set up in these hospitals.

F: Guidelines for Kitchen Staff

Kitchen staff should ensure that food served to workers is safe. Kitchen staff should:

- Strictly not report to work if they have symptoms such as fever, cough, shortness of breath, or have been in close contact with a confirmed COVID-19 patient.
- Be trained in common food safety practices including changing clothes and washing hands each time before entering the kitchen area. Kitchen clothes should not be used outside the kitchen.
- Not be involved in any cleaning or disinfection activities outside the food preparation and dining areas.
- Are required to wash hands regularly.
- Prevent cross contamination caused by people sharing the same serving spoons. This can be achieved by avoiding buffet-style food presentation. Instead serve food as much as possible by the kitchen staff or present food on individual serving plates.

G: Guidelines for Staff Accommodation

- Prevent infected persons from entering workers' accommodation area.
- Handwashing soap should be made available for the workers in all bathrooms. Everyone should follow a strict cleaning and housekeeping routine daily.
- Doorknobs, faucets, TV sets / media equipment, kitchen equipment, controls, buttons, and any other object in common areas that are regularly touched must be cleaned several times per day.
- Common surfaces, including ones in vehicles transporting workers from their accommodations to the workplace, counters, floors, and walls, should be treated as potentially contaminated and be cleaned regularly.
- Clean / replace AC filters at least monthly.
- Put / install sanitizers at main entrance.

H: Compliance Monitoring of the Plan

- HSE department will monitor the implementation status of actions / measures mentioned in this plan.
- HSE department will update CEO regularly on plan implementation status.

➤ HSE department will advise top management if any changes are required in the plan as per on ground situation.

I: Key Notes

- This plan will also be applicable to all company contractors, subcontractors & suppliers.
- Company will not terminate / dismiss any contractors, subcontractors & suppliers during the pandemic outbreak. Company will be taking all the services from contractors and suppliers according to requirements and will also comply with the contractual obligations.
- Furnished accommodation, food and other necessary welfare services / facilities have been arranged on site for shift staff on duty.

K: Information Helpline

Government Helpline: 1166

Annexure-1: Advice on the use of masks in context of COVID-19

Advice on the use of masks in the context of COVID-19

Interim guidance

6 April 2020



Background

This document provides advice on the use of masks in communities, during home care, and in health care settings in areas that have reported cases of COVID-19. It is intended for individuals in the community, public health and infection prevention and control (IPC) professionals, health care managers, health care workers (HCWs), and community health workers. It will be revised as more data become available.

Current information suggests that the two main routes of transmission of the COVID-19 virus are respiratory droplets and contact. Respiratory droplets are generated when an infected person coughs or sneezes. Any person who is in close contact (within 1 m) with someone who has respiratory symptoms (coughing, sneezing) is at risk of being exposed to potentially infective respiratory droplets. Droplets may also land on surfaces where the virus could remain viable; thus, the immediate environment of an infected individual can serve as a source of transmission (contact transmission).¹

WHO has recently summarized reports of transmission of the COVID-19 virus and provided a brief overview of current evidence on transmission from symptomatic, pre-symptomatic, and asymptomatic² people infected with COVID-19 (full details are provided in WHO COVID-19 Situation report 73).²

Current evidence suggests that most disease is transmitted by symptomatic laboratory confirmed cases. The incubation period for COVID-19, which is the time between exposure to the virus and symptom onset, is on average 5–6 days, but can be as long as 14 days. During this period, also known as the “pre-symptomatic” period, some infected persons can be contagious and therefore transmit the virus to others.^{3–5} In a small number of reports, pre-symptomatic transmission has been documented through contact tracing efforts and enhanced investigation of clusters of confirmed cases.^{3–8} This is supported by data suggesting that some people can test positive for COVID-19 from 1–3 days before they develop symptoms.^{9,10}

Thus, it is possible that people infected with COVID-19 could transmit the virus before symptoms develop. It is important to recognize that pre-symptomatic transmission still requires the virus to be spread via infectious droplets or through

touching contaminated surfaces. WHO regularly monitors all emerging evidence about this critical topic and will provide updates as more information becomes available.

In this document medical masks are defined as surgical or procedure masks that are flat or pleated (some are shaped like cups); they are affixed to the head with straps. They are tested according to a set of standardized test methods (ASTM F2100, EN 14683, or equivalent) that aim to balance high filtration, adequate breathability and optionally, fluid penetration resistance. This document does not focus on respirators; for guidance on use of respirators see IPC guidance during health care when COVID-19 infection is suspected.¹¹

Wearing a medical mask is one of the prevention measures that can limit the spread of certain respiratory viral diseases, including COVID-19. **However, the use of a mask alone is insufficient to provide an adequate level of protection, and other measures should also be adopted.** Whether or not masks are used, maximum compliance with hand hygiene and other IPC measures is critical to prevent human-to-human transmission of COVID-19. WHO has developed guidance on IPC strategies for home care¹² and health care settings¹¹ for use when COVID-19 is suspected.

Community settings

Studies of influenza, influenza-like illness, and human coronaviruses provide evidence that the use of a medical mask can prevent the spread of infectious droplets from an infected person to someone else and potential contamination of the environment by these droplets.¹³ There is limited evidence that wearing a medical mask by healthy individuals in the households or among contacts of a sick patient, or among attendees of mass gatherings may be beneficial as a preventive measure.^{14–23} However, there is currently no evidence that wearing a mask (whether medical or other types) by healthy persons in the wider community setting, including universal community masking, can prevent them from infection with respiratory viruses, including COVID-19.

Medical masks should be reserved for health care workers. The use of medical masks in the community may create a false sense of security, with neglect of other essential measures, such as hand hygiene practices and physical distancing, and may lead to touching the face under the masks and under the eyes, result in unnecessary costs, and take

² An asymptomatic laboratory-confirmed case is a person infected with COVID-19 who does not develop symptoms. Asymptomatic transmission refers to transmission of the virus from a person, who does not develop

symptoms. The true extent of asymptomatic infections will be determined from serologic studies.

masks away from those in health care who need them most, especially when masks are in short supply.

Persons with symptoms should:

- wear a medical mask, self-isolate, and seek medical advice as soon as they start to feel unwell. Symptoms can include fever, fatigue, cough, sore throat, and difficulty breathing. It is important to note that early symptoms for some people infected with COVID-19 may be very mild;
- follow instructions on how to put on, take off, and dispose of medical masks;
- follow all additional preventive measures, in particular, hand hygiene and maintaining physical distance from other persons.

All persons should:

- avoid groups of people and enclosed, crowded spaces;
- maintain physical distance of at least 1 m from other persons, in particular from those with respiratory symptoms (e.g., coughing, sneezing);
- perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- cover their nose and mouth with a bent elbow or paper tissue when coughing or sneezing, dispose of the tissue immediately after use, and perform hand hygiene;
- refrain from touching their mouth, nose, and eyes.

In some countries masks are worn in accordance with local customs or in accordance with advice by national authorities in the context of COVID-19. In these situations, best practices should be followed about how to wear, remove, and dispose of them, and for hand hygiene after removal.

Advice to decision makers on the use of masks for healthy people in community settings

As described above, the wide use of masks by healthy people in the community setting is not supported by current evidence and carries uncertainties and critical risks. WHO offers the following advice to decision makers so they apply a risk-based approach.

Decisions makers should consider the following:

1. **Purpose of mask use:** the rationale and reason for mask use should be clear—whether it is to be used for source control (used by infected persons) or prevention of COVID-19 (used by healthy persons)
2. **Risk of exposure** to the COVID-19 virus in the local context:
 - The population: current epidemiology about how widely the virus is circulating (e.g., clusters of cases versus community transmission), as well as local surveillance and testing capacity (e.g., contact tracing and follow up, ability to carry out testing).
 - The individual: working in close contact with public (e.g., community health worker, cashier)
3. **Vulnerability** of the person/population to develop severe disease or be at higher risk of death, e.g. people with comorbidities, such as cardiovascular disease or diabetes mellitus, and older people

4. **Setting** in which the population lives in terms of population density, the ability to carry out physical distancing (e.g. on a crowded bus), and risk of rapid spread (e.g. closed settings, slums, camps/camp-like settings).
5. **Feasibility:** availability and costs of the mask, and tolerability by individuals
6. **Type of mask:** medical mask versus nonmedical mask (see below)

In addition to these factors, potential advantages of the use of mask by healthy people in the community setting include reducing potential exposure risk from infected person during the “pre-symptomatic” period and stigmatization of individuals wearing mask for source control.

However, the following potential risks should be carefully taken into account in any decision-making process:

- self-contamination that can occur by touching and reusing contaminated mask
- depending on type of mask used, potential breathing difficulties
- false sense of security, leading to potentially less adherence to other preventive measures such as physical distancing and hand hygiene
- diversion of mask supplies and consequent shortage of mask for health care workers
- diversion of resources from effective public health measures, such as hand hygiene

Whatever approach is taken, it is important to develop a strong communication strategy to explain to the population the circumstances, criteria, and reasons for decisions. The population should receive clear instructions on what masks to wear, when and how (see mask management section), and on the importance of continuing to strictly follow all other IPC measures (e.g., hand hygiene, physical distancing, and others).

Type of Mask

WHO stresses that it is critical that medical masks and respirators be prioritized for health care workers.

The use of masks made of other materials (e.g., cotton fabric), also known as nonmedical masks, in the community setting has not been well evaluated. There is no current evidence to make a recommendation for or against their use in this setting.

WHO is collaborating with research and development partners to better understand the effectiveness and efficiency of nonmedical masks. WHO is also strongly encouraging countries that issue recommendations for the use of masks in healthy people in the community to conduct research on this critical topic. WHO will update its guidance when new evidence becomes available.

In the interim, decision makers may be moving ahead with advising the use of nonmedical masks. Where this is the case, the following features related to nonmedical masks should be taken into consideration:

- Numbers of layers of fabric/tissue
- Breathability of material used
- Water repellence/hydrophobic qualities
- Shape of mask
- Fit of mask

Home care

For COVID-19 patients with mild illness, hospitalization may not be required. All patients cared for outside hospital (i.e. at home or non-traditional settings) should be instructed to follow local/regional public health protocols for home isolation and return to designated COVID-19 hospital if they develop any worsening of illness.⁷

Home care may also be considered when inpatient care is unavailable or unsafe (e.g. capacity is limited, and resources are unable to meet the demand for health care services). Specific IPC guidance for home care should be followed.³

Persons with suspected COVID-19 or mild symptoms should:

- Self-isolate if isolation in a medical facility is not indicated or not possible
- Perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- Keep a distance of at least 1 m from other people;
- Wear a medical mask as much as possible; the mask should be changed at least once daily. Persons who cannot tolerate a medical mask should rigorously apply respiratory hygiene (i.e. cover mouth and nose with a disposable paper tissue when coughing or sneezing and dispose of it immediately after use or use a bent elbow procedure and then perform hand hygiene.)
- Avoid contaminating surfaces with saliva, phlegm, or respiratory secretions.
- Improve airflow and ventilation in their living space by opening windows and doors as much as possible.

Caregivers or those sharing living space with persons suspected of COVID-19 or with mild symptoms should:

- Perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- Keep a distance of at least 1 meter from the affected person when possible;
- Wear a medical mask when in the same room as the affected person;
- Dispose of any material contaminated with respiratory secretions (disposable tissues) immediately after use and then perform hand hygiene.
- Improve airflow and ventilation in the living space by opening windows as much as possible.

Health care settings

WHO provides guidance for the use of PPE, including masks, by health care workers in the guidance document: Rational use of PPE in the context of COVID-19.²⁴ Here we provide advice for people visiting a health care setting:

Symptomatic people visiting a health care setting should:

- Wear a medical mask while waiting in triage or other areas and during transportation within the facility;
- Not wear a medical mask when isolated in a single room, but cover their mouth and nose when coughing or sneezing with disposable paper tissues. Tissues must be disposed of appropriately, and hand hygiene should be performed immediately afterwards.

Health care workers should:

- Wear a medical mask when entering a room where patients with suspected or confirmed COVID-19 are admitted.
- Use a particulate respirator at least as protective as a US National Institute for Occupational Safety and Health-certified N95, European Union standard FFP2, or equivalent, when performing or working in settings where aerosol-generating procedures, such as tracheal intubation, non-invasive ventilation, tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, and bronchoscopy are performed.
- Full infection prevention and control guidance for health care workers is provided [here](#).

One study that evaluated the use of cloth masks in a health care facility found that health care workers using cotton cloth masks were at increased risk of infection compared with those who wore medical masks.²⁵ Therefore, cotton cloth masks are not considered appropriate for health care workers. As for other PPE items, if production of cloth masks for use in health care settings is proposed locally in situations of shortage or stock out, a local authority should assess the proposed PPE according to specific minimum standards and technical specifications.

Mask management

For any type of mask, appropriate use and disposal are essential to ensure that they are effective and to avoid any increase in transmission.

The following information on the correct use of masks is derived from practices in health care settings

- Place the mask carefully, ensuring it covers the mouth and nose, and tie it securely to minimize any gaps between the face and the mask.
- Avoid touching the mask while wearing it.
- Remove the mask using the appropriate technique: do not touch the front of the mask but untie it from behind.
- After removal or whenever a used mask is inadvertently touched, clean hands using an alcohol-based hand rub or soap and water if hands are visibly dirty.
- Replace masks as soon as they become damp with a new clean, dry mask.
- Do not re-use single-use masks.
- Discard single-use masks after each use and dispose of them immediately upon removal.

WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

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WHO reference number: [WHO/2019-nCoV/IPC_Masks/2020.3](#)

Annexure-2: CEO Approved Memorandum



Memorandum (MRef#HSE012 / 2020)

Subject: Important Note: Coronavirus Disease Breakout

To: All Employees / Staff

All staff are instructed to report their Departmental Head or Senior Manager HSE & CSR if they feel / suffer from any or some of the symptoms (Sneezing, running nose, fatigue, cough, fever and sore throat) of coronavirus disease. Based on the condition, if required, Management may decide about isolation / work at home about staff member suffering from the coronavirus disease symptoms.


In this regards, HSE department has already shared health newsletters both in English and Urdu through email. These are also pasted on company notice boards. Please read these carefully and follow the instructions mentioned in these health newsletters. HSE department will also conduct sessions for all staff awareness.

Date: February 27, 2020



Chief Executive Officer

Annexure-3: Temperature Monitoring Sheet

 Temperature Monitoring Data Sheet				
Normal Temperature: (36.1°C -- 37.2°C) (97°F -- 99°F)				Date: _____
S.N	Name	Tempertaure (F)	Symptoms (Fever, Dry Cough, Suffocation, Fatigue etc.)	Note / Comment (if any)
Chief Executive Officer				
1				
SUPPORT SERVICE TEAM				
2				
3				
4				
5				
HSE TEAM				
6				
7				
8				
9				
OPERATION TEAM				
10				
11				
12				
13				
14				
MAINTENANCE TEAM				
15				
16				
17				
18				
19				

Annexure-4: Shift Plan

☐ Shift working plan

⊙ Staff

Sort		A Shift		Remarks	B Shift		Remarks
		Name	Designation		Name	Designation	
Maintenance Team	Mech	Aaqib Khan	Sub Engineer		Safdar Yasin	2nd Engineer	
		Atif Bashir	Forman		Ghulam Mustafa	Technician	
		Saeed Ahmed Mughal	Sub Technician		Muhammad Javadi Abbasi	Sub Technician	
		Muhammad Ajmal Khan	Crane Operator				
	Elec	Syed Haider Ali Hashmi	3rd Engineer	o	Syed Haider Ali Hashmi	3rd Engineer	o
		Ishaq Ahmed	2nd Engineer		Waqas Khan	3rd Engineer	
		Abdul Wajid	Technician		Muhammad Ashfaq	Foreman	
		Aqeel Ur rehman	Sub Technician		Naeem Ahmed Qureshi	Sub Technician	
	C&I	Ammar Ikram	Sub Engineer		Tanveer But	Sub Technician	
		Syed Rizwan Kazmi	Technician		S.M Zaheer U Din	3rd Engineer	
	Civil	Sadaqat Bashir	Sub Engineer		Sohail Ahmed Qureshi	Sub Technician	
		Ahmed Sham as	Officer		Ammir Mehmood	Sub Engineer	
Support Service Team	Admin	Salarkhan Jadoon	2nd Engineer	o	Azmat Husain Shah	Senior Officer	
		Sh Iftikhar Rauf	Sr. Manager		Salarkhan Jadoon	2nd Engineer	o
	Finance	Itiaz Khan Usmani	Officer		Ramiz Ahmed Hashmi	Senior Officer	
		Syed Muhammad Zeeshan	Manager Jr		Adeel Manzoor	Senior Officer	
	Procure	Babar Hussain	Officer				
		Javadi Iqbal Qureshi	Driver		Muhammad Afan	Senior Officer	
	Driver	Nazar Hussain Shah Kazmi	Driver		Raja Shoab Khan	Driver	
		Ram eez Ahmed	Cleaner		Muhammad Mohsin Abbasi	Driver	
	Cleaner				Raja Zohaib	Cleaner	
					Tabarak Ali	Cleaner + Cook_support	
	Cook	Uaqat Abbasi	Cook Head		Uaqat Abbasi	Cook Head	
		Local Mess	Cook_Helper		Local Mess	Cook_Helper	
Operation Team	Group 1	Tanveer Ahmed	Cook_Local				
		Local Mess	Cook_support		Local Mess	Cook_support	
	Group 2	Imran Yousof	Sr. Officer		Syed Qamar Ali Shah	Sr. Manger	
		Majid Abbasi	CLO		Sundas Maqsood Tareen	HSE Sr. Officer	
	Group 3	Yasir Malik	Charge		Yasir Malik	Charge	
		Ahsan Qureshi	Control		Ahsan Qureshi	Control	
	Group 4 (Back Up)	Muhammad Anwar	Operator		Muhammad Anwar	Operator	
		Arshad Haroon	Operator		Arshad Haroon	Operator	
	Group 5	Yasir Ahmed Awan	Charge		Yasir Ahmed Awan	Charge	
		Nokhaiz javed	Charge		Nokhaiz javed	Charge	
	Group 6	Mudassir	Control		Mudassir	Control	
		Muhammad Fiaz	Operator		Muhammad Fiaz	Operator	
Labour	Mech	Amir Latif Khan	Charge		Amir Latif Khan	Charge	
		Addil Yusaf	Charge		Addil Yusaf	Charge	
	Elec	Raja Tahir	Control		Raja Tahir	Control	
		Shehryar Jadoon	Control		Shehryar Jadoon	Control	
	Civil	Shameem Walayat	Charge		Shameem Walayat		
		Umair Kiani	Control		Umair Kiani		
	Group 7	Sikandar Ali	Operator		Sikandar Ali		
		Sarfraz Ahmad	Operator		Sarfraz Ahmad		
	Group 8	Habib Ur Rehman	1st Engineer		Ahsin Mumtaz Gilani	3rd Engineer	
		Muhammad Usman	Sub Engineer				
	Group 9						

* Shift rotation is every two (2) weeks.

* Uaqat will be stay at Korean building to manage.

* CCR operator shift rotation is every month.

⊙ Labour

Sort		A Shift		Weir Site	B Shift		Weir Site
		Name	Designation		Name	Designation	
Maintenance Team	Mech	Usman Murtaza			Arsalan Qadeer		
	Elec	Naveed Abbasi		o	Naveed Abbasi		o
		Sadaqat Ali			Qasim Nazir		
	Civil	Nawaz Naqvi			Moin Kazmi		
		Jameel Abbasi			Touseef Abbasi		
					Moin Qureshi		
		Ali Abdullah		o	Ali Abdullah		o
		Umer Qureshi		o	Umer Qureshi		o

* Shift rotation is every two (2) weeks.

* Weir site staff will do their activity as same as normal condition.

Annexure-5: Shift Operation Memos

Memorandum (HR-20-04)



Subject: Implementation of Contingency Plan

To: All Staff

As you are well aware of that, the Corona virus is spread rapidly around the world. In this regard, the safety/protection parameters /memorandum already shared with you through HSE department.

However, to prevent the spread of Corona virus among the staff, the employees have been divided into two shifts i.e. shifts A and shifts B. (Annex-A)

The Shift A will carry out work at Powerhouse for consecutive 14 days inclusive accommodation at Pakistan O&M accommodation (Annex-B) with effect from the following schedule and shift B will work at home. (Vice Versa)

Shift A = April 08, 2020 to April 21, 2020

Shift B = April 22, 2020 to May 05, 2020

Therefore, you are requested to please ensure the above stated schedule and also follow the standards of the safety parameters in order to protect the complex from COVID-19 infection.



Date: April 07, 2020

Chief Executive Officer (CEO)

Page 1 of 1

Memorandum (HR-20-07)



Subject: Implementation of Contingency Plan for the Month of May & June 2020

To: All Staff

In compliance with the 1st month contingency plan the Shift A will carry out work at Powerhouse for consecutive 14 days inclusive accommodation at Pakistan O&M accommodation with effect from the following schedule and shift B will work at home and after that, the opposite will happen. (Annex-A & Annex B)

Shift A = May 06, 2020 to May 19, 2020

Shift B = May 20, 2020 to June 02, 2020

Therefore, you are requested again to please ensure the above stated schedule and also follow the standards of the safety parameters in order to protect the complex from COVID-19 infection



Date: April 30, 2020

Chief Executive Officer (CEO)

Note: During Eid Holidays all employees will stay at accommodation until/unless any emergency work permission granted by the Head of the department (except of shift operators). No overtime shall be paid while staying at the accommodation.

Page 1 of 1

Memorandum (HR-20-08)



Subject: Implementation of Contingency Plan for the Month of June 2020

To: All Staff

In compliance with the 2nd month contingency plan the Shift A will carry out work at Powerhouse for consecutive 14 days inclusive accommodation at Pakistan O&M accommodation with effect from the following schedule and shift B will work at home and after that, the opposite will happen. (Annex-A & Annex B)

Shift A = June 03, 2020 to June 16, 2020

Shift B = June 17, 2020 to June 30, 2020

Therefore, you are requested again to please ensure the above stated schedule and also follow the standards of the safety parameters in order to protect the complex from COVID-19 infection



Date: June 01, 2020

Chief Executive Officer (CEO)

Note: During every holidays employees will stay at accommodation until/unless any emergency work permission granted by the Head of the department (except of shift operators). No overtime shall be paid while staying at the accommodation.

Annexure-6: Self-Monitoring Sheet



COVID-19 DAILY SELF-MONITORING SHEET



Name	
Department	
Designation	
Place of Lodging /City:	

Date each day, check your temperature and then check any of the symptoms.

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Date														
Temperature (Specify: C)														
Fever, Cough														
Runny Nose, Sore Throat														
Vomiting/ Diarrhea, Breathing Issue														
Other, Specify														
No Symptoms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: If any employee/worker feel any of the above-mentioned symptoms continuously for (05) to (07) Days. He must seek medical attention from COVID-19 designated hospital by the government.

Annexure-7: Designated Hospitals / Isolation Ward for COVID-19



Designated Hospitals / Isolation Ward for COVID-19

Sr.#	Province / Region	Name of Hospital
1.	ICT	Pakistan Institute of Medical Sciences (PIMS)
2.	Punjab	Benazir Bhutto Hospital, Rawalpindi
3.		Services Hospital Lahore
4.		Nishtar Hospital Multan
5.		Allama Iqbal Memorial Hospital Sialkot
6.		Allied Teaching Hospital, Faisalabad
7.		Sheikh Zayed Hospital, Rahim Yar Khan
8.	Sindh	Civil Hospital, Karachi
9.		Jinnah Postgraduate Medical Centre (JPMC), Karachi
10.		Dow Hospital, Ojha Campus, Karachi
11.		LUMS Hospital, Hyderabad
12.	Baluchistan	Fatima Jinnah General and Chest Hospital, Quetta
13.		Sheikh Zayed Hospital, Quetta
14.		Prince Fahad/ DHQ Hospital, Dalbandin, Chaghi
15.		Jam Mir Ghulam Qadir Hospital Hub Lasbela
16.		DHQ Hospital, Uthal, Lasbela
17.		DHQ Hospital Gawadar
18.		Red Crecent Hospital, Gawadar
19.		GDA Hospital, Gawadar
20.		GDA Hospital, Gwadar
21.		DHQ Teaching Hospital, Turbat
22.	KP	Police Services Hospital, Peshawar
23.		Khyber Teaching Hospital, Peshawar
24.		Hayatabad Medical Complex, Peshawar
25.		Lady Reading Hospital, Peshawar
26.		Bacha Khan Medical Complex, Swabi
27.		Saidu Shareef Hospital, Swat
28.		Ayub Teaching Hospital, Abbottabad
29.	GB	Civil Hospital, Hunza
30.		DHQ Hospital, Gilgit
31.		DHQ Hospital, Chilas
32.		DHQ Hospital, Skardu
33.	AJK	Abbas Institute of Medical Sciences, Muzaffarabad
34.		DHQ Hospital Mirpur, AJK
35.		Shiekh Khalifa Bin Zaid (SKBZ) Hospital, Rawalakot

Annex-10 Fish Breeding Ground Report

Project Completion Report
Construction of Artificial Fish Breeding Ground
Patrind Hydro Power Project 150 -MW



By

Muhammad Yousaf Qureshi

Director Retired Wildlife & Fisheries Department

Government of Azad Jammu & Kashmir

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1. Background

The construction of hydro projects, such as dams, along with other anthropogenic changes to river systems has resulted in the rapid decline in the abundance of all fish species. Indeed, the effect of dams on the reproduction of the fish species has become a highly sensitive issue in Pakistan. Three additional dams are currently under construction upstream of the Patrind Hydro Power Project. While it is clear that these dams will further alter the hydrological regime in the river, there is currently little information available for the management and protection of fishes in the river Kunhar.

There had been a fish catch pressure on the river resource by the local and visiting fishermen. The use of explosives, electric currents, and poison were detrimental practices for the fish of the river. Despite these destructive practices, the fish could survive and breed to a certain level. But dam construction has caused a reduction in water quantity in the downstream flow and appearance of the reservoir just behind the weir point at Patrind. Low water quantity has created a disturbance in the river flow pattern and more centered flow was observed. Due to this change in the river water flow system, the breeding grounds of the local fish have disturbed altogether. Stagnant water or narrow passages does not suit to breeding behavior of the indigenous fish. The authorities then realized in light of the technical fish study reports to take mitigative measures for restoring the depleted fish population in the river downstream. A survey was carried out by a technical team to identify such points which can meet the requirements of fish creation of fish breeding grounds at appropriate places. The fish needs shallow watersides with gravel, Stoney, and shingle bed having whirling pools.

2. Introduction

The Dam was constructed on River Kunhar under Patrind Hydropower project in 2017. The river water was diverted through a tunnel and released at Allarra allowing a minimum e-flow of 2.25 m³/s. This reduction in water has impacted the aquatic life in the river downstream. The fish population has gradually reduced to a danger line due to the destruction of fish breeding grounds and the reduction of water.

Dam construction can dramatically affect migratory fish habitat. The consequence of river impoundment is the transformation of the lotic environment to lentic habitats. Independently of free passage problems, species which spawn in relatively fast-flowing reaches can be eliminated. From a study of the threatened fish, Hubbs and Pigg (1976) suggested that 55% of the man-induced species depletions had been caused by the loss of free-flowing river habitat resulting from flooding by reservoirs, and a further 19% of the depletion was caused by the construction of dams, acting as barriers to fish migration.

The suppression of flood regime downstream from an impoundment utilizing flow regulation can deprive many fish species of spawning grounds and valuable food supply (Petts, 1988). This can lead to changes in species composition with loss of obligate floodplain spawners.

The project authorities have realized the loss of fish in the river and wanted to take possible remedial actions for restoring the fish population. Two major activities were suggested under the fish study reports:

- a) Provision of possible artificial fish breeding grounds
- b) Restocking of the native fish species

To conduct these activities, a detailed survey of the area was conducted and under that four points were selected as possible fish breeding grounds. These areas:

1.	Boi	34°18'25'' N	73°26'49'' E
2.	Boi Domel	34°18'30'' N	73°28'46'' E
3.	Gotha Bridge	34°19'06'' N	73°26'36'' E
4.	Barbein	34°19'29'' N	73°26'00'' E
These points are shown on the Google map below.			



An estimated cost for the establishment of these breeding grounds and stocking fish seed was submitted to the project authorities. The authorities had approved the cost estimate after its review and requested me to carry out the activities immediately as the river water flow level may rise during the last week of March 2020.

3. Objectives of the job

- a. To reduce the negative impact on the riverine fisheries of the river flow system downstream through mitigation measures
- b. To restore/provide fish breeding grounds for maintaining the population of the native fish of the river.
- c. Provide the opportunities of income generation for the local poor fishermen community who were affected by the loss of fish mass in the Kunhar river system

4. Construction work of Breeding Grounds

The work was started on Saturday, February 29 of 2020. Excavator was engaged to collect and place stone boulders in the river and excavate the sides of the pool in such a manner that it makes a whirling pool of water with shallow water at the sides. Smaller stones were collected and carried by mini trucks to place them in between the boulders to check the easy

water flow from the stones. The side of the gentle water flow kept open for the fish movement up and downstream. As the fish will start its upstream migration during the breeding season, it will find a suitable water pool to take refuge and hopefully, breed here and then move downstream with the off-season. Some fish will stay at point-1, some will go beyond that up to the point-4, and some will go up to the weir point where a natural pool already exists if the flow at that time is not heavy. Shingles and gravels were placed at the sides to make the sides ideal for fish to breed.

The work at Point 3, Gotha could not be started because of the access problem. We could not initiate the work at the Point 3 as there is no road access for an excavator to that point. It was not possible to engage labor because of the continuous rain showers. The labor was engaged on March 20th to start work but the law-enforcing agency stopped the work. Initial work of boulder rolling, stone collection was done but the labor was arrested by the law-enforcing agency, and work had to be stopped. This important point is now scheduled to be completed in September or October if the time allowed. Similarly, the restocking of fish will be done in October when the fish seed of local species is available in nature.

5. Community Concerns

The local community was reacting to the construction work and pretended as this work may cause loss of their adjacent property at Point 1 and 2. Most probably they wanted to get some benefit from this activity. The issue was resolved amicably by dialogue and effective support from the HSE officers of the project through the local organizations. The locals were satisfied as the activity is for their benefit and fish catch may increase the income level of the professional poor fishermen of the local society.

This type of resentment again we faced at point-4, Barbein when the landowner of the link road was not allowing us to take our excavator to the site along with the mini truck. Then again, we talked to the community representative with the HSE staff and he helped us to take down the excavator with a condition of improving the road leading to the site. This took a lot of time and money for working in these sites but anyhow it was managed somehow. The work on three points has been completed on the 8th of March 2020.

6. Benefits of the Development of Fish Breeding ground

The native dominant species of Shizothorax (*Schizothorax plagiostomus*, *S. curvifrons*, *S. dilatata*, *S. kashmeriensis*) have the habit of upstream migration during the breeding season (September-October). During this process, they find a suitable place having a water pool with whirling nature and shallow sides having pebbles, gravel, or shingle bed. They avoid the pure sandy bed or bed having dense growth of algae. The fish takes refuge under the big boulders and come out in the shallow water when it feels safe. Lays the eggs there and the male spreads the sperms on these eggs. The female watches the incubation period, which may extend to several days. The juvenile fish swims around at this place and when they grow to a size of fingerlings, then they swim down for the search of their food.

Unfortunately, the breeding ground was completely destroyed by the construction of the dam and even no suitable point could be traced during the survey process where fish could stay and lay eggs. The migration of the fish was noticed up the weir point where it could complete the process of breeding but again the water current and depth at that point do not suit for breeding. The minimum discharge of 2.2 m³/s make the water flow more centralized, there remains no chance of favorable site to serve as breeding grounds. After a detailed survey and study of the 13 km downstream flow area, only four points were found suitable to be developed for providing the breeding environment for the river fish. Stagnant water was found at many places but that was not fit for the fish to survive or to take refuge or to breed. Finally, four points were selected to be developed for facilitating the fish to breed and all possible measures were taken to make these point hot favorite for the fish to come and breed here. These points are already under the intensive watch list of the project guards, so they can control the illegal poaching, especially during the breeding season of the fish.

The gentle flow of 100m³/s will not damage these points but heavy floods may destroy them so the annual maintenance of these points is highly recommended

Pictures of the work:

POINT 1 CONSTRUCTION WORK BOI



Labors collecting and placing stones at point 1



Final Pool like structure due to the obstruction of stones at point-1 Boi

POINT 2 CONSTRUCTION WORK



Excavator engaged at point 2 to Collect and place the stones

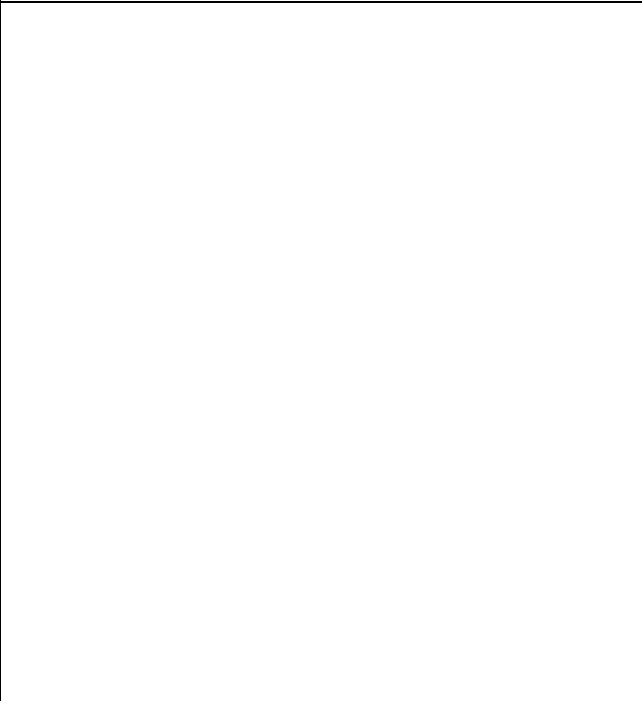


Final Pool like structure due to the obstruction of stones at point-2

POINT 4 CONSTRUCTION WORK



Labors engaged at point 4 to Collect and place the stones



Labors creating a pool at point 4



The truck carrying stones to point 4 and labor is fixing the stones to create a pool for the fish to breed



Excavator moving towards the Point 4 and working in the river to create a pool